



How to change the world, one street at a time;
A sustainability program for local neighbourhoods in Australia

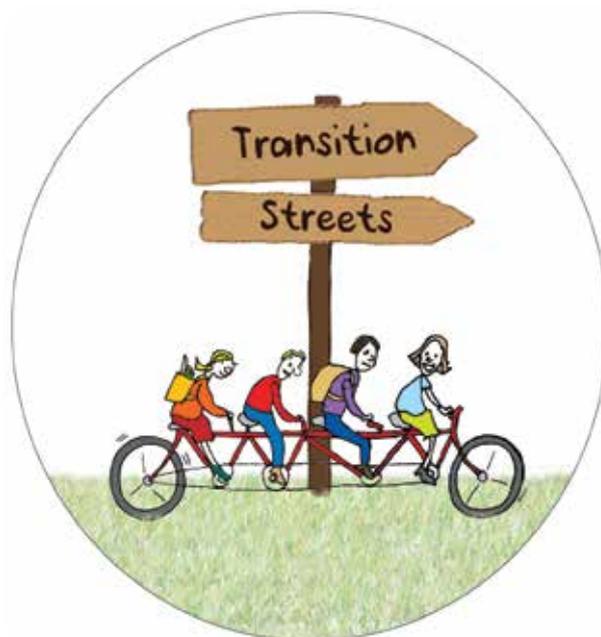
Welcome to Transition Streets!

We are excited by this initiative as we believe there is real strength in people coming together to build communities and develop creative responses to the environmental challenges we face.

Transition Streets aims to encourage co-operation and creativity; it is not a competition. There are no winners or losers and no street will be voted off!

The Transition movement (originally called Transition Towns) began in Totnes, UK in 2006. There are now hundreds of Transition groups around the globe, exploring local strategies for building low carbon, resilient communities able to respond to the challenges of climate change, resource depletion and environmental degradation.

We hope that through Transition Streets you will develop relationships within your immediate neighbourhood that will help you explore and respond to some of the significant environmental challenges before us. Whilst we face an uncertain future, we also have the opportunity to think about the type of community we want to live in and to start creating an alternative vision now.



Welcome to Transition Streets!



Transition Streets

Street Meeting Schedule

Topic	Meeting date & time	Host name & Contact no.	Discussion facilitator
1. Introduction			
2. Water			
3. Energy			
4. Food			
5. Transport			
6. Consumption/ Waste			
7. Where To From Here?			



National edition, March, 2015

Acknowledgements

Transition Streets grew out of the Transition Streets program based in Totnes, England. We acknowledge and thank them for their manual which inspired the development of the Newcastle workbook.

We also thank the team at Transition Newcastle (NSW) who worked tirelessly to develop the workbook and program in Newcastle, on which this national workbook and program is based.

Thanks to the Transition Streets National working group (NSW and Vic) for their work in putting together this version for use throughout Australia.

The Transition Streets Workbook is licenced under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License.



Contents

Chapter 1: Introduction.....	1
Chapter 2: Water.....	13
Chapter 3: Energy.....	33
Chapter 4: Food.....	69
Chapter 5: Transport.....	105
Chapter 6: Waste and consumption.....	131
Chapter 7: Where to from here?.....	161



Contributions

This workbook has been compiled by a large number of volunteers over a few years. The following list acknowledges some of these people.

Workbook Editing: Cathy Stuart **Proof reading / editing:** Lesley Edwards, George Stuart

Workbook Design and Layout: Karen Toikens, Christine Bruderlin, Cathy Stuart

Chapter 1: Introduction

Contributing authors: Graeme Stuart, Emily Grace, Cathy Stuart, William Vorobioff

Editing: Max Wright, Mary Stringer

Chapter 2: Water

Contributing authors: Aaron Hodgson, Cathy Stuart, Karen Toikens, Hunter Water

Editing: Emily Grace, Max Wright

Chapter 3: Energy

Contributing authors: Cathy Stuart, Karen Toikens

Editing: Emily Grace, Max Wright

Chapter 4: Food

Contributing authors: Gillian Harris, Liza Pezzano, Cathy Stuart, Julie French

Editing: Mary Stringer

Chapter 5: Transport

Contributing authors: Cathy Stuart, Ben Ewald, Graeme Stuart

Editing: Allan Evans, Maureen Beckett, John Merory, Tony Proust

Chapter 6: Waste and consumption

Contributing authors: Rebecca Tyndall, Cathy Stuart, Alicia Martin

Editing: Mary Stringer

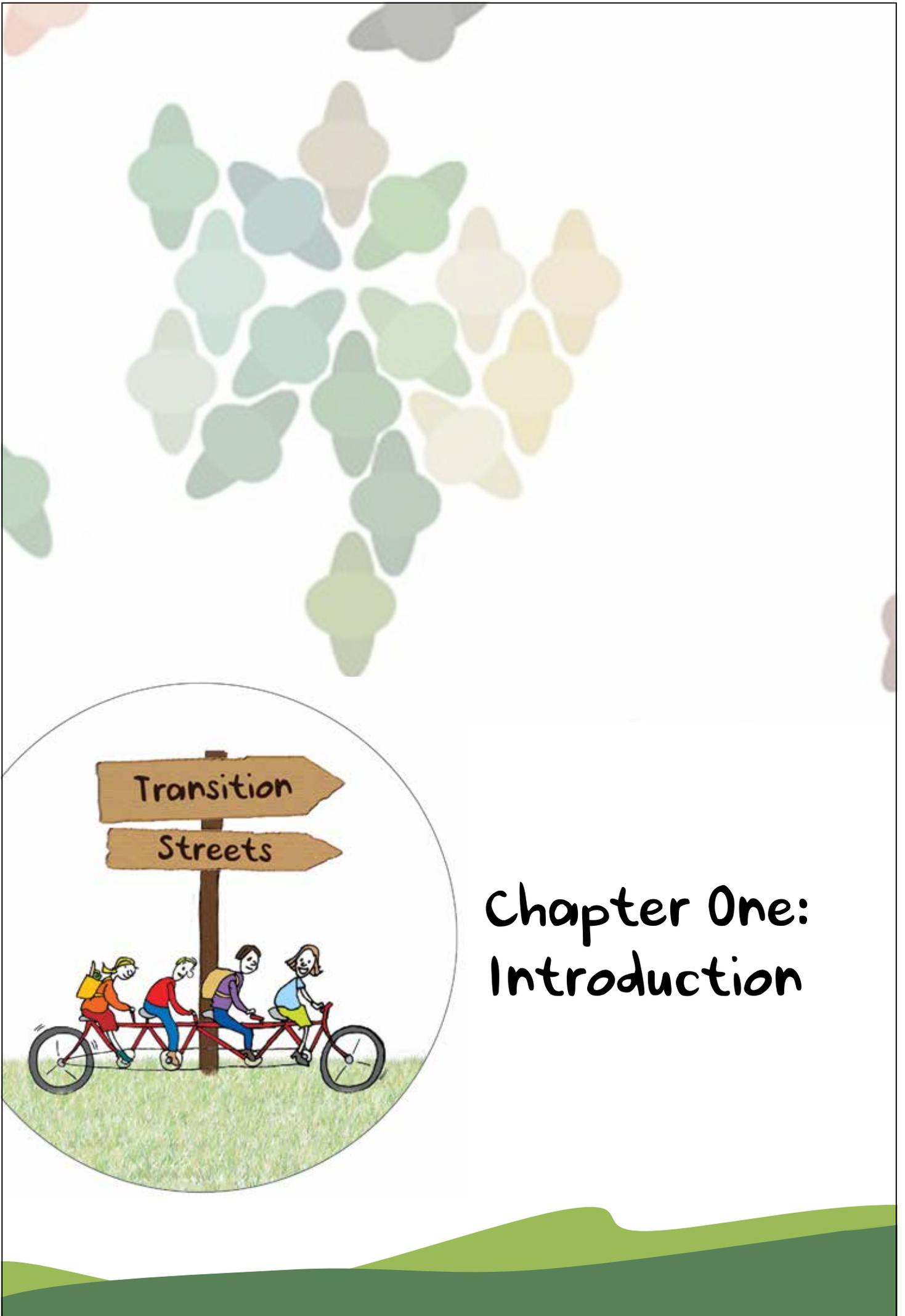
Chapter 7: Where to from here?

Contributing authors: Graeme Stuart, Cathy Stuart

Editing: Max Wright, Mary Stringer

There have been many others who have provided comments and feedback to improve this book, and we thank them all for their input.





Transition
Streets

Chapter One: Introduction

Introduction

Something remarkable happened a few centuries ago. We discovered that fossil fuels – first coal, then oil, and finally natural gas – could be harnessed as an abundant, easily accessible, and cheap source of energy. This discovery led to previously unimaginable advances in transportation, manufacturing, food production, medicine and health care, urban design, and more. In the blink of a geological eye, we radically transformed the way we lived and the world around us. It's like we won the lottery, and like a lot of lottery winners – or other species that discover an abundant resource – we went crazy for a little while.

We've awakened to find that the bills for this energy bonanza have come due. With an explosion in human population, consumption, economic activity, and environmental destruction, we're beginning to learn the true cost of our industrial binge: climate change, water and food scarcity, biodiversity and habitat loss, social and economic injustice, increasing conflicts over diminishing resources, and an utter dependence on economic growth, which simply cannot be sustained.'

Asher Miller, 'The Post Carbon Reader', 2010

We live in a time of incredible change, the fastest rate of change in humanity's history:

- 200 years ago, electricity was unknown, anything but locally accessed food was rare, and personal transport was essentially by foot, horse, or row boat.
- 100 years ago, few houses had internal plumbing, refrigeration or a telephone.
- 50 years ago, computers were huge room filling contraptions, slow to compute calculations that are now done quickly and easily by something that will fit into our pocket. Plastic packaging was virtually unknown.
- 25 years ago, very few houses or cars had air-conditioning and very few people owned a mobile phone.
- 12 years ago, Facebook and Twitter didn't exist, and using the internet to research a primary school project would have seemed a bit extreme.



Now we take most of these things so much for granted, it can be hard to imagine that human life has not always been like this.

Despite this progress, many in developed countries are striving for even further advances in their living standard. At the same time, developing countries are striving to lift huge populations out of poverty. The impact of all these efforts is felt by the world's air, soil and water. We appear to have forgotten that we have only one planet with finite resources that we must share and keep healthy for all people, now and well into the future. We need to find alternative ways of living.

There's a lot to do!

Over the 13,000-year history of human civilisation, CO₂ levels have hovered between 200 and 300 parts per million (ppm). Since the Industrial Revolution, when levels were 280 ppm, our burning of coal, oil and gas and accelerated deforestation have driven this heat trapping gas up and up. The levels have now reached 40 percent higher at 400 ppm.

According to a recent CSIRO report, the Earth's atmospheric CO₂ is likely the highest in at least 2 million years. Scientists associate 400 ppm with the Pliocene era, around 3 to 5 million years ago, when the world was 3°C warmer, the seas 25m higher, and the Greenland ice sheet was impermanent.

Scientists explain that the extra heat in the world's climate is loading the dice for more weather extremes and climate risks.

Our world as we know it is already changing. The Australian Bureau of Meteorology says that rainfall deficiencies are spreading, following a string of prolonged heat waves and record-breaking temperatures. January 2013 was Australia's hottest month on record during the hottest summer, with ocean temperatures around the continent exceptionally warm, too. The record floods and unprecedented bushfire conditions have cost Australian lives and billions of dollars in economic and infrastructure damage. These are a clear window into the future where these risks and realities will be more commonplace.

The idea that we industrialized humans are immune to the natural laws that have restrained growth in other species - and humans in past social regimes - is to me so self-servingly blind as to be morally reprehensible.

Richard Heinberg, *Powerdown*

The world we have created today has problems which cannot be solved by thinking the way we thought when we created them.

Albert Einstein

We can evade reality, but we cannot evade the consequences of evading reality.

Ayn Rand

The 'Do The Math' campaign presented by the international group, 350.org puts it clearly: It states that there are only 3 numbers we need to understand; 2, 565 and 2,795 to understand the challenge we face in dealing with climate change.

2°C

565 GT

2,795 GT

The official position of governments world-wide is that we must keep global temperature increase below 2 degrees celcius. So far, we've raised the earth's temperature by 0.8 degrees, and this has caused far more damage than scientists expected, with many now thinking that 2 degrees is too much. However, 2 degrees remains the official line.

- To have a reasonable (4 out of 5) hope of staying below 2 degrees of warming, 565 gigatons of CO₂ is the total amount that can be added to the atmosphere between now and 2050.
- The problem is that burning the fossil fuel that corporations have in their reserves would result in emitting 2,795 gigatons of CO₂ - 5 times the safe amount. This is the amount contained in the proven reserves of coal, oil and gas in the world. And the fossil fuel industry continues to search for more.

In other words, if we are to stay below the 2 degrees increase in temperature, we need to keep 80 percent of known fossil fuels in the ground. This requires radical new ways of thinking, as this future fossil fuel use is currently firmly entrenched into the world's economy.

The environmental challenges the world faces are undeniably significant. From how we use and care for water resources to how we consume the planet's other finite resources, from how we produce our food to how we move ourselves and our products around, and how we deal with the waste we produce, we must reconsider the long-term sustainability of all these practices. We can't simply just rely on governments and scientists to solve these immense challenges.

By understanding and preparing ourselves for the changes likely in our future, we can embrace alternatives in exciting positive ways. We believe that by understanding our interconnectedness and interdependence with our natural environment, and by building strong communities and real sustainability, we can look forward to a positive future with clean air, water, soil and energy supplies, and ensure a fair distribution of these things for generations to come.



Welcome to Transition Streets!

By joining with others in your street, we hope you find it informative, inspiring, constructive and a bit of fun. We hope you'll discover new ways of doing things together that help make life in your home and street more energy and water efficient, less resource dependent (oil, coal, gas and other resources), more self-reliant with food, less wasteful, healthier, and more enjoyable places to live. At the same time, when considering our comforts and lifestyle more closely, some people may find some of the ideas challenging. Yet we are not alone. We can help each other, and in fact through the program we hope you will also build stronger connections with your neighbours.

The program you have started is based on this workbook of seven chapters. The book will be the basis for group discussions and help you think about what changes you can make personally, as a household and as a street or local neighbourhood.

The action plan tables throughout the book help you to plan what actions you might like to take. An indication of the financial costs of actions listed is given as follows:

Free = NO cost

\$ = LOW cost (less than \$50)

\$\$ = MEDIUM cost (\$50 - \$200)

\$\$\$ = HIGH cost (more than \$200)

There will also be various challenges focusing on each of the main topics.

Transition Streets is an opportunity to see how creative you can get in your own street or neighbourhood to make it more vibrant, more sustainable, safer and friendlier.

Discussion sessions

We suggest that the group meets about once a month for about two hours for the workbook discussions. There may also be other local events or activities that you can get involved in, or initiate yourself based on ideas arising from the discussions. Particular issues, interests, or possibilities may be identified as you meet and reflect, and there will be an opportunities throughout the program to consider these in more detail.

For the workbook discussions, participants may take turns hosting the event at their home if they wish. People can also take turns to facilitate or lead each session, and ideally, the host is not the facilitator too, so that the workload is shared. A page has been provided at the front of this workbook to record meeting times and locations. You can fill this out together at your first meeting.

It is important that the facilitator for the session keeps good time, as it's easy to get off track, and not get through everything. There is a suggested meeting outline provided at the end

of each chapter. We also suggest you have a note-taker for each session to record ideas and decisions, and to jot down any questions for follow up. Someone may also need to take responsibility for collecting anonymous data surveys (see 'Collecting Data' section).

Through the program there are a variety of other activities you might decide to try, and resources you can draw on. These include:

- Films –at the end of each chapter there is a list of films available through libraries or online that you can show in your own street.
- Thought-provoking, fun challenges to participate in, on a household or street level.
- Ideas for events in your street, such as street parties, local produce pizza nights or dinners.
- Books, websites and other resources which are also listed at the end of each chapter to stimulate you to explore issues further.

Collecting data

As part of your participation in Transition Streets, we may ask that you provide us with anonymous data on such things as your water and energy usage and the way you source food, use transport and dispose of waste. We're asking this for a few reasons:

- **Evaluation:** The information will help us determine the value of the program in addressing environmental issues in our community.
- **Expansion:** Being able to show the impact of the program will help us with funding and grant applications and so expand its reach to others.
- **Enhancement:** It will help us discover ways to improve Transition Streets and make it even more effective
- **Encouragement:** We hope that collecting this information will encourage you to look more closely at how you use resources, dispose of waste etc. and perhaps stimulate you to make (or maintain) some personal or household lifestyle changes.

The data will be used by Transition Newcastle and research partners for Transition Streets evaluation only, and will not be made available to any other parties.

We may ask you to fill in a questionnaire at the beginning (Chapter One) and one at the end of the program, together with providing some de-identified information from your energy and water bills. We would be very grateful if you decide to share this information with us, and will ensure that all collected data is anonymous.

Your participation in this data collection is, of course, totally voluntary, and you are very welcome to be part of Transition Streets without providing this data.



Street Contacts

The Street Contacts are the people who have initiated the project in your street. We hope however, that roles such as organising and hosting meetings and events in the street, will be shared among neighbours.

Organising your first session

For your first session together, we encourage you to get to know each other (maybe more than you already do), find out why people have come and what they're hoping to get out of Transition Streets. It would be good to also talk about expectations, set some group agreements, and possibly even some group goals, though these can be added to continuously (and even after) the program. You will also need to agree on when you want to meet together, where and who will coordinate or run each session. You can record these details on the sheet at the front of the workbook.

If you are willing to share data on your energy and water usage with Transition Newcastle (see the Collecting data section), you can take your recent bills with you to the first get-together to record details in the questionnaire while meeting together.

The Ecological Footprint calculator

There is an eco-footprint questionnaire; with the heading 'Is One Planet Enough?' at the end of this chapter.

Our ecological footprint is an estimate of the land area it takes to support our lifestyle. It takes into account all of the resources required to provide the food we eat, clothing, housing and transport, as well as all the other daily items we consume. It gets interesting when we calculate how many Earths we would need if everyone on the planet enjoyed the same standard of living as us.

It is not a very precise measure and some questions may be difficult to answer accurately; just try to give the closest score you think fits with the options given. Despite the inaccuracies, it is likely to give you a fairly good indication of your ecological footprint, and it can be a thought-provoking exercise. Your end score may well surprise you, and might suggest some areas you could look at to reduce your environmental impact. We encourage you to fill it in before or during the first group meeting, discuss it and then revisit it at the end of the program.

Working together as a group

A major part of the Transition Streets program is working as a group with your neighbours, so it's important to ensure your discussions and activities are a positive experience for everyone. The following are some practices (most of them fairly obvious) that could help make the experience work successfully.

Respect is at the heart of a successful Transition Streets group. People will come to the program with different backgrounds, experiences, beliefs, commitments and priorities. This diversity brings richness to our community (and Transition Streets) and we need to respect differences. We can help show respect by:

- Letting everybody have a say and actively listening to them.
- Being reliable, trying to do what we say we'll do, and letting people know if we are unable to do so.
- Being understanding when other people are unable to do what they said they would do.
- Being committed to the process.
- Respecting people's privacy.
- Offering practical and moral support to each other.
- Respecting people's differing levels of involvement.

You may wish to discuss your hopes and expectations of the group and each other at the first session.

Suggested plan for your group discussion

Introduce yourselves – who's in your household, where you live, whether or not you or your household have explored sustainability issues before, why you've decided to participate in Transition Streets and what you hope/expect to get out of it.	(30 mins)
Agree on guidelines for your group (see above in the 'Working together as a group' section)	(10 mins)
Set your group schedule for discussion sessions – how often, where, and who will facilitate the discussion. Fill in the meeting schedule sheet in the front section of the workbook.	(10 mins)
Complete the eco-footprint calculator questionnaire separately and discuss the results in the group. What areas do you want to work on/learn more about?	(30 mins)
Fill in the data questionnaire (if you have received it) to record your initial measurements and information. Any questions, issues? Discuss.	(25 mins)
Exchange contact details, confirm date, time, place and facilitator of next discussion.	(5 mins)



Resources

If you're interested in learning more, the following films, books and websites may assist. Other resources on specific topics will be listed in later relevant chapters.

DVDs:

- *Bag It: Is Your Life Too Plastic* – a very informative and entertaining look at plastic in our lives.
- *Crude Impact* – Explores the interconnection between human impact on the planet, and the discovery and use of oil
- *In Transition 2.0* – an overview of some Transition Initiatives around the world.
- *No Impact Man* – One family's journey to no impact living
- *The Power of Community: How Cuba Survived Peak Oil*
- *Relocalisation: How Peak Oil can Lead to Permaculture*, David Holmgren

Books:

- *The Great Disruption: How the Climate Crisis Will Transform the Global Economy*, Paul Gilding
- *The Long Emergency: Surviving the Emerging Catastrophes of the Twenty-First Century*, James Howard Kunstler
- *The Transition Companion: Making Your Community More Resilient in Uncertain Times*, Rob Hopkins
- *The Transition Handbook: From oil dependency to local resilience*, Rob Hopkins
- *The Post Carbon Reader: Managing the 21st Century Sustainability Crises*
- *This Changes Everything*, Naomi Klein

Websites:

- <http://www.bom.gov.au/climate/>
- www.csiro.au/Outcomes/Climate.aspx - Climate change and adaption - Providing comprehensive, rigorous science to help Australia understand, respond to and plan for a changing climate.
- *Take a street and build a community*: Shani Graham at TEDxPerth - www.youtube.com/watch?v=C1WSkXWSJac
- Transition Network - www.transitionnetwork.org

CHAPTER 1

- *300 Years of Fossil Fuels in 300 seconds* – bit.ly/9U5Vi0 Short (5 minute) video by the Post Carbon Institute
- *The Story of Stuff* - www.storyofstuff.org

References:

- www.csiro.au/Outcomes/Climate/Understanding/State-of-the-Climate-2014
- *The Great Disruption: How the Climate Crisis Will Transform the Global Economy* (Paul Gilding)
- *Oil and Honey: the education of an unlikely activist* Bill McKibben
- *The Post Carbon Reader: Managing the 21st Century Sustainability Crises*
- www.math.350.org;



IS ONE PLANET ENOUGH?

How many Earths would be needed if everyone on the planet enjoyed your standard of living? Find out how much land is needed to support your lifestyle - your ecological footprint



Questionnaire © NewScientist Used with permission"

Questions

Pick the answers that best apply to you

WATER

- Have you had a bath every day this week? If yes, score 14
- If you have a bath just on Sunday night—or twice a week, score 2
- Do you shower every day rather than have a bath? If so, score 4
- Do you think we're too obsessive about personal hygiene? If you take a shower once a week, score 1

Score

And...

- If you use your dishwasher every day or every other day, score 6
- On hot, sunny summer days, do you water the garden or wash the car with a hosepipe? Score 4

Score

FOOD

- When you last went shopping, did you buy only locally produced fresh products—such as bread, vegetables and meat? If yes, score 2
- Alternatively, do you buy more heavily packaged and processed items and not even bother to look at where food comes from? If the answer is yes, score 15
- Or, do you search out food that comes from closer to home? If you are successful at least part of the time, score 5

Score

And...

- What sort of food do you eat? Do you insist on meat with every meal? If so, score 85
- Or do you eat mostly vegetarian dishes? If so, score 30

Score

WHERE YOU LIVE

If you share your home, divide the score by the number of people sharing and round up the answer. If your home is...

- a flat with just enough room to swing a cat, score 7
- a terraced house, score 15
- a large and spacious flat, score 12
- a semi-detached house, score 23
- a detached house, score 33

Score

HEATING & COOLING YOUR HOUSE

If you have no heating or air conditioning, score 0 and skip to the next section.

For everyone else, the energy to heat or cool your home probably comes from burning fossil fuel, which releases carbon dioxide. To soak up this greenhouse gas, a wood will have to be planted, using up precious land. *So, start this section with a score of 45.* On the bright side, you get to subtract some points

- If you prefer to add another layer of clothes before turning up the heating, subtract 5
- If you use natural ventilation rather than the air conditioning, subtract 15
- Do you only turn on the heating or air conditioning when absolutely necessary rather than keeping it on the timer all year round? If so, subtract 10

Score

ELECTRICITY

- If your power comes from only renewable sources, score 2 and skip to the next section. For everyone else, generating your electricity releases carbon dioxide, so start this section with a score of 75
- Do you always switch off the lights if a room is no longer in use? If yes, subtract 10
 - Computers, TVs and hi-fis can now be left on standby. If you shun this setting and switch these devices right off, subtract 10

Score

HOLIDAY (and business)

- Where did you go last year?
- If you flew as far as Europe, score 155
 - If you flew to Asia or the Americas, score 85
 - If you flew within Australia, score 20
 - If, instead, you went by road or rail somewhere in Australia, score 10

Score

DAILY TRAVEL

- Did you drive to college or work today? Is your car a modern, small-engined car? If so, score 40
- Or do you drive a big 4-by-4?

Score 75

- If your car is something between these two, score 50
- Do you take a bus or train, rather than travel by car? If so, score 25
- If you are fortunate enough to cycle to work or college, score 3

Score

PAPER

The last book you read, did you borrow or buy it?

- If you always buy, score 2
- If you always borrow, score 0
- If it's half and half, score 1
- Do you always share your newspapers and magazines? If so, score 5
- If you bin your newspapers when you have finished with them, score 10

Score

WASTE

To dispose of waste, you're once again going to use up valuable land. So, start this section with a score of 100.

- Do you return your bottles for recycling? If you do, subtract 15
- If you separate out waste paper for recycling, subtract 17
- If you keep used cans apart and recycle them, subtract 10
- Do you recycle your plastic containers? If so, subtract 8
- Are you keen on composting the organic waste left over from the kitchen and garden? If so, subtract 5
- If you avoid generating waste by, say, buying less or reusing things then subtract 15

Score

TOTAL SCORE

SCORE
 Many of the amenities you use every day, from roads to shops and buildings, make their own demands on land. People who consume more tend to rely more on these amenities. So, to take account of this, double your score

Each "point" in your score is equal to one-hundredth of a hectare. So, for example, a score of 350 is equal to about 3.5 hectares

FINAL SCORE

Name: _____
 Phone: _____
 Email: _____
 Postcode: _____
 Organisation/School _____

PLANET CHART



200 or under Well done, you are living within or close to the average Earth share. If everyone lived like you, then human and non-human existence could be sustainable and equitable. Around two-thirds of the global population have a footprint lower than 200



200 - 400 Your footprint is below the Australian average. However, this is still around twice the average Earth share. If everyone on the planet lived like you we would need at least one "extra" planet to support consumption. About 15 per cent of the world's population falls into this category



400 - 600 Your footprint is close to the European average. This is about three times greater than the Earth share. If everyone lived like you we would need two additional planets to support us! About 7 per cent of the world's population falls into this category



600 - 800 Your footprint is just below that of the average Australian and still below that of the average North American. If everyone lived like you we would need to find three additional planets! About 3 per cent of the world population falls into this category

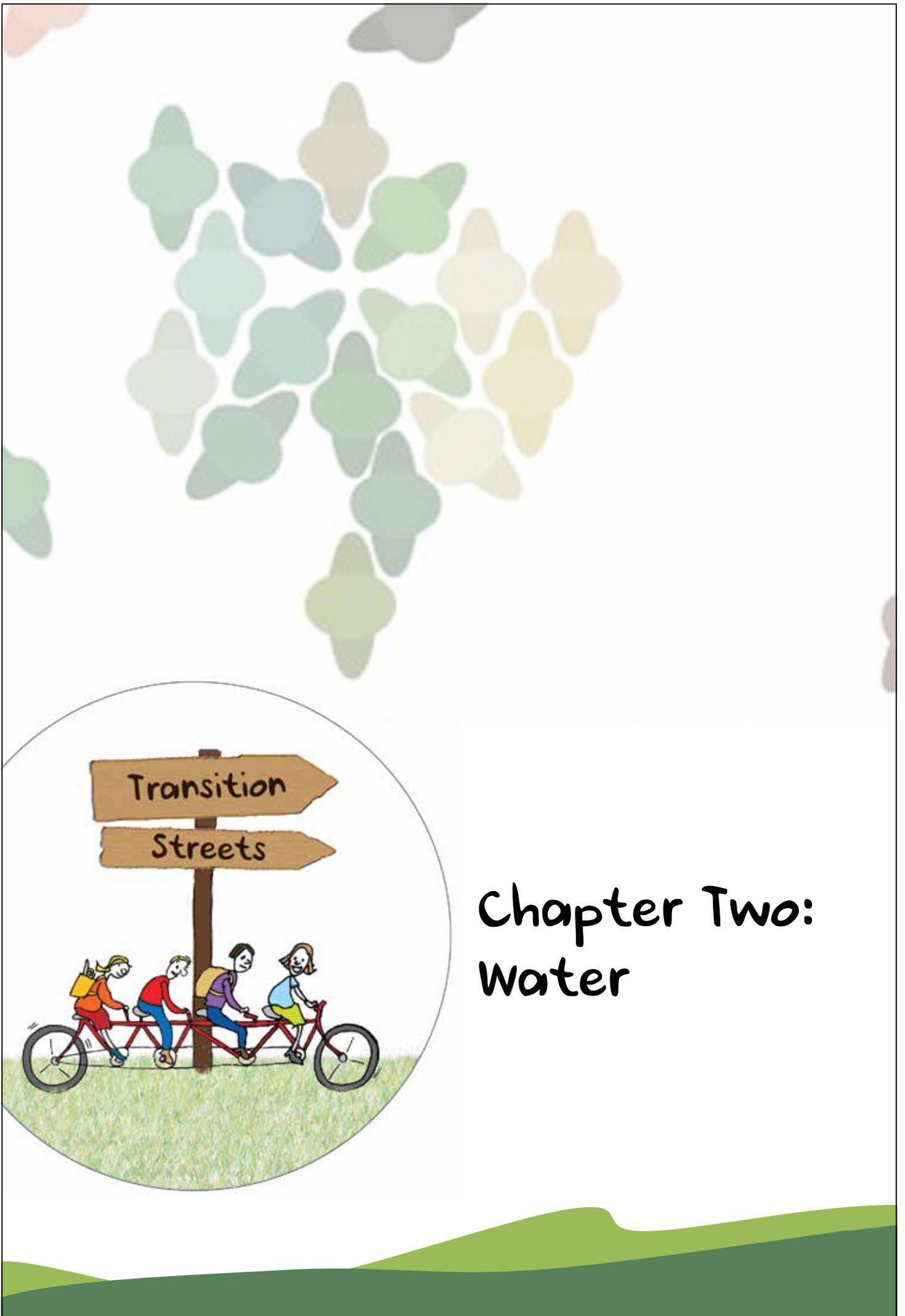


Over 800 Your footprint is now close to that of the average Australian and North American. If everyone consumed the same we would need at least four extra planets to live sustainably. About 5 per cent of the world's population have a footprint this big

Not convinced? This quiz gives only a crude estimate of your personal footprint. For a more detailed online calculator, go to www.ecologicalfootprint.com

Further reading: *Sharing Nature's Interest* by Nicky Chambers, Craig Simmons and Mathis Wackernagel, published by Earthscan





Transition
Streets

Chapter Two: Water

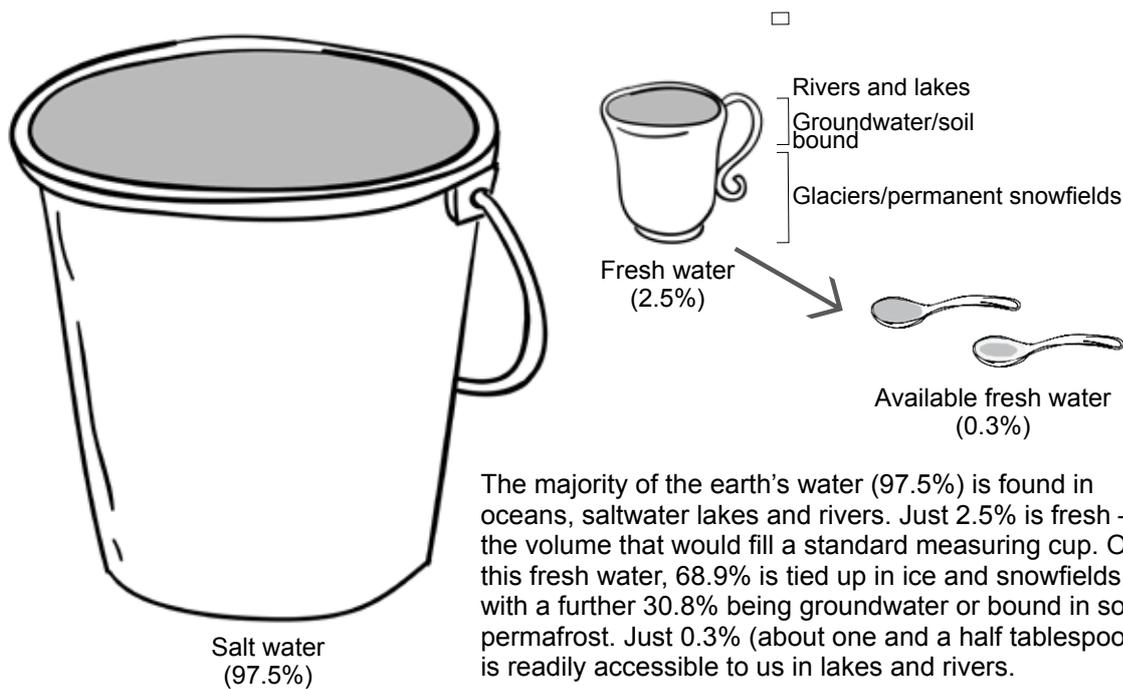
Why save water?

Thousands have lived without love - not one without water.

W. H. Auden

Australia is the driest inhabited continent on Earth yet we have one of the highest per capita water consumption rates in the world. Two-thirds of the world's population use less than 60 L (litres) of water per person per day, while the typical Australian uses almost twice that amount during a single shower!

There is a lot of water in the world, but very little is available for us to use. In fact, only 2.5% of all the water on Earth is fresh, with most of this fresh water locked up in ice caps.



The majority of the earth's water (97.5%) is found in oceans, saltwater lakes and rivers. Just 2.5% is fresh – the volume that would fill a standard measuring cup. Of this fresh water, 68.9% is tied up in ice and snowfields, with a further 30.8% being groundwater or bound in soil/permafrost. Just 0.3% (about one and a half tablespoons) is readily accessible to us in lakes and rivers.

Composition of the world's water

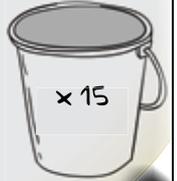
Although water is a renewable resource, we can still run out of fresh water if it's used faster than it's replaced by rainfall, or if we pollute it so it's no longer useable.



Did you know?

In 2011-2012, residents in Melbourne used an average of 149L of water daily.

That's the equivalent of 15 buckets of water per person every day.



It's important to make every drop count. While our governments can build more dams, these structures put enormous pressure on our environment and economy. The construction of dams can destroy wildlife habitat (including the homes of endangered and threatened species) and take away land that could otherwise be used for food production. Desalination plants – which convert seawater into drinking water – use huge amounts of electricity and the costs of infrastructure, maintenance and operation to society are substantial.

Climate change is also likely to effect our water resources. The Intergovernmental Panel on Climate Change (IPCC) 5th Assessment Synthesis Report (2014), states that we are likely to see more droughts and floods with increasing climate change. It also states: 'Climate change is projected to reduce renewable surface water and groundwater resources in most dry subtropical regions, intensifying competition for water among sectors.'

Being more sustainable with how we use our existing precious water resources is therefore crucial for ensuring access to water for everyone well into the future. The good news is we can all start taking water wise actions today, house by house, street by street.

Saving water not only helps protect our environment, it'll save you money. You can cut your water usage costs and, by using less hot water, reduce your energy bill too!

As a nation, we are becoming more water conscious. For example, water restrictions were introduced in Southeast Queensland in 2005 due to dwindling dam supplies. Prior to these restrictions, average daily use per person was 230 litres. During the drought years, this decreased to 140 litres per day, and by early 2013, when water restrictions were removed, the daily usage per person was 180 litres.

Even though restrictions were no longer in place, people continued to use some of the water saving techniques they'd used during the drought.



How much do you use?

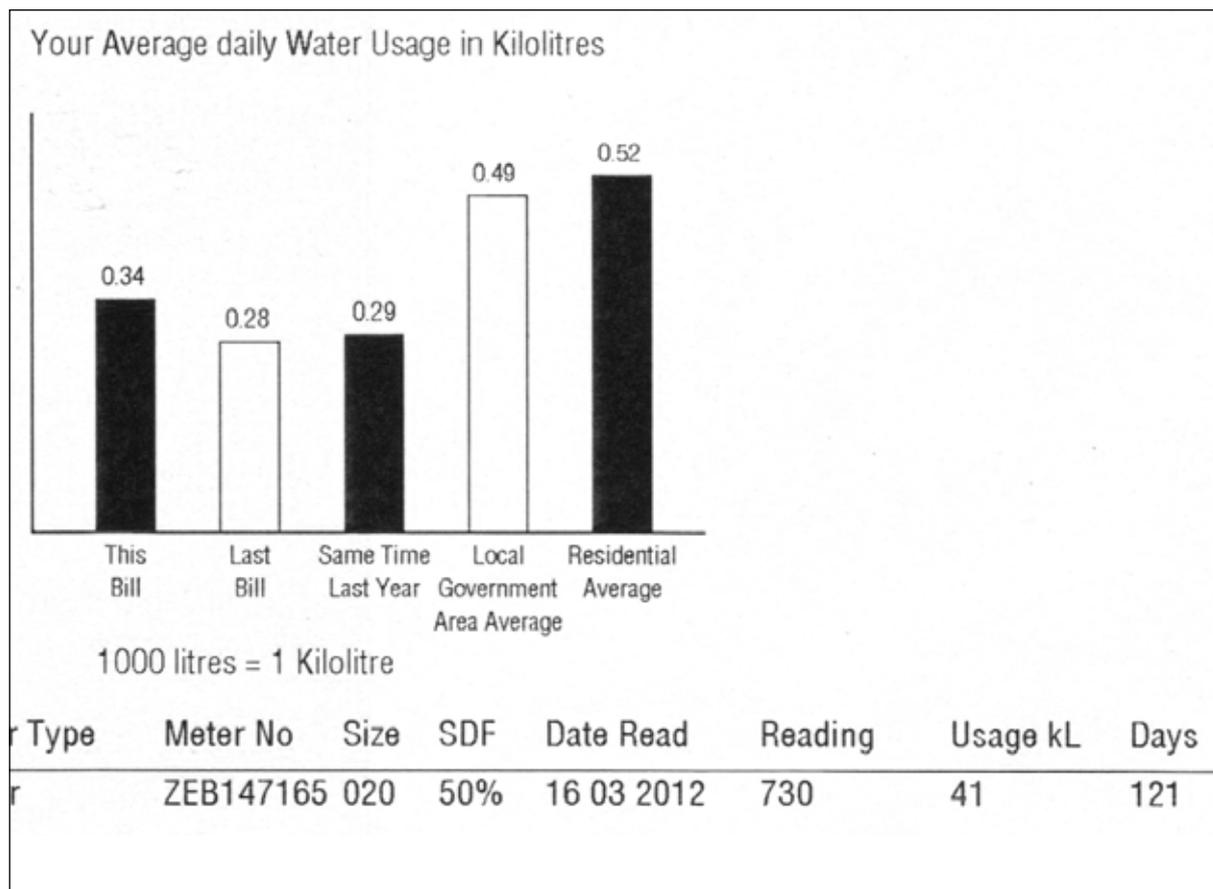
You can work out your daily consumption by checking your water bills.

Most bills have a bar graph showing your average daily usage, and some give comparisons with the local residential average. As water usage can vary significantly between seasons, it is useful to have a year of usage information.

Don't forget, water usage is provided on your bill in kilolitres, not litres. One kilolitre equals 1,000 L.

Use your recent water bills to fill in the table opposite.

Example of graph and meter information on water bills:



Worked example:

Multiply column B
by 1,000

	A	B	C
	Usage period	Average daily usage (kL)	Average daily usage (litres)
Bill 1	8 Mar - 6 Jun	0.33	330 = (0.33 x 1000)
Bill 2	6 Jun - 9 Sept	0.28	280
Bill 3	9 Sept - 16 Dec	0.34	340
Bill 4	9 Dec - 16 Mar	0.37	370
Average daily usage (for year)		$\frac{0.33 + 0.28 + 0.34 + 0.37}{4}$	330

Add all 4 bills
and divide by 4

My water usage for the past year



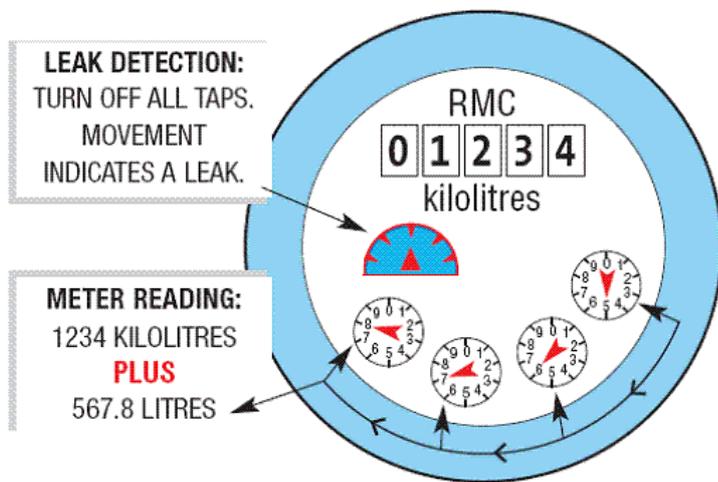
	Usage period	Average daily usage (kL)	Average daily usage (litres)
Bill 1			
Bill 2			
Bill 3			
Bill 4			
Average daily usage (for year)			

Keep track of your progress

Now that you know your average daily usage, you can measure your reductions in water usage from here on. This can be done by reading your water meter regularly as you undertake water saving actions.

Your water meter is generally found in your front yard, near your front boundary. If you have trouble finding it, phone your local water authority and they should be able to provide information as to its general location.

There may be different styles of water meter in your area. The two common types are shown below.



The meter on the left, shows water usage in kilolitres at the top of the meter.

The five-digit number reads **01234** (i.e. 1,234 kilolitres, or 1,234,000 litres).

The small clock meters count the litres in tenths, single litres, tens and hundreds of litres.

The meter on the right shows the total kilolitres used, on the five-digit black on white number **00044** (i.e. 44 kL, or 44,000 L).

The three-digit white on red numbers indicate the number of litres that have been used beyond the 44 kL (i.e. 714 L).



Monitor your daily usage

Use your meter to fill out the table below. You will need to take a reading once at the beginning and again at the end of the month. You can continue to take readings over the coming months and enter additional data to keep track of your progress.

In the example below, 20,350 L (i.e. 390,350 minus 370,000) has been used over 30 days (i.e. 31 May – 1 May). The average daily usage can be calculated by dividing the total litres by the number of days (i.e. 20,350 L ÷ 30 days = 678 L per day).

Worked example:

Date of reading	No. of days	Litres on meter	Total usage (litres)	Average daily usage (litres)
1 May	-	370,000	-	-
31 May	30	390,350	20,350	678

You may want to track your usage more closely than monthly. If you want to record your meter reading weekly, try to check it on the same day and time each week.

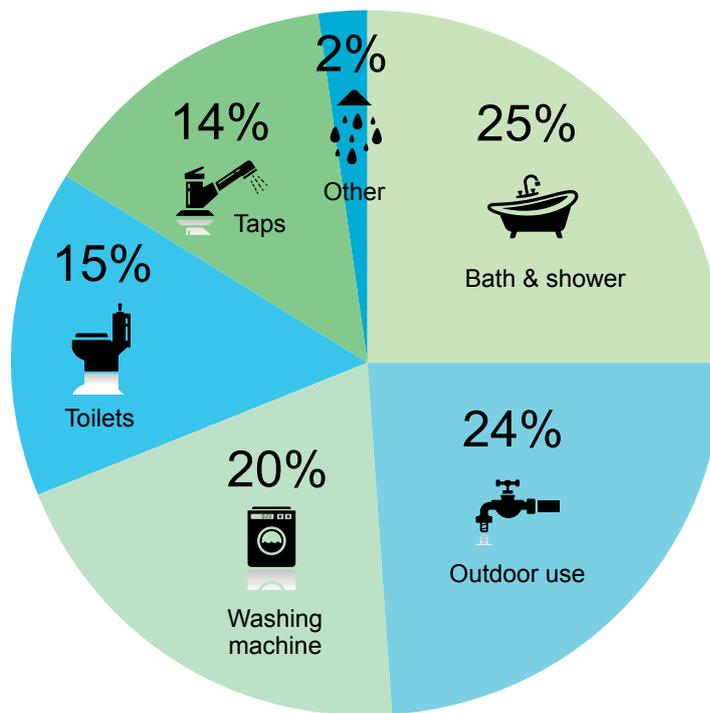
My water usage from now on 

Date of reading	No. of days	Litres on meter	Total usage (litres)	Average daily usage (litres)

Saving water in and around the home

Now that you know how much water you're using, it's important to understand where it's being used and how to take small steps (or larger ones) to make big reductions.

The chart below gives a typical breakdown of where water is used in the home.



There are different ways of addressing the water issues around your home. Essentially, you can:

- use what you have more efficiently (don't waste it, ensure you have water efficient fittings/appliances)
- use it more than once where appropriate (by redirecting it after use, collecting and reusing it, or collecting, treating and reusing it)
- collect your own rainwater (e.g., install a tank, redirect rainwater directly to where it's needed).

For some households it may be appropriate to use a combination of 2 or all 3 of these.

The following pages discuss ways of looking (or relooking) at water use, and changing behaviours and/or water systems in our homes.



1. Fix leaks

A lot of water is lost around the home due to dripping taps and leaking pipes.

To detect a leak on your property, you need to not use any water in the home for at least three hours (a good time to do this is when everyone is going out). Ensure all your taps are turned off. Write down your meter reading when you leave and as soon as you return home. If no water has been used the reading should be the same. If the meter has moved, you have a leak that should be found and fixed.

Leaks can usually be fixed by changing washers on dripping taps or repairing leaking toilet cisterns. To check your toilet, put a few drops of coloured food dye in the cistern. If it is leaking, coloured water will appear in the bowl between flushings. If you still have leaks after fixing your taps and toilets, there may be a leak elsewhere on your property possibly requiring the assistance of a plumber.



My action plan to fix leaks

	Will do	Have Done	N/A
FREE Check for leaks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE - \$ Change washers (if required)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
\$\$-\$\$\$ Fix any remaining leaks (if required)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. In the bathroom

Around half of household water usage usually occurs in the bathroom, the majority of which is used for showering.

Shower and bath

Old style shower heads use up to 25L per minute, whereas a 3-star one uses 9L per minute or less. Some showers can be purchased that use as low as 5.5L per minute.

On average Australians spend 7 minutes in the shower. It's quite reasonable to have a good shower in less than 4 minutes – remember shorter showers can also save on energy bills associated with heating water. Do you know how long your showers are? Try using a shower timer to help.

Could you replace some showers with washes instead? Using a basin of water to wash obviously reduces the amount of water used considerably, and sometimes may be all that's needed.

By choosing to have a shower over a bath, you will generally reduce your water use significantly. Baths typically use between 80L and 200L of water, whereas a 4-minute shower from a 3-star shower head will use no more than 36L. For children bathing, try to keep baths only as deep as they need to be.

Using a bucket to collect cold water in the shower while you wait for hot water to come through is a good way of collecting water for re-use. A hot water circulator can also be used. They are, however, around \$600 to purchase, giving a 10–15kL saving per year (i.e. \$20–\$30 per year).

Toilet

A 4-star toilet can save the average home up to 35,000L per year. These toilets use just 4.5L for a full flush and 3L for a half flush, while an old-style single-flush toilet typically uses 11L of water in every flush.

Replacing inefficient old toilets can be expensive; however, you can purchase small gadgets to reduce the volume used with each flush of an old-style toilet, which work by causing the toilet to flush for as long as the button is pressed.

Alternatively, you can use small plastic bottles filled with water. With lids tightly screwed on, place bottles inside the cistern ensuring they do not cover water-flow holes or come into contact with moving parts. This will reduce the volume in the cistern where water can fill. Often in old large toilets the amount of water used to flush was far too much. Only try this if you have confidence, as a little experimenting may be required. Reduced cistern capacity should not affect adequate flushing.



Basin taps

Make sure you don't leave the tap running while brushing your teeth, and consider shaving your face/legs before showering. Install a tap aerator and reduce flow rates from typical 12L per minute to 5L.

Insulating pipes

By insulating your hot-water pipes, you can avoid wasting so much water while you wait for hot water to flow through.



My bathroom action plan		Will do	Have Done	N/A
FREE	Measure shower rate (litres/minute)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE - \$	Replace showerhead/s	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE - \$	Time your showers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE	Take shorter showers/shower less often	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE	Shower rather than bath	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE	Collect cold shower water	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE - \$	Reduce toilet cistern capacity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
\$\$-\$\$\$	Replace toilet with water-efficient one	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE	Turn tap off when brushing teeth	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE	Use basin when shaving	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
\$	Install tap aerator	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
\$\$	Insulate hot-water pipes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other ideas: _____				

3. In the laundry

Between 14–20 % of all water consumed in the home occurs in the laundry. With the average family doing 274 loads of washing a year, using around 50L of water per wash, there are many opportunities to reduce wastage and make savings.

Washing machines vary significantly in how much water they use per wash: when adjusting for capacity, some use as much as 20L per kilogram while others as little as 6L. So when buying a washing machine, make sure it has at least a 4-star rating (WELS Label). Generally, front-loading washing machines are the most water and energy efficient. Buy the smallest washing machine you think you will need, e.g. an 8 kg machine is generally too large for a couple. There is now little price difference for washing machines up to 4.5-star rated and less efficient models.

Try to familiarise yourself with your washing machine cycle options. Some settings provide the same cleaning power but with less water and energy. Check your user manual or contact the manufacturer.

You can often adjust the water level to suit the size of the washing load – some new water-efficient models will do this automatically. Washing a full load in one cycle can save at least 10L of water than washing the same clothes in two half-loads.

Consider how often you really need to wash your clothes or towels. Often many items can be used more than once before being thrown in the washing basket, as we often wash things that don't need it out of habit – if it doesn't look or smell dirty, it may last another day! This will also obviously save you unnecessary work.



My laundry action plan

	Will do	Have Done	N/A
\$\$\$ Buy water-efficient washing machine	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE Become familiar with efficient cycle options	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE Wash only full loads	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE Reduce number of washes per week	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other ideas: _____



4. In the kitchen

The kitchen is also a large consumer of water for cooking, cleaning, washing and drinking and again the most effective and cheapest way of reducing usage is through small habit changes.

When washing dishes by hand, try not to rinse them under a running tap.

Catch running water in containers (such as 3L juice or milk bottles) whilst waiting for it to warm up. You can then use it to wash fruit and vegetables, rinse dishes or water plants.

Place food in refrigerator to defrost overnight, rather than defrosting under a running tap. Also try not to wash vegetables under a running tap, but rather, use a container.

Flow-controlled aerators for taps are also a good option in the kitchen (go for 8 L per minute), as they reduce the volume of water used.

Garbage-disposal units use about 6 L of water per day. Put suitable food scraps into compost or worm farm to reduce use of this.

Dishwasher

A common misconception is that dishwashers use more water than hand washing. In fact, these machines can be water savers if used wisely (though they usually use more energy depending on how your water is heated). In the 1970s dishwashers used as much as 50 L per cycle, but modern models can use as little as 10 L.

Most modern dishwashers do not require you to rinse dishes prior to placing them into the machine racks. You simply need to scrape off excess food.

Only use the dishwasher when you have a full load. If you find yourself running out of utensils before the dishwasher is full, it may be worth investing in a few extra forks and plates. Secondhand shops generally have these quite cheaply.

If you are considering buying or replacing a dishwasher, look for the WELS (Water Efficiency Labelling Scheme) label. The best water rating achieved by a dishwasher is 6 stars.

Freshwater Fish Tanks

When cleaning fish tanks, you can use the dirty nitrogen and phosphorous rich water on your plants – they'll love it!



My kitchen action plan		Will do	Have Done	N/A
FREE	Don't rinse dishes under running tap	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE	Catch water while waiting for hot water	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
\$-\$\$	Install tap aerators	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE	Use dishwasher only when full	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
\$\$\$	Buy water-efficient dishwasher	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other ideas: _____				

5. Outdoors

As the driest populated continent on earth, we can't afford ornamental gardens that require excessive amounts of water. Many Australian gardens contain plants that are inappropriate for our environment and we tend to water far more than necessary because we don't know what our plants really need. Outdoor water use accounts for around 24% of total household water use, but in summer this can rise to over 50%. There are lots of easy and effective ways to reduce the use of water on our gardens – you may already be doing lots of these things.

Search for water-efficient, beautiful and hardy plants for your garden. Australian natives and plants indigenous to your local area are drought tolerant and attract native birds and animals. The organisation Trees in Newcastle sell local native trees and offer selection advice. Newcastle Council has free trees for ratepayers available at Blackbutt Nature Reserve.

You can avoid or reduce the need to water lawns by choosing drought-tolerant varieties (e.g. buffalo) and not mowing the grass too short. A longer grass length promotes deep roots and shades the ground, reducing evaporative losses. And it's okay to let your lawn go brown – it will recover immediately after rainfall.

Give your plant's roots a good soaking once or twice a week in dry weather. Deep watering occasionally is better than frequent shallow watering.

Mulching will not only keep away water-loving weeds, but will also keep the soil cool and decrease evaporation by up to 75%. Adding compost into soil increases the organic content, increasing moisture and nutrient-holding capacity.



Rather than washing your car with a running hose, try using a bucket and sponge instead. Or consider using a commercial car wash that recycles its wash water.

Use a broom, brush or rake to sweep and clean outdoor paths and paving instead of hosing them down with water.

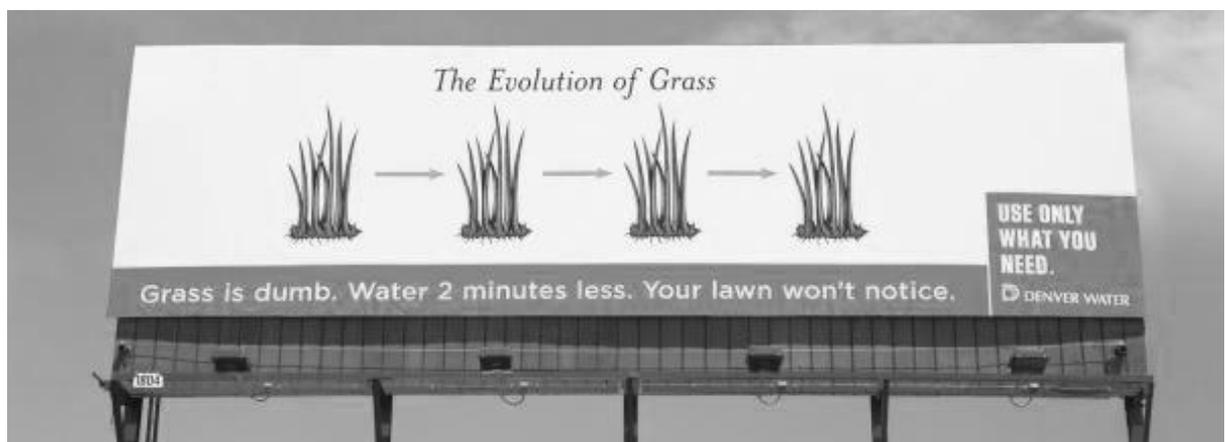
Sprinklers can use as much as 1,000 L of water per hour! If you must, use them early morning or late evening, as this will minimise evaporation losses. Preferably, use a quick shut-off trigger nozzle on outside hoses.

My outdoors action plan

	Will do	Have Done	N/A
\$-\$\$\$ Change plants to drought-tolerant ones	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE Change garden-watering methods	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE Change car-/path-washing methods	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE-\$\$ Mulch all garden beds	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE-\$ Use quick shut-off trigger nozzle	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other ideas: _____

Billboard promoting water saving in Denver, USA



6. Pools and spas

Evaporation is a major cause of water loss from your swimming pool. Remember that this evaporation rate is highest in the early morning as the air cools and the water remains warm. Pool covers decrease evaporation whilst preventing debris from falling on the pool surface.

Sand filters require backwashing which can use up to 8,000 L of water every year. You may be able to replace a sand filter with a cartridge filter as they don't require backwashing to be cleaned, so use a lot less water.

Rainwater diverters attach to a downpipe and can be used when needed, to divert rainwater into your swimming pool. You'll need to monitor the water level in your pool so that it doesn't overflow. Consult a plumber about rainwater diversion options.

My pool/spa action plan

	Will do	Have Done	N/A
\$\$ Use a pool cover	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
\$\$ Replace sand filter	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
\$ Install a rainwater diverter	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

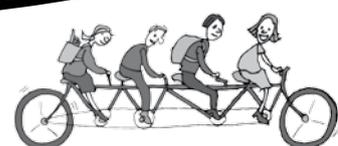
Other ideas: _____

7. Greywater re-use

Greywater is typically from bathrooms (excluding toilets) and laundries. Water from kitchen sinks and dishwashers is technically greywater; however, the high concentration of food waste, grease, oil, fat and chemicals mean that it's not really suitable for reuse.

Safe use of greywater requires some ongoing cost, maintenance and commitment from your family to change what goes down the drain as some household chemicals can harm soil and damage greywater-treatment systems.

A simple greywater diverter can cost under \$100 while complete treatment systems can cost thousands of dollars. This is why it's important to carefully research if you're considering greywater as a water-saving option. It's recommended that untreated greywater be stored for no longer than 24 hours and irrigated using subsoil irrigation. It's also important to check current council regulations. Remember: greywater should not be used on plants intended for consumption, unless previously treated.





My greywater re-use action plan

	Will do	Have Done	N/A
\$-\$\$ Install a greywater-diversion system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other ideas: _____

8. Rainwater collection

Water tanks have become very popular in many suburban households and can potentially save the purchasing of huge amounts of water.

When considering water tanks think about how many appliances you would like to connect your tanks to; for example, garden hoses, toilet, laundry or more. Water savings are typically 40,000–70,000 L per annum with an internal connection. How big does the tank need to be? How big is the water-catchment roof area, and what is your local area’s average annual rainfall?

Overhanging trees can affect water quality so cleaning gutters and filters is essential to maintaining good water quality. Sediment in the bottom of tanks may also need cleaning every couple of years. Other contaminants like industrial air pollution, lead paint or lead flashings as well as bird droppings may all need to be considered depending on the purpose of your water tank.

Rainwater not only saves you from buying many thousands of litres of water but can save your gardens during droughts and times of water restrictions as well as helping to reduce the need to build more water-storage dams and desalination plants.



My rainwater collection action plan

	Will do	Have Done	N/A
FREE Research tank installation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
\$\$\$ Install a rainwater tank	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other ideas: _____

Challenges

These challenges are designed to be a fun way of exploring issues, making us aware of how reliant we are on the resources we have, and encouraging longer term behavioural change.

Below is a list of water challenges, but we also welcome your ideas. We hope you will do at least one of the challenges, but feel free to have a go at more! If you have other ideas, we'd love you to share them with others in the Transition Streets Challenge.

We encourage you to share your experiences of the challenges, through social media, such e.g. Transition Streets Challenge Facebook page, or simply chatting with family and friends.

- 1. For one day** – Turn off your water at the meter and, using buckets, collect your entire household's water for the day from a neighbour. Return the favour to them on another day. How did you go? How many buckets did you have to collect? How many times did you subconsciously turn on a tap?
- 2. For one day** – Fill one bucket of water for each person in your household. Then turn off your water at the meter. Can you get through the day with this amount of water to use for drinking, cooking and washing? You could use the dirty water for toilet flushing. How did it go? Were you OK with having a wash instead of a shower?
- 3. For one day** – See if you can stop water going down sinks or basins (apart from the toilet) for the day. Can all water used for washing, including clothes, vegies, hands and bodies be collected and used on the garden, or for toilet flushing.
- 4. For one week** – Knowing your average daily household water use, see how little water you can use over one week. Take a meter reading at the beginning of the week, and see if all household members can make an extra special effort to reduce water consumption for the week. Consider such things as:
 - If your shower is over the bath, put the plug in, and wash your clothes after showering – great activity for the kids, stomping around on the clothes in the bath.
 - Collect shower/bath water in buckets to use for toilet flushing or on the garden.
 - Use a basin of water for repeated hand washing after toileting.
 - Consider replacing some showers with washes from a basin.
 - Clean your teeth using one cup of water only (like when camping).

Take your meter reading at the end of the week and calculate your average daily consumption. How low could you go? What strategies did you use? Are there any strategies that you feel you could continue long term?





1. Get them to time their showers, and yours!
2. Teach them to read the water meter (or have them teach you!)
3. Ask them to design a spreadsheet to keep track of monthly water usage.
4. Ask them to choose (or design) at least one challenge that they'd like to do as a household.
5. Set up a household reward if water usage is decreased for the month by an agreed amount, e.g. 20% or 30%. Rewards could include such things as a games or barbecue night where kids invite a friend each for the evening.

Suggested plan for your water group discussion

Catch up – How has everyone's week been?	(15 mins)
Review chapter content <ul style="list-style-type: none"> • What was the main thing you gained from the chapter? • Did anything surprise you? • How did you go with the measurements and reading bills? • What might contribute to differences between households? 	(30 mins)
Discuss your action plans <ul style="list-style-type: none"> • What do you want to achieve this month? • What assistance (if any) would you like from others in the street? 	(30 mins)
Explore ideas for action that you could do as a group? <ul style="list-style-type: none"> • What could you do together that you couldn't do alone? 	(20 mins)
Decide on which challenges you want to try this month.	(10 mins)
Confirm details for the next time you get together.	(5 mins)

Further resources

The following films and website explore further issues of water, looking at the increasing privatisation of water resources throughout the world, and the issues surrounding the use of bottled water (an issue that will be covered in the 'Consumption and Waste' month).

Films

- *A Drop of Life: Who controls water controls life*
- *Blue Water: World Water Wars*, <http://www.bluegold-worldwaterwars.com/>
- *Flow: For Love of Water*, <http://www.flowthefilm.com/trailer> – Irena Salinas' film about the global crisis we face as Earth's fresh-water supply constantly diminishes.
- *Tapped*, <http://www.tappedthemovie.com/> – examines the role of the bottled water industry and its effects on our health, climate change, pollution, and our reliance on oil. Produced by Atlas Films.

Websites

- Guidance on the use of rainwater tanks (enHealth) – <http://bit.ly/IV87sr> – is an excellent source of information on rain-water tanks that will answer most of your questions.
- Urban Greywater Design and Installation Handbook - http://www.nwc.gov.au/_data/assets/pdf_file/0017/10754/GREYWATER_handbook_nwc_logo.pdf

Reference info

www.hunterwater.com.au

www.savewater.com.au

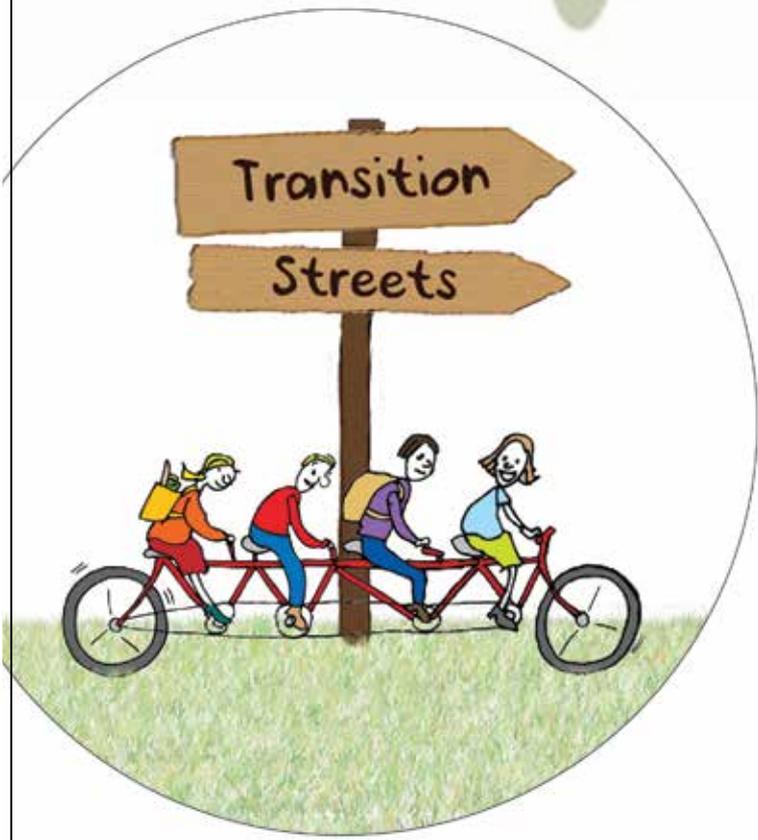
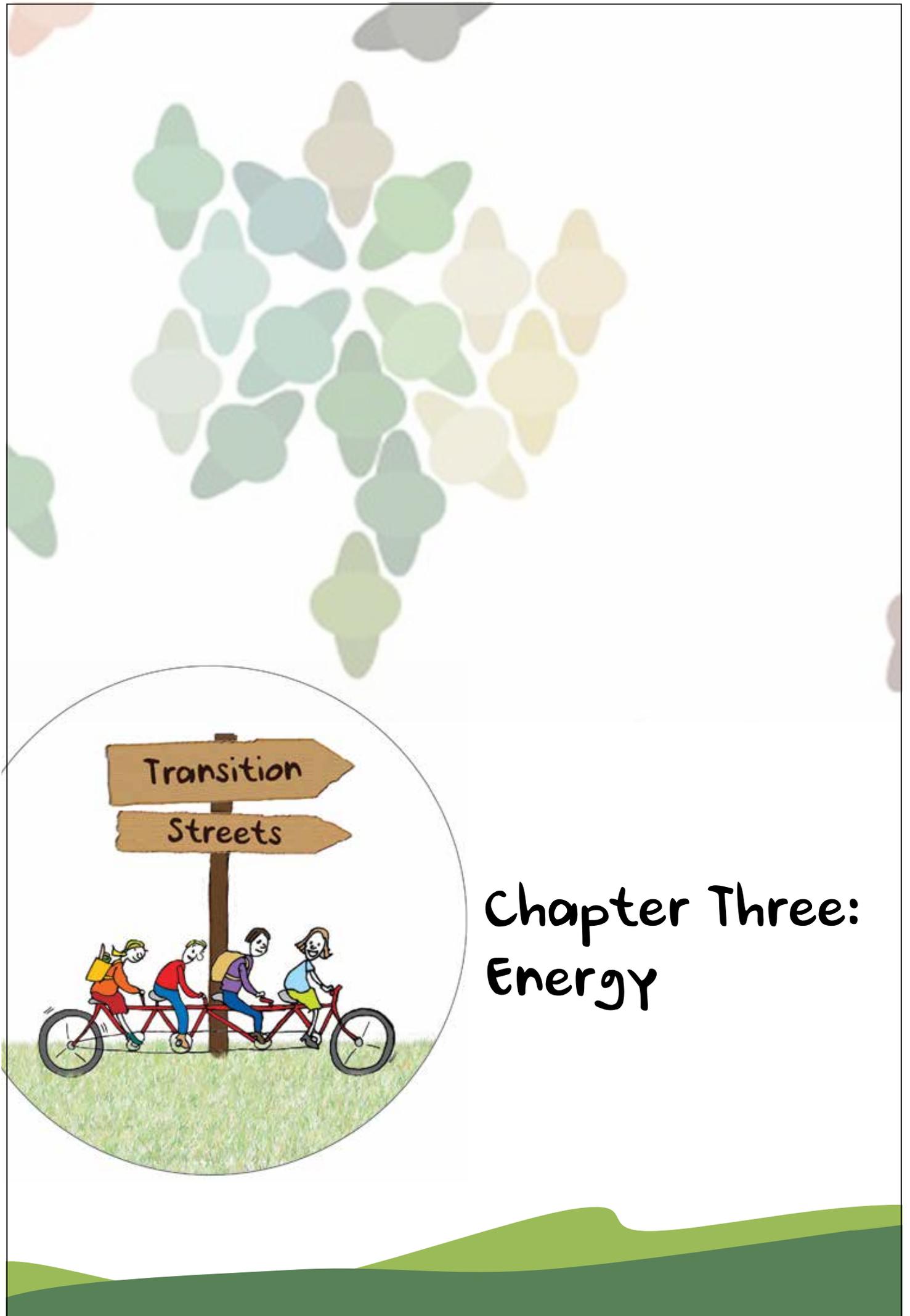
www.reec.nsw.edu.au

www.waterforlife.nsw.gov.au

<http://www.melbournewater.com.au/waterdata/wateruse/Pages/default.aspx>

Transition together UK Action Plan





Chapter Three: Energy

Why save energy?

Id put my money on the sun and solar energy. What a source of power! I hope we don't have to wait until oil and coal run out before we tackle that.'

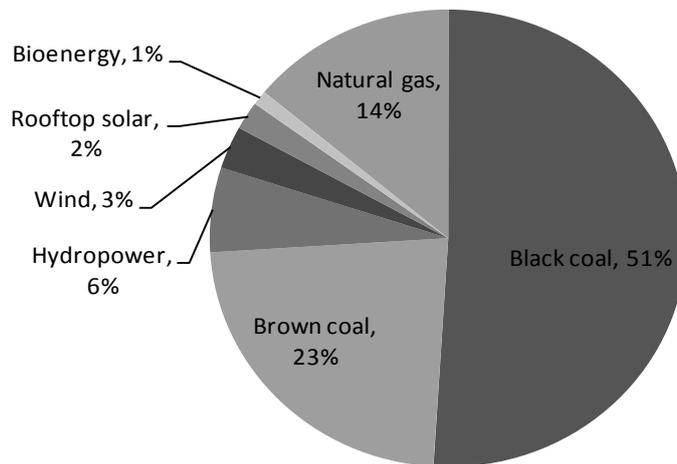
Thomas Edison, 1931

The world's hunger for energy continues to grow. There is an increasing world population with rising living standards and increasing energy demands in developing countries, and huge levels of consumption in developed countries. The pace of fossil fuel generated energy consumption and resulting environmental damage is a global problem.

In this chapter we look at use of electricity, gas and renewable energy.

How is our electricity generated in Australia? The graph below shows that we are still heavily reliant on fossil fuels, with 88% of our electricity produced from coal or gas in 2012; only 12% from renewable sources, half of which is hydropower.

Electricity Generation in Australia - 2012



From data analysis from Origin Energy 2012



Australia's reliance on coal for electricity generation means we have particularly high GHG emissions for the electricity generated. In 2011, Australia ranked the highest in the OECD and 8th highest in the world, for carbon polluting electricity sectors.

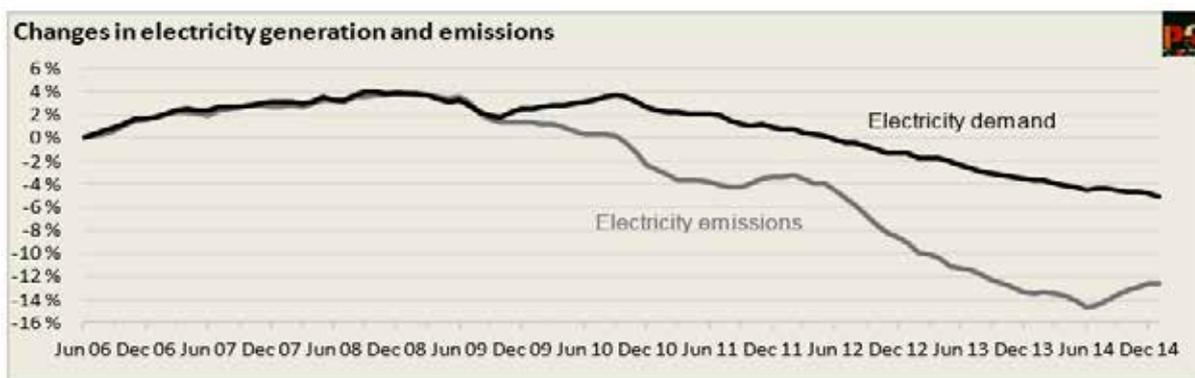
Because Australia is rich in fossil fuels, particularly coal and gas, many believe we need to exploit these riches to maintain our current economic prosperity.

Yet the science tells us that we must transition away from fossil fuels to decrease our CO2 emissions, and that the earlier we do this, the more effective and cheaper it will be in the long term. Many countries have accepted this and are indeed increasing their renewable energy infrastructure and production within their economies. The renewable energy industry across the world is now achieving energy prices for consumers that are on par with fossil fuel electricity, and the cost of renewable energy production is continuing to come down.

The world is also increasingly recognising the need to factor carbon emissions into the economy. Many countries and states have or are planning to introduce carbon pricing – Australia is now (in 2014) the only jurisdiction to have removed a price on carbon.

Australia has great wealth, leading edge research, knowledge and expertise in renewable technologies, and abundant sun and wind resources. Unfortunately, government policies are currently (Oct. 2014) removing support from this industry, with abolition of the price of carbon, and attempts to either abolish or cut the Clean Energy Finance Corporation, the Australian Renewable Energy Agency, the Climate Change Authority and the Renewable Energy Target (RET). With the removal of support to this industry, investment moves out of Australia, and our ability to transition away from fossil fuels is diminished.

Between 1900 and 2010, the amount of electricity used in Australia increased each year (even through two world wars and the Great Depression). Since 2010, however, consumption from the electricity grid has actually decreased each year as shown in the graph below. Whether this trend will continue is uncertain. This graph also shows that since removal of the carbon price in July 2014, emissions from this electricity generation has increased.



CEDEX (Carbon Emissions Index) Electricity Update, February 2015

Roof top solar and other small scale electricity generation accounts for some of the decrease in demand on the electricity grid, but one reason for actual reduced consumption has been increasing awareness of higher electricity prices by householders. Interestingly, 2010 was the year when there was a growing political and media focus on the rapid increases in electricity prices, mainly because of higher network costs. This was also when price rises due to the carbon price became a major political issue. Analysis has shown that many residential electricity consumers have managed to adjust to higher electricity prices by reducing their consumption (Saddler, 2014).

In 2012, the average Australian household spent \$39 a week on household energy (ABS, 2012). With electricity prices having more than doubled in Australia between 2007 and 2014, and natural gas and LPG prices also increasing, saving money on energy bills continues to be a priority for many households.

By combining the strategies of decreasing our energy use through our behaviour, converting to renewable energy sources where possible (including buying GreenPower) and supporting low energy technology in such things as appliances in our homes and workplaces, we can contribute to Australia's continuing decreasing electricity demand.

Is Gas better than Electricity?

Many of us in Australia use natural gas for heating, cooking and/or water heating. There is some debate as to whether it is better to run appliances using gas or electricity. If the electricity is generated from renewable sources (as it is if you use solar or wind power or purchase 100% GreenPower), it produces no GHGs, so the answer is no, gas is not better than electricity.



If you purchase electricity that is coal generated, the issue is not so clear. While gas produces less GHGs for the amount of energy generated at the point of use, increasingly gas is not necessarily the 'greener alternative' it was perceived to be. Fugitive emissions, or emissions produced from leaking gas throughout the mining and distribution line are thought to contribute significantly to the overall GHGs emitted.

Added to this are increasing concerns with coal seam gas (CSG) mining in many rural and regional communities around Australia. With the growing demand for gas around the world, for electricity generation as well as domestic and industrial use, this extraction method for gas is causing concern with possible long term effects on aquifers, ground water and ecosystems, as well as impacts on farming and rural land use.

Maybe we need to consider whether using gas is really sustainable into the future, particularly when renewable technologies are becoming more viable and cost effective.



Do you understand your bills?

The ABC's program, *The Checkout*, used the analogy of the supermarket to explain what happens with our electricity and gas usage and bills for most of us.

Imagine you're in the supermarket and none of the items on the shelves are priced - you simply choose what you want and head to the checkout. At the checkout, the attendant processes everything but then waves you through without you needing to pay a cent! 'Don't worry,' they say 'We'll send you a bill at the end of three months'. You leave, happy enough, but without having a clue how much anything has cost you, no idea how much the total for the day was, and no idea how much of your total food budget (if you have one) you've spent.

You happily consume what you've bought. Three months later the bill arrives. You're either shocked at how much it is because you were sure you'd been really careful over the last few months (maybe the kids bought more that you didn't know about) or you're pleasantly surprised (though this is more unlikely). You have 3 weeks till the bill is due, so you make sure you have the large amount of money together to pay it, during which time you're on the way to racking up your next bill.



For most people, this is how our power bills work. No real idea how much energy each appliance in the house is using, no idea how much it's all costing each day or week, and no idea what really to expect when the bill arrives, but hoping it might be less than the last one.

If you can relate to this, hopefully, after learning a bit more, this situation might start to change, as you understand more about how your home's energy systems work. This will give you more power (excuse the pun) to make decisions about how energy is used in your home. Am I happy paying \$1.25 more in my summer bill to leave the ceiling fan on for an extra hour each day? Probably. Am I OK with paying an extra \$50 in winter to leave the small fan heater on for an extra hour each day? Maybe. Maybe not. But now I can make an educated decision.

How much do you use?

Currently, each household in Australia uses an average of about 16 kWh (kilowatt hours) of electricity and for households using natural gas, an average of 4 kWh (or 15 MJ - Megajoules) of gas per day. Differences in gas usage vary widely on location in Australia, with colder climates using more.

How well do you understand your electricity and gas bills? Do you know how much energy you use, and how it compares to the average household? Do you know if you are on a flat rate or time-of-use tariff for electricity and what the difference is? If you have electric storage hot water, are you on an off-peak tariff? While many people simply look at the amount due and the due date, electricity bills contain useful information that can help you understand your energy consumption.

Use your recent electricity and gas bills (preferably for the last 12 months) to fill in the following tables. Bar graphs, often on the second page of your bill, show your average daily usage. If you don't have all your bills, you can usually obtain information for the previous few quarters from your last bill, or you can call your retailer for this information. It is useful to have a year's usage, as often our energy use changes with the seasons.

Worked example (electricity):

		A	B	C	D
	Usage period	No. of days	Total usage (kWh)	Average daily usage (kWh)	Total cost (\$)
Bill 1	16 Feb 2013 - 20 May 2013	94	1,640	17.4 (= 1640 / 94)	\$592
Bill 2	21 May 2013 - 17 Aug 2013	89	2,048	23.0	\$737
Bill 3	18 Aug 2013 - 15 Nov 2013	90	1,695	18.8	\$610
Bill 4	16 Nov 2013 - 20 Feb 2014	97	1,580	16.3	\$569
Yearly totals / Average daily usage		370	6,963	18.8 (= 6963 / 370)	\$2,508

divide column B
by column A

divide column B total
by column A total





My electricity usage for the past year

	Usage period	No. of days	Total usage (kWh)	Average daily usage (kWh)	Total cost (\$)
Bill 1					
Bill 2					
Bill 3					
Bill 4					
Yearly totals / Average daily usage					



My natural gas usage for the past year

	Usage period	No. of days	Total usage (MJ)	Average daily usage (MJ)	Total cost (\$)
Bill 1					
Bill 2					
Bill 3					
Bill 4					
Bill 5					
Bill 6					
Yearly totals / Average daily usage					

My LPG usage for the past year



A	B	C	D	E
Gas bottle size (kg)	No. of bottles per year	Total kg used (= column A x B)	Average daily usage (= column C / 365)	Total cost (\$)

While the unit of energy used on electricity bills is kilowatt hours (kWh), for gas it is a megajoule (MJ) and LPG is sold per kilogram (kg) in bottles.

To enable comparison in the same units, we can convert them all to kWh by:

- dividing the number of MJ of gas by 3.6 (i.e. 1 kWh is equivalent to 3.6 MJ); and
- multiplying the number of kilograms of LPG by 12 (i.e. 1 kWh is equivalent to approximately 0.83 kg of LPG).

My total energy usage for the past year



	Total usage		Total average daily usage	
	A	B	C	D
Electricity		kWh		kWh
Natural gas	MJ (= column A / 3.6)	kWh	MJ (= column C / 3.6)	kWh
LPG	kg (= column A x 12)	kWh	Kg (= column C x 12)	kWh
Total		kWh		kWh



Keep track of your progress

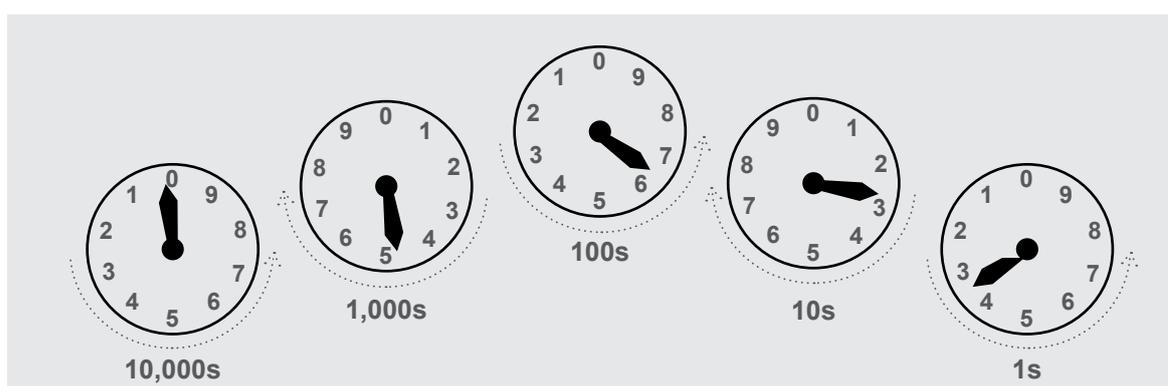
Now that you know your average daily usage, you can set yourself some targets and monitor your progress. By reading your electricity and gas meter(s) regularly and keeping a record, you will gain a better understanding of your usage. It can be surprising how much difference simply keeping track of your usage makes.

There's a wide variety of meters, but basically they will be either an older style dial meter, or a newer digital one.

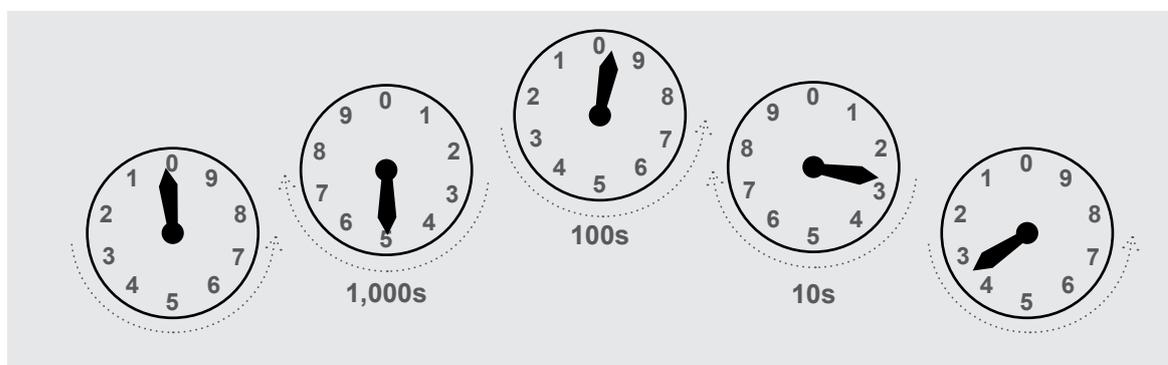
Clockface meters

To read a clockface meter, start by reading from left to right, obtaining one number from each clock face. When the hand is between two numbers, always write down the **lesser** value of the two, not the number the hand is closest to. The exception to this is when the hand is between 9 and 0, in which case write down '9'.

For example, the reading from the meter diagram below is 04623 (i.e. 4,623 kWh).



When the hand appears to be exactly on a number look at the dial to the right. If it has not passed zero, the preceding number has not actually been reached. In the diagram below, the total reading is 04923 (i.e. 4,923 kWh) **not** 05923.



Digital meters

Digital electricity meters display the meter readings as a row of numbers, like the odometer in a car. You simply read the number from left to right.

There may be a number of screens that you scroll through, including date, time, number of kWh for energy use and a separate reading for number of kWh for the hot water service.

Monitor your daily usage

Use your meter to fill out the table below. You can take monthly readings, or to really keep track on what effect your changes are having, try weekly or even daily readings.

My electricity usage from now on



Date of reading	No. of days	Meter reading (kWh)		Total usage (kWh)		Average daily usage (kWh)
		Energy	Hot water	Energy	Hot water	



Understanding different tariffs

Different electricity retailers can have different tariff names or ways of charging for the electricity you receive. The following are the most common ones, used by Tru energy (formally Energy Australia), AGL, Origin Energy and Integral Energy:

Domestic usage (not including hot water)

Domestic usage can be either a 'Domestic all time' rate (flat rate) or a 'Time-of-Use' rate (which uses a Smart meter).

- **Domestic all time** means you pay the same for your electricity regardless of when you're using it. It does however, usually have two tiers. You usually get your first 11 kWh/day at a lower rate (currently around 28c/kWh), the next 11 kWh/day slightly higher (30c) and anything over this is charged at a highest rate (currently about 32c/kWh).
- **Time-of-use (TOU)** means you are charged different rates depending on what time you're using the electricity. If you are on this, your bill will list the three rates; peak, shoulder and off-peak.

If you are on TOU metering, you may be able to save money by knowing when the times for the 3 rates are, making use of the cheaper rates. If you can use a lot of your appliances during the cheaper times, you can make significant savings.

If you have any major electrical work done at your place, such as re-wiring, or installing a solar power system, your meter will automatically be updated to a Smart meter, and with some retail companies, you may be transferred to TOU metering unless you ask not to be. If used with the knowledge of how it works, households (particularly those using gas for cooking and heating) may not be disadvantaged by it. But you can also ask your retailer to opt out.

Hot water

If you have an electric hot-water system, this is normally a separate charge to your other usage. 'Controlled Load 1' or '2', and 'Off-peak 1' or '2' are for hot water.

Controlled Load 1 or Off-peak 1 means that your hot water is heated overnight only, and this is the cheapest rate, usually around 12 - 13c/kWh (current before July 2014). If you don't use a lot of hot water and you mostly shower in the mornings, this might be a good tariff to be on.

Time-of-Use billing

The purpose of this system is to spread energy use more evenly throughout the day, in order to decrease the peak load demands on power stations. Coal fired power stations are unable to respond quickly to changes in demand and so run at the maximum expected demand. This increases the cost of electricity and the amount of GHG emissions.

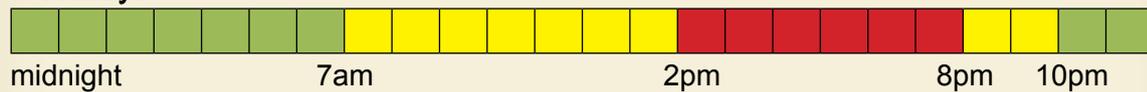
Controlled load 2 or Off-peak 2 means that your hot water is also heated if needed for a while during the day (whenever it suits the supplier to turn it on), so will give an extra boost before evening hot-water use, and costs about 15 - 16c/kWh (before 1 July 2014).

Are you on Time-of-use (TOU) Metering?

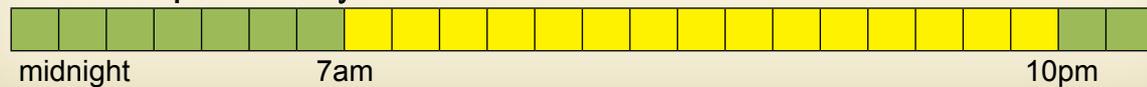
Times and charges below are an example of one retailer's TOU, at July 2014 (charges include GST). These prices usually rise at the beginning of each financial year. Check your retailer's website for the times and charges in your area.

 Peak	2pm–8pm Monday to Friday	56c/kWh
 Shoulder	7am–2pm & 8pm–10pm Monday to Friday 7am–10pm Saturday, Sunday & public holidays	25c/kWh
 Off peak	10pm–7am every day	14c/kWh

Weekdays



Weekends / public holidays



The website energymadeeasy.gov.au is an Australian government website from the Australian Energy Regulator that provides tariff comparisons available in your local area. By entering your postcode and energy usage information it gives alternative retailers' charges.

But what exactly is a kilowatt hour?

We can think of kilowatts (kW) and kilowatt hours (kWh) in this way:

- Kilowatts measure the rate (like the speed) at which energy is used. This is the power use of the appliance (similar to how hard a tap is turned on), or its wattage.
- Kilowatt hours measure the amount of energy consumed (like the distance travelled). This is the energy use of the appliance (similar to how much water is used).

So, one kWh is one kW (i.e. 1,000 watts) being consumed for one hour. As different appliances use different amounts of power (or wattage), they each take a different amount of time to clock up a kWh. For example, if you have a 2,000 watt (2 kW) electric heater, it will only take half an hour to consume 1 kWh. If you have a computer that uses 100 watts (0.1 kW), it will take 10 hours to use 1 kWh.



A lot of appliances have a black or silver label (or some are stamped into the plastic) at the back or on the bottom of them, which tells you their wattage. Just look for a number followed by a lower case 'w'. Also, remember to convert this number to kW by dividing by 1,000 before you do the calculation. (e.g. a kettle using 2200w uses 2.2kW)

So, the simple equation to work out the kWh usage of anything is:

Power (or wattage) x time = number of kWh

Taking our above examples:

- The 2kW heater used for half an hour uses 1 kWh
(i.e. 2kW x 0.5 hours = 1 kWh)
- The 0.1 kW computer used for 10 hours also uses 1 kWh
(i.e. 0.1 kW x 10 hours = 1 kWh)

Once we know the wattage of an appliance and the how long it is on for, we can easily work out how many kWh it is using, and once we know the cost of a kWh we can work out how much that appliance is costing us to run.

If we continue with our examples above:



If the heater is used for 6 hours per day for 90 days over winter, and we know from our bill that we are charged 30c per kWh, we can work out that the cost will be:

$$\begin{aligned} \text{Energy cost} &= (2\text{ kW} \times 6\text{ hours/day} \times 90\text{ days} \times 30\text{c}) \\ &= (2 \times 6 \times 90 \times 0.3) = \$324 \end{aligned}$$

Therefore, the heater is costing \$324 to run over winter.



If the computer is used 5 hours per day, 6 days per week, for 50 weeks per year, at 30c per kWh, this will be:

$$\begin{aligned} \text{Energy cost} &= (0.1\text{ kW} \times 5\text{ hours} \times 6\text{ days} \times 50\text{ weeks} \times 30\text{c}) \\ &= (0.1 \times 5 \times 6 \times 50 \times 0.3) = \$45 \end{aligned}$$

So the computer is costing \$45 per year to run.

Of course, every appliance doesn't have neat figures to always make it easy, but with a trusty calculator by your side, you will be amazed (and amaze others) with the power of your new-found knowledge!

GreenPower

GreenPower is a government accreditation program that enables your energy provider to purchase renewable energy on your behalf.

The program was developed in consultation with the energy industry, and various non-government organisations, including the Australian Consumers Association, Greenpeace, the Australian Conservation Foundation and the World Wide Fund for Nature. The main aim of the program is to facilitate the installation of new Renewable Energy generators across Australia beyond mandatory renewable energy requirements.

See www.greenpower.gov.au for more information.

If you decide to buy GreenPower, you can usually elect to purchase 10%, 25%, 50% or 100% renewable energy through your energy retailer. Check out their website for what they offer and how much it costs. Sometimes they charge a flat rate per bill, or you pay a few cents extra per kWh.



Measuring energy use of your appliances

By measuring the amount of energy that different appliances in your house use, you may start to see your home in a whole new way; as an energy-consuming machine!

A power-usage meter, such as the one pictured, plugs in between the powerpoint and your appliance, giving a reading of the power use. It can be left on for a set period to determine the energy usage of items that change power use through their cycle; for example, fridges, dish washers and washing machines.



Save Power Kits, containing a power usage meter, stopwatch, compass and thermometers, can be borrowed free of charge from some libraries.



Energy star-rating stickers

Remember that every appliance has two price tags, one is the price that you pay up front, and the other is what you pay for the energy usage over its lifetime.

The large number in the red rectangle is the number of kWh the appliance uses per year. This assumes that the appliance is on for a certain time, which is written on the sticker (in very small print under 'kWh per year').

When you look at the number of stars on energy rating stickers, make sure you're comparing same size products; e.g. with fridges, you might see an 500 L model with 3.5 stars and a 350 L model with 3 stars and mistakenly think that the bigger fridge uses less power. You can't compare the energy usage of a bigger fridge (or TV, washing machine or air conditioner) with a smaller one by simply looking at the stars, as they are rated differently.

The stickers on all new appliances (even TVs and computer monitors now) have more useful information on them than just the number of stars.

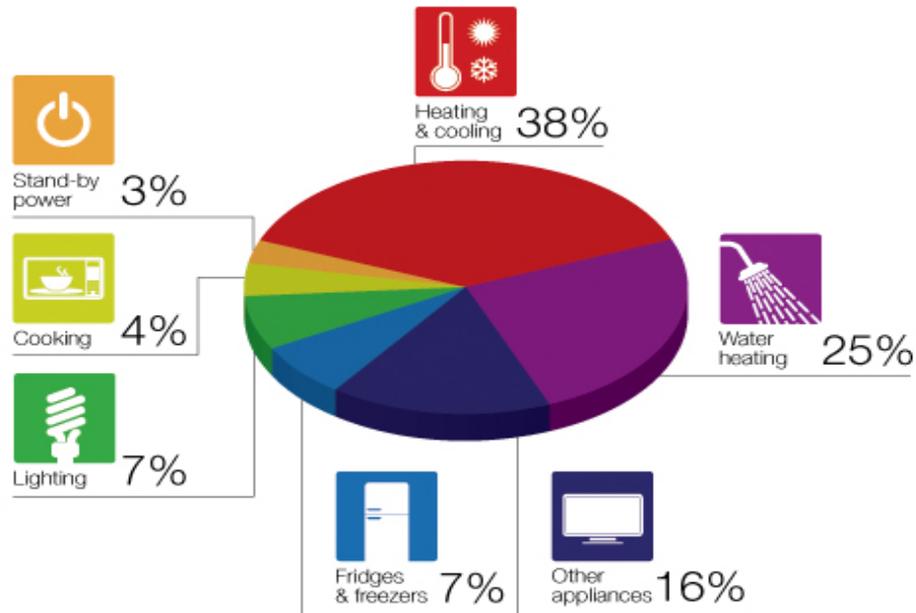


Work out how much that new appliance will cost to run.

Multiply the number of kWh (on the star rating sticker) by your electricity rate. E.g. If a fridge uses 500 kWh and your rate is 30c/kWh, then the amount it will cost you a year is $500 \times 30c = \$150$. Take a calculator with you when you go shopping if you want to know what that new fridge, washing machine, TV or air conditioner is really going to cost.

Saving energy in and around your home

This graph gives the average breakdown of energy use in households in Australia.



Source: www.sa.gov.au

By investigating each of these areas, we can see where savings can be made.

1. Lighting

Lighting generally uses between 6% and 10% of the household electricity bill.

Although the sale of standard incandescent globes was banned in Australia in late 2009 due to their poor efficiency (90% of the energy consumed produces heat rather than light), many houses still have significant amounts of these globes in use.

Low-voltage halogen downlights (a type of incandescent) are also a popular choice for new lighting in homes. The 'low voltage' label is often misinterpreted as being low energy, when in actual fact the way these lights are used is often a higher energy-using option than even the old incandescents, as they tend to be installed in groups.

Many alternatives are available, including compact fluorescents (CFLs) that typically use 75% less energy than incandescents, and light-emitting diodes (LEDs) that can use 90% less. CFLs have improved substantially in both performance and appearance/colour; the warm white globes have a similar colour as incandescents. LEDs are falling in price, and for lighting that is used a lot, will now pay themselves back quite quickly.



The costs of a few lighting options for a year

Typical lighting options for a 14m² room (e.g. a bedroom or small living area) are shown below. The figures are for 6 hours use a day for the year, at a cost of 28c per kWh.

Remember though, if you are on Time-Of-Use billing, you are paying a lot more than this during peak time, in the evenings when lighting is mostly used.



4 x low voltage (12v) = 240w = \$146/yr
halogen downlights



4 x 7w LED (240v) = 28w = \$17/yr
downlights



Old style
incandescent = 100w = \$62/yr
globe



Compact
fluorescent = 24w = \$15/yr
globe (CFL)

Of course, there are many other options including fluorescent tubes, CFL downlights and various multi-globe fittings. The important points with choosing lighting are not to overlight an area, and to compare the total wattage of the different suitable options. If the lighting in a room is very inefficient or inappropriate, consider not using it but installing a lamp instead.

My lighting action plan

	Will do	Have Done	N/A
FREE Assess lighting needs/research alternatives	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE Change our household's lighting behaviour	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
\$-\$\$ Replace globes with energy-efficient ones	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
\$-\$\$ Replace inefficient lighting with lamp	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
\$\$-\$\$\$ Replace some light fittings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other ideas: _____

2. Heating and cooling

Heating and cooling can account for between 30% and 40% of a household's energy bill. By ensuring that our homes are operating well, a home's need for additional heating and cooling can be substantially reduced.

Older homes may be uninsulated, draughty and without good access to the sun and cooling summer breezes making them cold in winter, and hot in summer. The good news is there are heaps of things we can do to improve the comfort of our homes. Some of these cost next to nothing, and some cost larger amounts, but all help to reduce the time those expensive heaters and air conditioners need to be on, and therefore reduce our ongoing power bills and carbon footprint.

Passive design

Passive design uses the sun's movement, natural night-time cooling and building features to enhance a building's ability to deal with the seasons.

You can ensure that your home stays cooler in summer and warmer in winter without huge amounts of artificial cooling and heating by understanding how your home operates and how to apply some basic principles. Some of these principles ideally need to be incorporated into the building at the design phase, but others can be addressed, at least in part, for existing buildings.

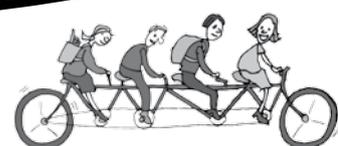
Orientation

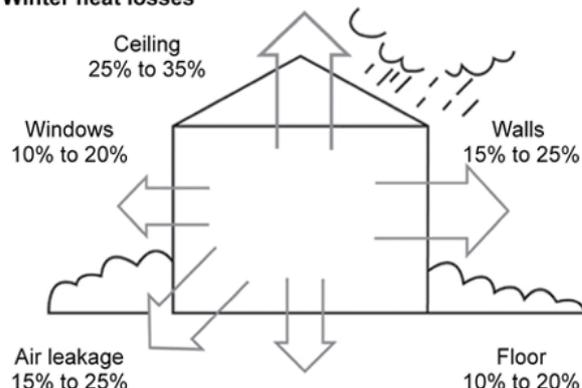
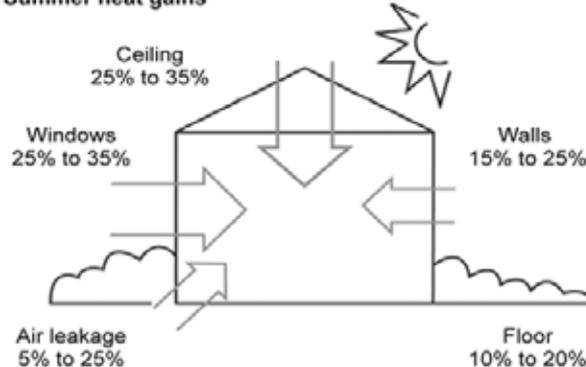
The sun is high in the sky in summer, and low in the northern sky in winter (in the Southern Hemisphere), and this principle can be used to help keep buildings cooler in summer and warmer in winter. Windows on the north side of a building (assuming there is at least an eave shading them) will keep the high summer sun out, while letting the low winter sun in.

Of course, we can't pick buildings up and turn them around if they aren't facing the right way, but sometimes it is possible to look at the layout of a home, and see if some of the rooms can be rearranged to make use of this free climate control. And if you're looking at moving, consider this principle for your new home.

Insulation

Insulation is about providing a barrier to the flow of heat; keeping heat out in summer and keeping it in, in winter. Installed correctly, insulation can make a big difference to how naturally comfortable your home will be.



Winter heat losses**Summer heat gains****Typical heat gains and losses in a temperate climate** (*Your Home Technical Manual, 2011*)

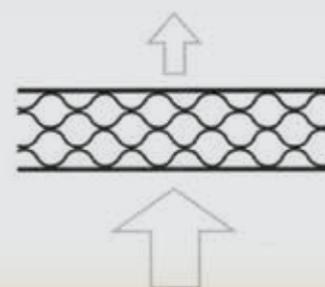
Insulation has an R-value that is a measure of its insulative ability (or its thermal resistance). The higher the R-value, the better the insulation. For warm temperate regions (e.g. Sydney, Adelaide, Perth) the recommended R-value for roof/ceiling insulation is R3.2 – R3.7 and wall insulation (if you're renovating and able to include it) is R1.9 – R2.2. For cool temperate regions (e.g. Melbourne, Canberra, Hobart) roof/ceiling insulation of R3.7 - R4.3 and wall insulation of R2.2 - R2.4 are recommended.

If your house has a suspended floor, and gets cold in winter, under floor insulation can also help to reduce the amount of heat escaping from your home.

Installing insulation

If you're installing insulation, remember that bulk types (such as fibre glass, wool or polyester batts) are not to be compressed. Like a doona, the thing that insulates is the trapped air, so if insulation is squashed, the R-value will be reduced.

bulk insulation traps air in still layers

**Glazing (glass)**

The benefits of glass are obvious – light, heat from the sun in winter, and (through opening windows) cool breezes in summer. Unfortunately, there are often disadvantages of glass in buildings too. Standard glass allows large amounts of heat to flow through buildings, i.e. lose heat in winter and gain heat in summer.

Controlling how the glass works in your home can help to keep the benefits, and minimise the disadvantages. This includes making sure windows are appropriately shaded in summer and protected on the inside (blinds or curtains) in winter to limit heat loss. Also consider

Did you know?

One square metre of glass with direct sun hitting it can transfer as much heat into a room in summer as having a 1 kWh radiator on.

improving the performance of windows that are allowing too much heat gain or heat loss. Tinting, DIY methods using double-glazing principles (such as Clear Comfort), or even replacing, installing (particularly on the north) or eliminating (particularly on the west) windows may be worth considering.

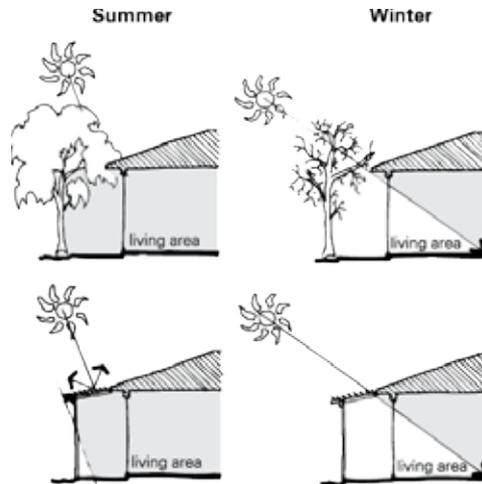
If you are thinking of buying new windows, make sure you check the rating label that gives information on how well the whole window (including frame) performs in limiting heat gain or heat loss.

Shading

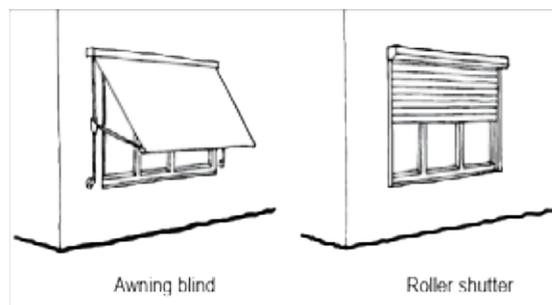
Unshaded glass is often the greatest source of heat coming into a home in summer. By understanding the orientation of your home's windows and ensuring good shading options for each, you can minimise the summer heat gain, while still allowing the winter sun in.

North facing: Because the sun is high to the north in summer, horizontal shading protects these windows. For deeper shade on the north, a wider pergola (up to about 1.2m), or deciduous vine or tree will still allow sun in during the winter.

East and west facing: As the sun rises in the east and sets in the west, it is harder to stop it shining directly onto the windows. An eave or other horizontal shading won't work. While this is not necessarily a bad thing in winter, hot afternoon summer sun beating in a west-facing window can be a significant problem. Shading, therefore, needs to be vertical and preferably adjustable (see awnings pictured) so that sun can still be accessed in winter. Deciduous vines are also a good solution for this.



The effect of shading on the North for different seasons (*Your Home Technical Manual, 2011*)



Vertical shading options for windows include awnings and shutters (*Your Home Technical Manual, 2011*)



South facing: Windows on a true south aspect do not receive direct sun on them in Australia and, therefore, don't require shading to protect them from direct sun's rays.

Internal curtains and blinds: Internal window coverings help to stop heat escaping in winter. To ensure window coverings are effective, they need to be without gaps, so venetian or vertical blinds do not work in preventing heat loss.

Thermal mass

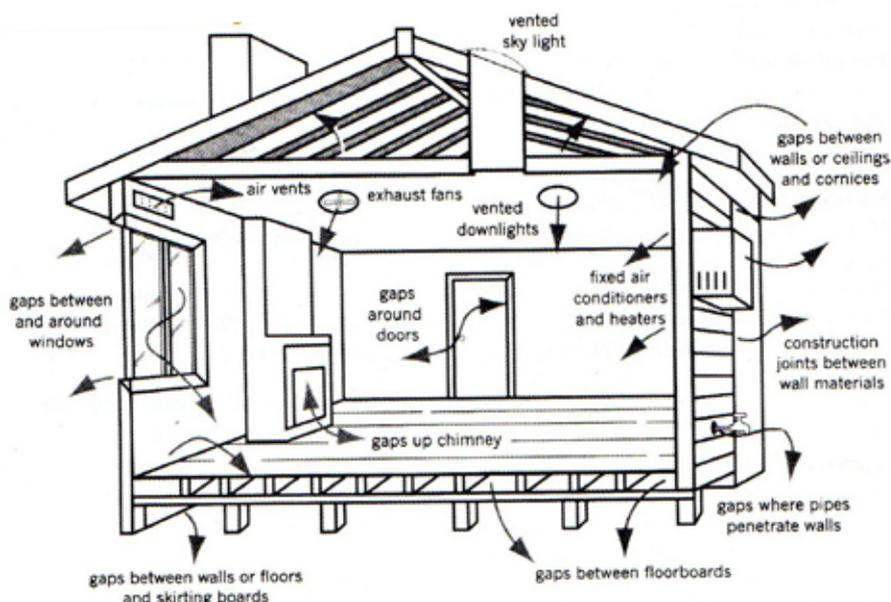
Thermal mass is the term used to describe a material's ability to store heat. Dense, heavy building materials, such as concrete, bricks, stone and tiles, are materials that have high thermal mass. When exposed to a heat source (the sun, or a heater), they absorb that heat, and when the temperature falls (in the evening/night), this heat is then released. If used in combination with other passive-design features, this can be used to benefit the inside of a building. If the winter sun comes into a home in winter and heats up a tiled concrete slab floor, this heat is absorbed and as the home cools in the evening, the heat is released and helps to keep the inside temperature warmer.

Ventilation

Enabling your home to cool overnight can mean it doesn't continue to build up heat over a long heatwave. Accessing breezes, particularly through east- and south-facing windows and doors, can assist with the air exchange within the home. Roof ventilation, including actively controlled exhaust fans, can also help to vent the roof space of this heat.

Draught proofing

Air leakage can account for 15 to 25% of winter heat loss. Sealing gaps around doors and windows with draught-proofing strips, under skirting boards and even insulating under timber floors and sealing wall vents can all help contain the heat. You can then control the ventilation in your home through windows and doors.



Air leakage in homes (*Your Home Technical Manual*, 2011)

Using heating appliances

Although cheap to buy, portable electric heaters are expensive to run. The following table compares the cost of using various appliances 6 hours/day for 3 months.

Electric heating appliances	Typical wattage	kWh used	Approx. cost for 3 months (30c/kWh)
2 kW radiator, fan heater or oil filled heater	2,000	1,092	\$328
Room air-conditioner, newer inverter style	500	273	\$82

Gas heating is generally more efficient and less costly than radiators, fan heaters or oil filled heaters, though this may change in the near future. It also produces fewer GHG emissions (unless you purchase GreenPower).

Apart from the building issues discussed previously, ways to reduce the cost of heating can also include:

- Have cosy blankets in the living area for each person, make sure you have seriously warm clothing, and invest in hot-water bottles or wheat bags.
- Close off (zone) a small area of the home that is to be heated, rather than heating large areas.
- Make sure you limit heat escaping through windows by installing heavy curtains or blinds (without gaps as are in venetians or verticals), and preferably with pelmets to prevent cold air circulating behind them.
- Set air conditioner thermostat at no more than 18°–20° in winter.
- Use a ceiling fan on the reverse setting to push warm air down from the ceiling.

Using cooling appliances

Using a ceiling or pedestal fan for 6 hours a day, for 3 months will cost you less than \$10, whereas using an air conditioner for the same amount of time will probably cost between 10 and 20 times as much.

If using an air conditioner, make sure the thermostat is set at around 22°–24°. If set lower, the unit will not achieve a cool temperature any quicker, it will simply work longer to achieve the lower temperature. By setting the thermostat at the higher setting you will still remain more comfortable than the extreme outside temperature, yet will be saving substantial amounts of energy compared to a lower setting.

If fans are used as the first option for cooling, and used in conjunction with air conditioning in higher temperatures, the cost of cooling can be significantly reduced.

Fans

Costing little to buy and run, fans are able to create a 4°C cooling effect by providing a breeze on our skin. They do not reduce the room temperature, or humidity and because of this, there is no point leaving them on in an unoccupied room.





My heating and cooling action plan

	Will do	Have Done	N/A
FREE Assess our home's orientation/sun access	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE Assess our home's insulation levels in roof	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
\$\$-\$\$\$ Install appropriate insulation in roof space	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE Assess window orientations and shading needs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
\$-\$\$\$ Install/grow shading on problem windows	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE Assess potential for increasing ventilation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE Assess draught problems in our home	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
\$-\$\$ Draught-proof windows and doors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
\$\$-\$\$\$ Draught-proof floors and other openings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE Assess for internal window coverings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
\$\$-\$\$\$ Install curtains/blinds on problem windows	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE Reduce heated/cooled area in home (zoning)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE Wear warmer clothing inside in winter	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE Increase/decrease thermostat on air-con	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE-\$\$\$ Install/use fan to replace some air-con use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other ideas: _____

3. Water heating

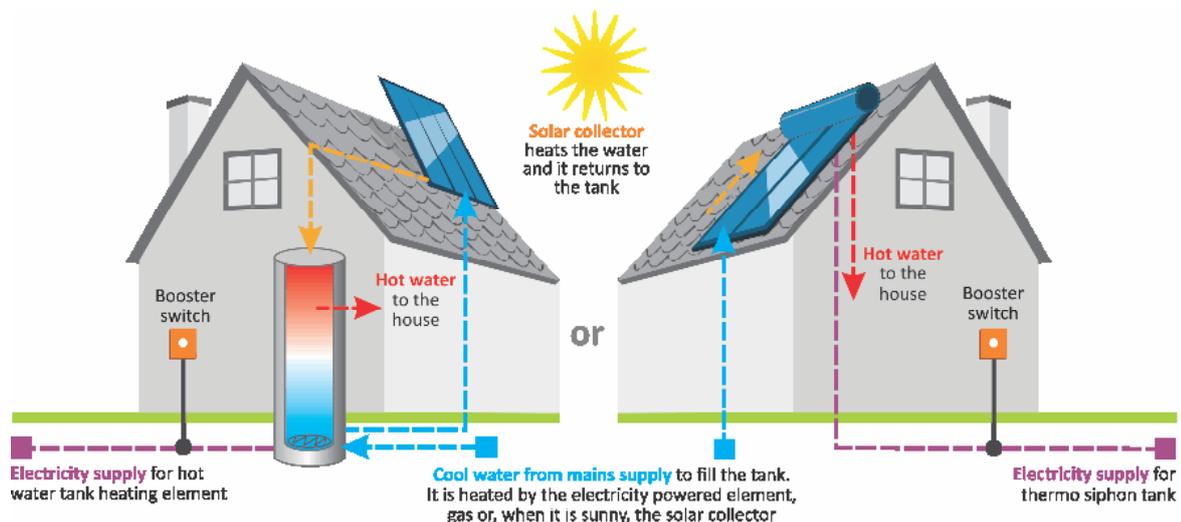
Changing traditional electric storage hot-water systems to another type is one of the biggest single things you can do in your home to reduce your GHG emissions; similar to taking a medium-sized car off the road. For this reason, electric storage hot water systems are no longer admissible for new dwellings in some states in Australia. There have been attempts by federal and state governments to outlaw them from sale altogether in Australia, but as of 2014 they are still allowed in various situations. Check with your state government regulations for current rules as they apply to you.

Reducing your current heater's energy use: To reduce the energy consumption of an electric- or gas-storage system, ensure that the water temperature is no hotter than needed (some government bodies recommend they be set at 60°C to prevent the growth of harmful bacteria). Sometimes you can do this yourself, but for some systems, a plumber is required. If a few people in your street wish to do this, see if you can hire a plumber to do them together to reduce costs.

Hot-water use can also be reduced by taking shorter showers, and using cold water in your washing machine. When you go on holidays, remember to switch your hot-water system off at the meter.

Changing your system: Alternatives to electric hot water heaters are gas (storage or instantaneous), solar (flat panel or evacuated tube systems) and heat pump systems.

Instantaneous gas heaters are more efficient than storage heaters, and are now star rated according to their energy efficiency.



How solar hot water systems work (CSIRO, 2012)



Evacuated tube solar systems are more expensive than flat panel systems, but are more efficient, and particularly good in cooler climates or partly shaded situations.

Heat pump systems use about one third the amount of electricity of an electric storage system. They work like a reverse refrigerator by collecting heat from the air to heat a gas that heats the water. These can be good in situations where there is not enough unshaded roof space available for a solar hot water system.

If you are thinking of buying a solar hot-water system, or already have one, keep these tips in mind to get the most out of your system:

- Systems with a manual control/booster switch allow you to maximise the use of the sun for heating your water, by giving you control over when you use electricity or gas to heat water and when you want to use solar power. This can help prevent your water being heated overnight before the sun rises and has an opportunity to provide a contribution.
- The external (inlet and outlet) pipes running between the solar collector and the water tank should be effectively insulated (approximately 1 cm thick). This is particularly important in split hot-water systems where it can prevent a high proportion of the solar energy gathered by the panels from being lost.
- Shade from overhanging trees and dust reduce the efficiency of the solar collectors by obstructing the sun. Make sure your solar collector is kept clean and clear (CSIRO, 2012).

While the initial cost of a solar or heat pump system is significant, the savings in running costs will likely pay back the up-front cost within a few years.

My water heating action plan

	Will do	Have Done	N/A
FREE Take shorter showers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE Only use cold water in the washing machine	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE-\$ Reduce hot-water temperature	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
\$\$\$ Replace hot-water system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other ideas: _____

4. Household appliances: Fridges, cookers and cleaners

Fridges

Fridges have improved significantly in their efficiency in recent years. In fact, the energy-star-rating system for fridges in Australia has changed because of this; an older 5-star fridge is now the equivalent of a 3-star one. Fridges over 10 years old are among the biggest energy users in the home, using up to 3 times that of modern models and often costing \$300 or more per year to run.

Replacing an old inefficient fridge is one of those things that does justify the embodied energy that goes into producing the new one, due to the fact that so much energy is wasted in keeping old fridges alive. Just make sure you don't relocate the old one to the garage and keep it plugged in for drinks for the occasional party - very expensive drinks!

There are a number of things you can do to run your fridge as efficiently as possible.

Working out how much fridge and freezer storage you really need, can help to establish if it's feasible to get rid of any spare fridges.

Thermostat – should be ideally set at 3° to 5°C for fridges and -15° to -18°C for freezers. Any lower than this and the fridge is using more energy to keep compartments colder than required.

Fullness – a fridge actually runs more efficiently the fuller it is, so again the old fridge out in the garage is likely to be very wasteful of energy if it is only used for storing a few drinks.



Position – if it's in a hot area like the garage or a back verandah, the fridge has to work a lot harder to keep cool. It should also have sufficient room around it – at least 50 mm on either side, 100 mm at the back, and open above.

Seals – if the seals are damaged or perishing, leakage occurs which again makes the fridge work harder to keep cool.



If you're looking to buy a new fridge or freezer, some useful facts to consider are:

- side-by-side fridge/freezers typically use more energy than standard types
- upright freezers tend to use more energy than chest freezers
- fridges that have an ice or iced-water dispenser in the door use significantly more energy than those without.

Remember to check the number of kilowatt hours per year on the energy rating label rather than just the number of stars.

Washing machines

Most of the energy used by a standard hot-water cycle in modern washing machines goes to heating the water. By using cold water only (and most washing detergents are made to be used with hot or cold water), the energy savings are significant.

When considering buying a washing machine, remember that front-loader models usually use less electricity than top loaders (as well as using less water), are gentler on clothes and use less detergent. It is more efficient to have the right size for your needs as it is more wasteful to run a large machine only partially full.

Clothes dryers

Most clothes dryers are huge energy users. Most people in Australia don't use a dryer to dry every load of washing, but even regular use in rainy weather or winter can really push up your bill. If it was used 2 times per week for 90 minutes, this would use about 468 kWh a year costing around \$140 (though less if used during off-peak time if you're on Time-Of-Use metering).

Alternatives to drying clothes in wet weather include:

- using a clothes horse inside or on a verandah
- for a single item needed quickly, wrap the item in a towel, wring it out (really needs 2 people), then iron dry.

Dishwashers

As with washing machines, the main energy usage of dishwashers is in heating the water, which most dishwashers now do internally rather than drawing in heated water from the hot-water system. By setting the dishwasher at the 'eco' cycle (if it has one) or the normal cycle, it will, therefore, use less power than a higher-temperature cycle. And of course, fill it up before turning it on! If you are on Time-of-use metering, turn it on at night to reduce running costs.

Cooking

Any appliance that uses an electric element to heat will use high amounts of power, so the oven, a cooktop element, kettle and toaster are all high energy users. A standard-sized oven will use about 3,000w at 180°C (so if used for one hour will consume 3kWh), while a kettle will use around 2,200kWh and a toaster, 1,200w. Slow cookers will use less than an oven, but for a longer time. You can check the power usage of your appliances on the labels at the back or underneath them.

A microwave uses generally between 800 and 1,200w, and since it cooks food much quicker than an element, is more energy efficient.

My household appliance action plan



	Will do	Have Done	N/A
FREE Assess our household's fridge/s efficiency	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE Get rid of the spare fridge(s)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
\$\$\$ Replace fridge with energy-efficient one	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE Use washing machine efficiently	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE Reduce clothes dryer use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE Use dishwasher only when full	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other ideas: _____



5. Entertainment and computer equipment

This category - including TVs, DVD players, set top boxes, stereo systems, games consoles, computers and peripherals - is one of the smaller categories of energy usage in homes, however the standby usage with these items can be significant.

Over the last 10 years, the average TV size has increased considerably. A 51 cm cathode ray tube (CRT) TV (the old type) was quite normal, as is a 106 cm plasma now. Energy consumption has increased dramatically as a result. The old CRT one would have used around 60w, whereas the plasma may use 200–300w, and even more if hooked up to a home theatre system.

Of course, many people have a size in between these and/or a LCD TV, both which use less power than a plasma. The older LCDs (more than 5 years old) may use around 200w, but a lot of the newer models are now using less than 80w. A more recent technology, the LED TV is using less power still, with some as low as 30w.

Standby power is also decreasing in more modern TVs. With the old CRTs, the standby power of around 17w was common, whereas the standby power of a new LCD is often less than one watt.

When you buy a TV, the display is usually pre-set on a showroom setting. This setting uses more energy than the normal home setting. You can use your instruction booklet to re-set the unit to a more appropriate and energy efficient setting.

Did you know?

Laptops use about one-third of the power of a desktop computer (30-40 w compared to 90-110 w). Old CRT monitor desktops use even more power (around 130-140 w).

6. Standby power

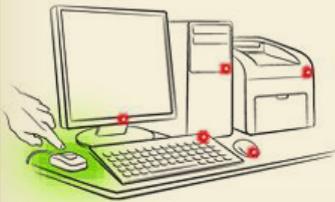
A lot of our modern electronic appliances use some standby power if left turned on at the powerpoint. Although these amounts are generally small, they all add up, both in number of appliances and number of hours they're on. TVs, set top boxes, DVD players, games consoles, computers, printers, modems, microwaves, ovens, dishwashers, washing machines, clothes dryers, MP3 and phone chargers are all likely to be using some amount of standby power. Usually these draw less than 5w, some less than 1w. Combined, the average household uses around 50w on continuous standby, costing around \$100 per year and producing nearly half a tonne of CO₂.

The following table shows the usage and standby costs of typical appliances.

Appliance	Hours used/ week	Usage power (watts)	Energy usage cost/year	Standby power (watts)	Standby cost/year
DVD player	10	15	\$2.00	3	\$6.00
Microwave	1	1000	\$13.00	3	\$6.50
Old style CRT TV	15	60	\$12.00	17	\$34.00
Average LCD TV	15	80	\$16.00	1	\$2.00
Desktop computer	20	100	\$26.00	10	\$19.00
Modem	20	10	\$2.60	10	\$19.00

An interesting exercise is to take a electricity meter reading before going on holidays and when you return, to see how much your daily usage is when no-one is there, and how this compares to your normal daily usage.

Hard to reach the powerpoint behind the entertainment unit or computer desk



Energy-saving power boards or cords, such as the Eco Switch, make turning off the power quick and easy. At around \$20, it is likely to pay itself off in less than one year.



My entertainment & standby action plan



	Will do	Have Done	N/A
FREE Set TV/computer screens on efficient settings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE Turn off standby power after use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
\$ Buy cord/board for difficult to reach points	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other ideas: _____



7. Pools and spas

Pools and spas can be the largest energy users in a home, through the operation of their pumps and heating systems. Even if a pool is solar heated, it requires a pump to circulate the water through the solar collectors.

There are many ways of reducing the energy use of pools or spas including:

- Using a pool cover if the pool is heated, to reduce heat loss (also decreases water evaporation)
- Using an efficient two-speed pump, which can reduce the energy use by up to two-thirds
- Make sure the pump is not on for longer than needed – usually about 6 to 7 hours per day in summer down to about 3 to 4 hours per day in winter
- One of the best ways to really reduce the electricity consumed by your pool pump is to use a solar powered ioniser (such as the 'Floatron' pictured). As well as significantly reducing the amount of time the pump is needed, it reduces the amount of chemicals required. People using these have found they can reduce their pump time by about 3/4, decreasing their electricity bill by hundreds of dollars each year, so paying off the upfront cost in under a year. See the blog - <http://www.rowetel.com/blog/?p=38> for details.

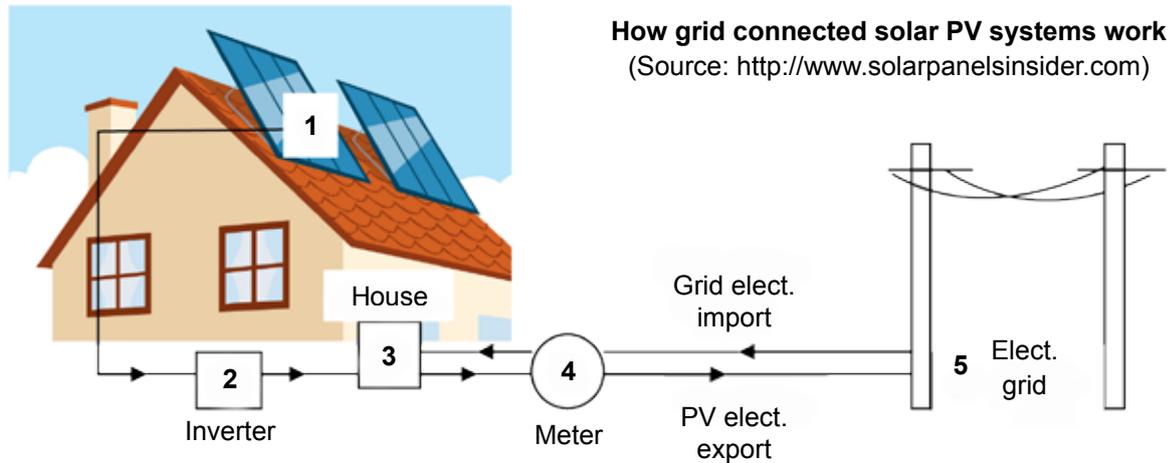


Solar power

By mid 2014, there were over 1.2 million photovoltaic systems installed in Australia.

Solar or photovoltaic (PV) systems have come down significantly in price in the past few years, and are continuing to decrease.

A grid connected system feeds excess electricity into the network, so if your home isn't using the power as it's being produced, it will be fed into the grid. A stand-alone system (not usual in urban areas) needs a battery bank to store excess energy for later use. Some householders who have PV installed are now starting to explore the options of having battery storage for their grid connected systems, to enable them to store the energy they are producing, for use when the sun isn't shining. The cost of battery storage is also decreasing, and some in the industry predict that as early as 2020, large numbers of householders in urban areas may purchase battery storage and disconnect from the grid altogether.



<p>1 PV panels Supplying DC power</p>	<p>2 Inverter Changing the solar DC power into 240v AC suitable for household use and feeding to grid</p>	<p>3 Your home Uses electricity firstly from the PV panels with additional demand supplied from the grid</p>	<p>4 Meter Measuring electricity imported from, and exported to, the grid.</p>	<p>5 Any excess power is 'exported' to the electricity grid</p>
-----------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------

If you are considering installing solar power, there are a few things to consider:

- You need a sunny, preferably north facing roof space. With most types of panels, if shade falls onto even a small section of your system, the whole system can only produce power at the shaded section's rate.
- Do you currently use a lot of energy? If so, your money may be better spent becoming more efficient first, through behaviour and changing appliances, before buying a system to power an inefficient house.
- Remember that you can't use your solar power at night (unless you have battery storage), so if the majority of energy usage is late afternoon and evening, you may not be able to use much of the power you produce.
- To find a reputable supplier, ensure they are an accredited retailer with the Clean Energy Council. Refer to <http://www.solaraccreditation.com.au> for details and other information.

Rebates, and feed-in tariffs for unused power sent back to the grid are fast disappearing, so it's important that you do your homework and understand the relationship between how your home uses energy and how a PV system would supply power.



Challenges

These challenges are designed to be a fun way of exploring issues, making us aware of how reliant we are on the resources we have, as well as encouraging longer-term behavioural change.

Following is a list of challenges, but we also welcome your ideas. We hope you will do at least one of the challenges, but feel free to have a go at more! If you have other ideas, we'd love you to share them with others in Transition Streets.

- 1. For one week** – After working out your average daily use, take a meter reading, noting the time and day. As a household, see how much you can reduce your energy consumption for one week. Take a meter reading as close to one week as you can. How much did you reduce your usage by? Did it hurt? Which things would you consider doing long term?
- 2. For one week (or month)** – Set a household energy budget for the week (or month), say 20% or 30%, (or more!) under your current usage, and see if you can stick to it; for example, if you know from your bills that you currently use 18 kWh/day, set a budget of 15 or 12 kWh. This requires you to regularly track how you're going by reading your meter daily, make changes as necessary, and to understand what things in your home really make a big difference to your usage. Could you do it? What really helped to keep you on track?
- 3. For 1 to 3 months** – Every time someone in your household buys a take away coffee, or a can or bottle of drink, put the same amount of money into a jar at home for energy bills (or write it down on a list). Did your drinks for the month/s cost more than your energy? This challenge is about exploring how we may think our bills are too high because we pay for our energy in a 3-month lump sum (or maybe monthly), rather than as we consume it.
- 4. For one week, or one day** – Try to go for a week (or a day) without TV, or lights, or heating. What did you give up for a week (or day)? Was it hard?
- 5. For one week** – Make sure there is never more than one light globe per person on in your home? How did you achieve this? E.g. could you use a candle in the bathroom?
- 6. For one week, as a street** – Calculate the total average daily electricity usage of participant households in your street for this time last year (from bill information), then take a reading of all electricity meters on the same day. See how much the entire group can reduce their usage by, over a week. Take the readings a week later and work out the overall percentage decrease you achieved together, then organise a party to celebrate your great achievement!

Suggested plan for your group discussion

Catch up – How has everyone’s week been?	(10 mins)
Discuss outcomes from the water month <ul style="list-style-type: none"> • What has changed in your home? Street? • What challenges did people attempt, and how did they go? 	(20 mins)
Review Energy chapter content <ul style="list-style-type: none"> • What was the main thing you gained from the chapter? • Did anything surprise you? • How did you go with the measurements and reading bills? • Compare energy usages. What might contribute to differences in households? 	(25 mins)
Discuss your action plans <ul style="list-style-type: none"> • What do you want to achieve this month? • What assistance (if any) would you like from others in the street? 	(30 mins)
Explore ideas for action that you could do as a group? <ul style="list-style-type: none"> • What could you do together that you couldn’t do alone? 	(20 mins)
Decide on which challenges you want to try this month.	(10 mins)
Confirm details for the next time you get together.	(5 mins)





GET THE KIDS INVOLVED!

If your kids are particularly good at using energy, e.g. leaving lights, computers and other equipment on when not being used, or having extra long showers, here are some ways to get them involved in reducing their energy usage.

1. Same as water – get them to time their showers, and yours (showers use energy as well as water).
2. Decide on a family reward if the usage is down by 10% or 20% on the previous bill (better to compare same season bills due to heating/cooling differences). Suggest a dinner and/or a games night with friends.
3. Teach them to read the electricity meter, and keep a record of usage each week
4. Ask them to design a spreadsheet on the computer to keep track of the usage, and see whether the household is on target for a reward!
5. Teach them how to use a plug-in power meter (or have them teach you!), and encourage them to try it with all kinds of appliances (e.g. the toaster, computer, TV, lamp) to learn what appliances use the most power
6. Have someone responsible for making sure everything is turned off when going on holidays, including the hot-water system, and the fridge if possible.

Further resources

Websites

- Most energy retailers have an energy saving tips section on their website.
- **Climate Spectator** – commentary on green business, clean technology, carbon markets and climate change policy. Free registration to receive regular commentaries at www.climatespectator.com.au
- **Energy rating website**, www.energyrating.gov.au
- **Living Greener** - Information, how to's and rebates for sustainable living, www.livinggreener.gov.au/energy
- **Renew Economy** - clean energy information and analysis. Free registration to receive regular updates, www.reneweconomy.com.au

CHAPTER 3

- **Sustainable households** – NSW government initiative, www.environment.nsw.gov.au
- **Your Home Technical Manual** – Australia's guide to environmentally sustainable homes, www.yourhome.gov.au/technical/index.html

Books

- *The Transition Handbook: From oil dependency to local resilience*, Rob Hopkins
- *The Transition Companion: Making Your Community More Resilient in Uncertain Times*, Rob Hopkins
- *The CSIRO Home Energy Saving Handbook*
- *The Post Carbon Reader: Managing the 21st Century Sustainability Crises*
- Other books at Non-fiction section of libraries, call numbers in the 300's

DVDs

- *No Impact Man* – One family's journey to no impact living
- *The Power of Community: How Cuba Survived Peak Oil*
- *An Inconvenient Truth: The Crisis of Global Warming*

References

ABS (2013) 4670.0 - Household Energy Consumption Survey, Australia: Summary of Results, 2012 I

CSIRO (2012) Solar hot water [Fact sheet].

EnergyAustralia (2010) *Summary Report – Community Sector Education Forums*.

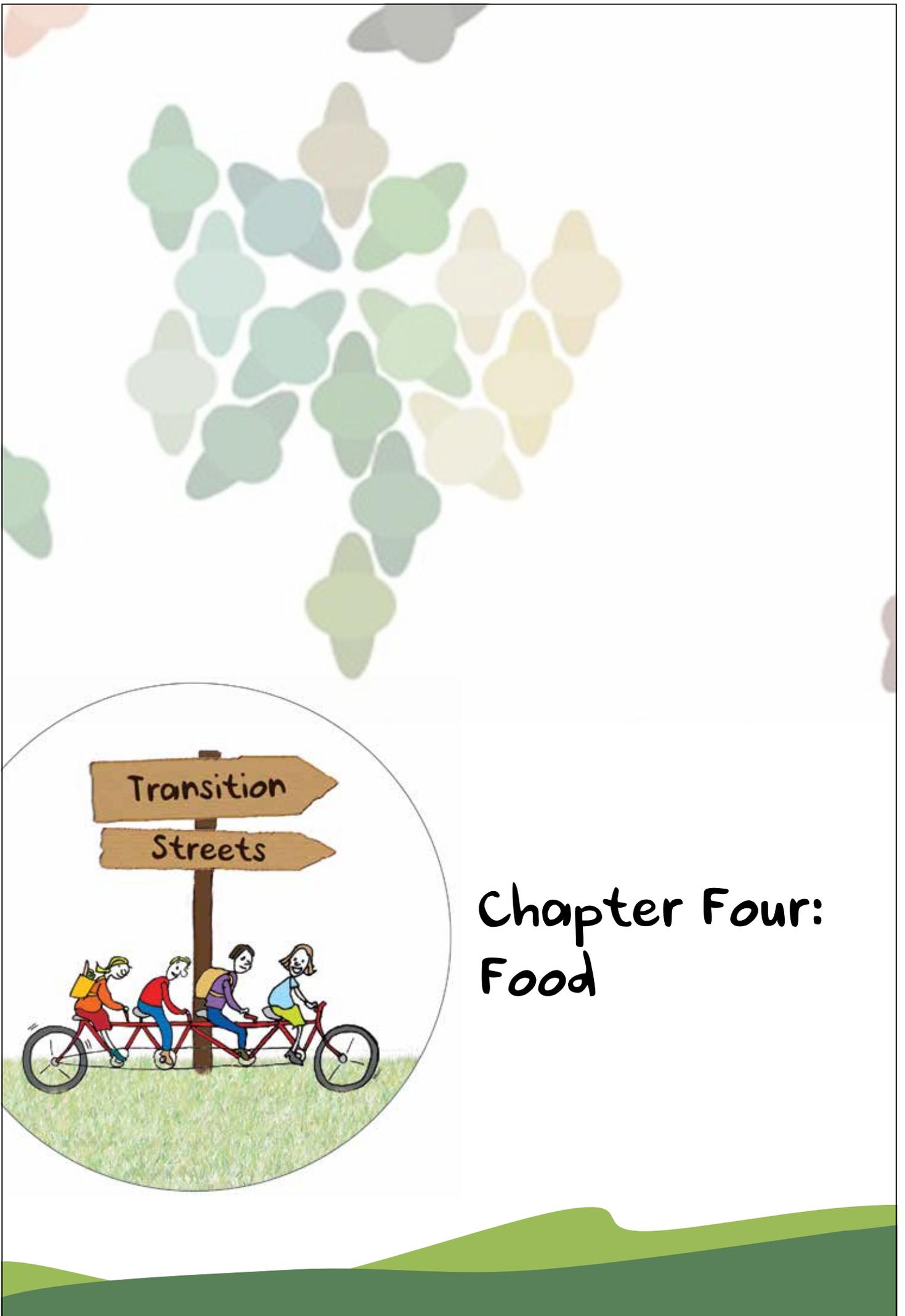
Solar Panels Insider, www.solarpanelsinsider.com

Your Home Technical Manual, www.yourhome.gov.au/technical/index.htm

Saddler, Hugh - Why is Electricity Consumption Decreasing in Australia, 2 January 2014 (The Conversation)

www.sa.gov.au/topics/water-energy-and-environment/energy/saving-energy-at-home/check-and-reduce-your-energy-use/energy-use-at-home





Chapter Four: Food

Why worry about what we eat?

Our food systems are designed to make money. We need them to make sense.

ANON

At any time of the year, most Australians can purchase a vast variety of fresh food: from tropical to temperate fruits and vegetables, meat, fish and dairy produce to a range of luxury food items. However this has come at a cost to us, to our planet and to the creatures we share it with.

Not only what we eat but how we purchase food has changed significantly over the past 50 years, as has our connection to our food and its production. Whereas in the past we may have grown some or most of our own food, shopped at the local butcher, baker, or greengrocer for food grown or produced by locally owned businesses, now we shop at

This most intimate nourishment, this stuff of life - where does it come from? Who produces it? How do they treat their soil, crops, animals? How do these choices - my choices - affect my neighbours and the air, land and water that surround us? If I knew where my food and drink came from, would I still want to eat it?

J. B. Mackinnon,
Plenty



supermarkets owned by large corporations, often unaware of where our food comes from, how it is grown, what resources are used in its production, and what wastes are produced as a result.

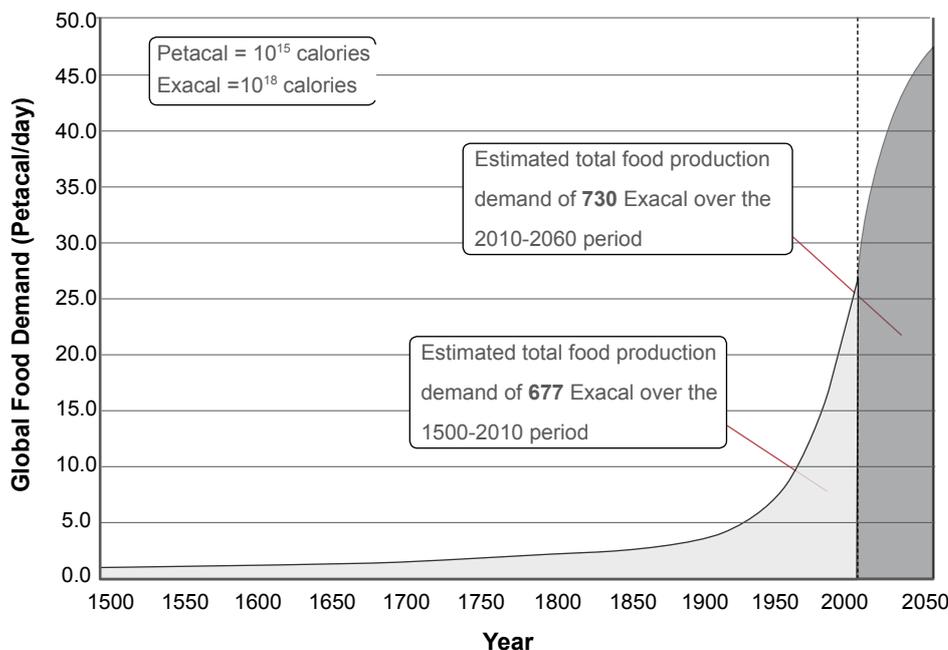
This chapter will look at how this has come about, what it has cost us and how we could respond by doing things differently in our own lives and in our communities.



The real cost of food on our plates

The modern industrialised agricultural practices that are now used to grow much of our food, were introduced by the Green Revolution (GR) of the 1950s, 60s and 70s. The GR sought to bring an end to world hunger by improving the production of staple crops such as wheat and rice. It saw the development of new varieties of high-yielding, disease resistant food crops, the introduction of oil-based fertilisers and pesticides, the construction of large-scale irrigation schemes and the development of globalised distribution systems.

These practices resulted in global food production doubling between 1960 and 2000, and saw the percentage of deaths by hunger decrease for a time (from 18.6% to 12.5% of the world's population between 1990 and 2008), after which it has levelled off (Food and Agricultural Organization of the United Nations [FAO], 2013). We still face the issue of continuing world hunger, now exacerbated by the impacts of climate change, economic development and world population growth. According to the CSIRO, the world faces something like a 70% increase in food demand between 2010 and 2050.



The challenge to produce enough food will be greater over the next 50 years than in all human history (Source: CSIRO, 2009)

The industrialisation of our food production has come at significant cost to our environment, our communities, our health and our local economies. The following diagram lists many of the impacts of this system of food production.



Large mono-cultures encourage erosion, pests and weeds. To maintain crop yield, large amounts of oil and gas based pesticides and herbicides are required.

The manufacture of fertilizer produces nitrous oxide as a by-product, and each tonne of nitrous oxide has the equivalent greenhouse effect of 310 tonnes of CO₂.

Agricultural land use contributes 12% of global GHG emissions.

There is significantly greater use of water than in more ecological forms of agriculture, with the depletion of ground water and artesian supplies likely results.

The use of hybrid seeds that don't reproduce true to type, therefore requiring the farmer to purchase new seeds every season rather than saving their own.

Severe health problems can result from exposure to synthetic pesticides and herbicides

Modern agricultural practices increase soil erosion above the rate of soil formation, depleting soils of their fertile layer.

Our food diversity is hugely reduced (Loughnan, 2012) and global seed companies own much of our food plant seeds.

Toxic chemicals, nitrogen, phosphorous and other fertilisers often run off into our streams, rivers and oceans. This affects drinking water and the health of ecosystems. Once these chemicals are in the food chain, they are ingested and accumulated by plants and animals, many of which end up on our plates.

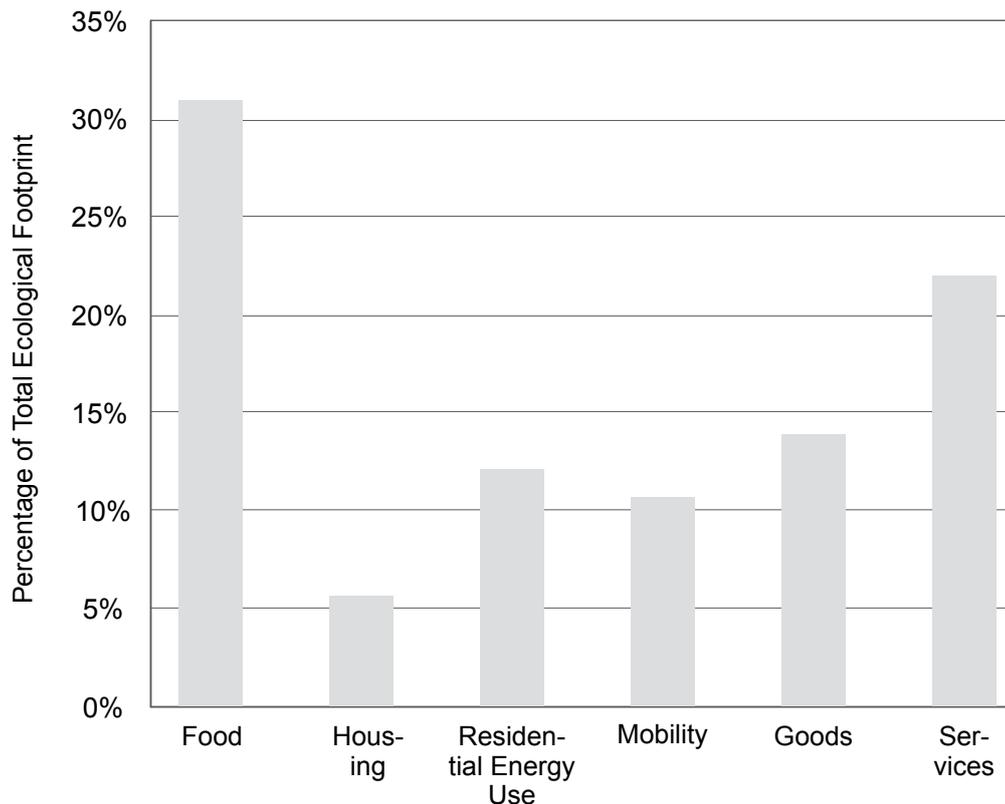
The build-up of synthetic chemicals depletes soil of natural soil microbes (bacteria, fungi, worms, tiny insects), which makes it less fertile. This in turn increases the amount of chemicals needed to sustain plant growth.

Impacts of industrialized food production

Other factors that contribute significantly to the environmental and human cost of the food on our plates include:

- the resources used to process, package, transport and store our food and dispose of the significant amount of food we waste (Loughnan, 2012)
- our increasing appetite for animal products, which has led to unsustainable farming and harvesting practices
- ownership of food production and supply services moving towards a small number of corporate giants, with many negative economic and social costs.
- population growth and development that leads to loss of farming land (according to the FAO the world loses 1% of its arable land each year)
- Increases in the incidence of obesity leading to chronic health issues such as cardiovascular disease and diabetes .

In Australia food plays a significant part in how we impact the environment. As well as the agricultural practices used to produce it, processing, packaging, transport, storage, refrigeration and waste disposal means that food is responsible for around 30% of our ecological footprint .



Australia's ecological footprint (Source: EPA 2008)

The cost of using oil and gas based chemicals and fuels for food production

The vast majority of agriculture today relies on oil or gas based synthetic chemical pesticides, herbicides (weed killers) and fertilisers to grow crops, and oil-based fuels to operate the machines that help produce them and the vehicles to transport them.

Oil and gas are non-renewable resources, and our access to cheap oil will decrease in the foreseeable future, which will have a huge impact on food production, prices and availability. It has been calculated that the energy required to produce food in the USA is 14 times the energy we obtain by eating it (Garza, 2014) Although improvements in agricultural methods are occurring, this dependence on oil for global food production and consumption cannot continue indefinitely.

Added to this are growing concerns about the use of synthetic chemicals in modern agriculture and their negative effects on human health and the environment. While there is still a great deal of controversy around this issue, a number of studies have shown that there is good reason to apply the precautionary principle to what we eat and to avoid food that has been grown with the assistance of synthetic fertilisers, pesticides and additives (Loughnan, 2012).

Some say that modern industrial agricultural practices are needed to produce the quantities of food required by our rapidly growing global population. The United Nations Food and Agriculture Organisation (FAO), however, has produced many reports expressing grave concern about the unsustainability of current food-production methods (FAO, 2014).

Fortunately, there are many people now challenging the direction in which our food- production systems are moving. Community gardens, farmers' markets, Community Supported Agriculture (CSA) projects, food hubs and food co-operatives are gaining momentum globally, and increasingly people are demanding healthier food options for ourselves and our environment.

'The world needs a paradigm shift in agricultural development ... from conventional, monoculture-based...industrial production towards mosaics of sustainable, regenerative production systems.'

United Nation Conference on Trade and Development, 2013

What can we do?

By buying or growing food that is produced without oil-based chemicals, we can begin to address these issues.





While organic food may sometimes cost more, this is not always the case.

You can source organic food through food co-operatives, some of which have weekly box schemes. The cost of a box can be comparable to similar non-organic produce from the supermarkets.

Another way to address the cost is to consider reducing the amount of processed food you buy, as this is often more expensive than fresh food.

Making sure food is not wasted also obviously reduces the amount of food you need to purchase.

Organic, chemical free, permaculture, biodynamics: What does it all mean?

Organic and certified organic

- According to chemists 'organic' describes carbon-based molecules, whether or not they are actually products of an organism or products of laboratory synthesis. According to this definition, all food is composed of organic materials whether or not they contain harmful chemicals.
- In terms of farming and gardening 'organic' means that all inputs for growing and pest or weed control are non synthetic.
- 'Certified organic' describes production practices that meet independent certification standards. In general, any business directly involved in food production can be certified, including seed suppliers, farmers, processors, retailers and restaurants.
- Generally, organic produce is healthier, and better for the environment, but not necessarily.
- Organic producers may still rely on mono-cropping; for example, a farm can still grow carrots organically using monocultural methods, run a fossil fuel burning pump 24/7, drain the aquifer to water the crop, and use underpaid illegal workers in appalling conditions. The farm may be owned by a large corporation who will simply leave it and move on when it becomes unproductive.
- Certification doesn't guarantee that food does not contain pesticide residues. While synthetic pesticides are prohibited in organic farming, some 'natural' pesticides may still be used, and they're not necessarily less worrisome just because they're 'natural'.

Chemical free

- Has no precise meaning, and food with this label may be any of several types.
- Food might have been grown using the same organic practices as 'certified organic' food.
- A farmer may have chosen not to pursue certification for a number of reasons, including the fact that gaining certification is a long and expensive process.
- Growers may claim produce is chemical free because they have not used pesticides, but they may still have used liberal quantities of chemical fertilisers.



Permaculture

- Permaculture is an integrated ecological design system for growing food, building homes and creating communities, while minimising environmental impact.
- Permaculture has 3 fundamental ethics:
 1. Take care of the earth
 2. Take care of the people
 3. Share the surplus (including limit consumption).
- Practitioners have a commitment to mimicking nature using the interconnectedness of natural systems (no monocultures here!).
- Through careful design, resources and effort can be minimised for maximum productiveness.
- It encourages resourcefulness and self-reliance. By careful consideration of resources used, it is possible to get much more out of life by using less.

Biodynamics

- Biodynamic thinking recognises a spiritual dimension to life, enlarging the basis of science to include the cosmic (planetary and lunar influences) and energy forces that impact on the growth of plants and animals.
- Each and every farm and farmer is different and each farmer is active in supporting the 'livingness' of their farm. The biodynamic method has no single recipe to offer.
- Has a focus of creating healthy and well structured soils, by supporting the production of humus. Creating healthy soils involves the use of fermented herbal and mineral preparations as compost additives and field sprays. By building and taking care of the soil using these methods, the aim is to be less reliant on large applications of compost or organic matter, which, in practical terms, could not be applied on large commercial farms.
- A focus of knowing the best time to plant, prune, harvest etc., which occurs, not according to season, but by using the phases and signs of the moon.
- Respects the interconnectedness of the soil, seeds, food and water, animals and people.

These various philosophies, principles and methods may overlap, or not be used in a pure sense. The best way to ensure quality for yourself and minimise impact on the environment is to get to know the grower, supplier or retailer, and ask questions.

Essentially, when you reduce the amount of synthetic chemicals you purchase through your food (however you do it), many benefits will follow.

CHAPTER 4

The following information is from the Environmental Working Group in the USA (a non-profit organisation that analyses results of government pesticide testing) and gives an indication of foods that are more likely to be affected by pesticides. (Unfortunately, there is no equivalent Australian data; however, the website: http://www.foodstandards.gov.au/_srcfiles/20thATDS_SUPPL_Part_3.pdf gives information on pesticide detections from some Australian studies.)

The fruits and vegetables below are ranked regarding their levels of pesticides on average, with a pesticide score given after each (source: www.foodnews.org).

highest pesticide load ↑	1	Peaches	100	16	Cucumbers	52	31	Watermelon	25
	2	Apples 	96	17	Raspberries	47	32	Blueberries	24
	3	Capsicums	86	18	Plums	46	33	Papaya	21
	4	Celery	85	19	Oranges	46	34	Eggplant	19
	5	Nectarines	84	20	Grapes (Dom.)	46	35	Broccoli 	18
	6	 Strawberries	83	21	Cauliflower	39	36	Cabbage	17
	7	Cherries 	75	22	Tangerine	38	37	Bananas	16
	8	Lettuce	69	23	Mushrooms	37	38	Kiwi 	14
	9	Grapes (Imprt)	68	24	Rockmelon	34	39	Asparagus	11
	10	Pears 	65	25	Lemon	31	40	Peas-Frozen	11
	11	Spinach	60	26	Honeydew	31	41	Mango 	9
	12	Potatoes	58	27	Grapefruit	31	42	Pineapples	7
	13	Carrots 	57	28	Squash	31	43	Corn-Frozen	2
	14	Green Beans	55	29	Tomatoes	30	44	Avocado 	1
	15	Chillies	53	30	Sweet Potato	30	45	Onions 	1
								lowest pesticide load ↓	



The cost of food miles

The term 'food miles' commonly refers to the distance our food travels from the time of its production to the time it reaches the consumer. The issue of food miles isn't simple, but is an important consideration when assessing the impact of the foods we choose to eat.

A lot of our food comes with its own 'round the world ticket', and the energy used is significant and increasing. A study into food miles in Australia found that the total distance for all transportation for a typical food basket in Melbourne containing 29 common food items, was 70,803 km; equivalent to travelling almost twice around the earth's circumference.

Oranges grown locally travelled 567 km, whereas Californian oranges (often found in supermarkets) travelled 12,878 km (Gaballa & Abraham, 2007).

Processed or multiple ingredient foods may accumulate more food miles.



Let's look at a packet of Kettle Chips (Choice, 2008) labelled "made in Australia", with a Sydney address:

- *The ingredients are potatoes from all along Australia's east coast, salt from Price in South Australia, and sunflower oil extracted in Newcastle and refined in Sydney.*
- *The packaging comprises fused layers of plastic and aluminium, with coloured ink for labelling. The plastic film is from Wodonga. The inks are made in Melbourne using components from India, China, the US and Europe. And the aluminium from Italy is added in Sydney, but the aluminium itself has probably been smelted from Australian bauxite.*
- *The chips are made in Shepparton – then transported to your store!*

An estimate of the average global carbon footprint of food attributes 11% to food miles, and a much larger percentage (83%) to how our food is grown (Weber & Matthews, 2008).

While there has been a great deal of emphasis on considering food miles, a more recent trend is in analysing the whole lifecycle of the food product's supply chain to assess its overall environmental and social impacts. This includes understanding how our food is produced and processed, how fairly workers have been treated in the process, what packaging has been used, as well as how far it has travelled to get to us. Learning more about how our food is produced and what it is made up of, as well as how far it has travelled to get to us, can help us to make wiser choices.

What can we do?

Buying locally or growing our own reduces food miles and therefore helps to reduce our carbon footprint, and our dependence on oil.

The cost of corporate ownership of our food

Does it matter who owns the seeds from which our food is grown? Does it matter where we buy our food from, or who has produced it? Isn't it good that we can now buy our milk and bread cheaper than a few years ago?

Increasingly, the ownership of our food systems is moving into the hands of fewer, larger corporations, whose fundamental responsibilities lie in looking after shareholders, rather than the communities in which they operate. The costs of this trend are enormous for local farmers, manufacturers and retailers who are being driven out of the market when they are unable to compete. For example, Inghams and the Steggles brand between them grow and process more than 80% of the chicken meat eaten in Australia. (Loughnan, 2012, p.115). And in 2014, Australia had only 7,500 milk farms, mostly owned by foreign companies, compared with 30,000 milk farms 30 years previously, of which 75% were family-owned (Knox, 2014). With increasing control acquired by the big players, we risk being vulnerable to collusion and price fixing, decreased choice of where to shop, and reduced choice of producers.

The ownership of seeds

Until the first half of the 20th century, seeds were overwhelmingly in the hands of farmers and public-sector plant breeders. Farmers exchanged their seeds allowing them to share new varieties.

After WWII chemical companies who had diversified into fertilisers and pesticides began to invest heavily into seed research and the development of 'hybrid' seeds, while buying up seed companies. These seed companies have used intellectual property laws to commodify the world seed supply. In other words, they have worked to ensure that seeds that everyone has a right to collect, exchange and share, have become a product that can only be bought and sold. By patenting their seeds, they are able to charge growers on the basis of intellectual property rights, and thereby maximise profits. Hybrid seeds require chemicals, and many seeds will only grow with the exclusive use of chemicals owned by the company who owns the seeds (CSIRO, 2011). Hybrid seeds also do not generate fertile seeds that can then be used to grow subsequent crops. This means that farmers need to continue buying their seed from the companies that "own" them.

In 2008, the proprietary seed market (branded varieties subject to intellectual property protections) already accounted for 82% of the world's commercial seed supply. In less than 3 decades, a handful of multinational corporations have managed to take control of much of the first link in the food chain. The world's largest seed company, Monsanto, accounts for

Seeds are the very beginning of the food chain. He who controls the seeds, controls the food supply and thus controls the people.

Dominique Guillet,
Association Kokopelli,
www.kokopelli-seeds.com



If more of us valued
food and cheer above
hoarded gold, it would
be a much merrier
world.

JRR Tolkien

almost one-quarter (23%) of the global proprietary seed market. The top 3 companies (Monsanto, DuPont, Syngenta) together account for US\$10.3 billion, or 47% of the worldwide proprietary seed market (ETC Group, 2008).

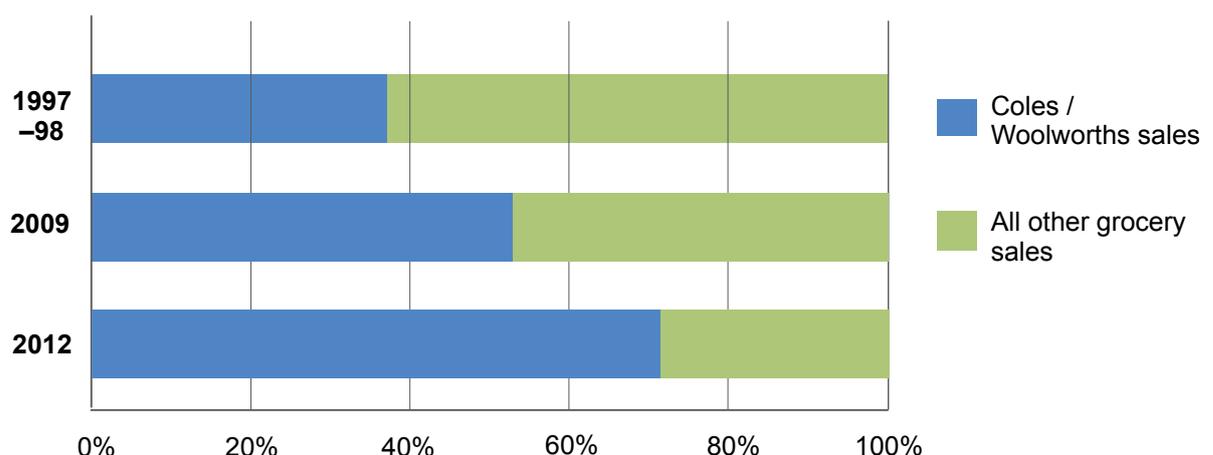
To date, the corporate takeover of seed production in the US, has had several negative impacts, including:

- Conventional seeds are reduced/eliminated, giving farmers little choice but to buy genetically modified (GM) seeds.
- The high price of GM seeds (Monsanto's patents on seeds permit prosecution of farmers who save the patented seeds, so seeds must be bought each year) and the fertilisers and pesticides used with them. This hurts farmers financially.

Monsanto's 'strong-arm' tactics with ever fewer remaining independent seed companies further reduces farmers' seed choices, and increases the company's stranglehold on seed sales. For example by January 2013 Monsanto had filed 144 patent infringement suits against 410 farmers and 56 small businesses in the USA with Monsanto pocketing US\$23million. Such tactics have led to a huge drop in the diversity of seeds that have been cultivated for millennia. Over 85% of corn, cotton, and soybeans farmed in the U.S.A. are now genetically-engineered (GE) varieties. This makes the option of farming non-GE crops increasingly difficult (Center for Food Safety, 2013).

Supermarket domination

Most of us buy most of our food from supermarkets. And of these supermarket sales, most are now from the big 2 chains, Woolworths and Coles, who between them have a huge 71% share of the grocery market (Choice online July 2012)



Market share of all grocery sales in Australia (Source: Choice online and <http://bit.ly/NZHLHo>)

Supermarket shelves are now also increasingly packed with their own home brands (or private labels). The market share of private labels grew from 15 per cent in 2003 to 25 per cent in 2010 and both Coles and Woolworths are looking at doubling their private label market share (Australian Food & Grocery Council submission to Senate Committee 2012).

Where do these private-label products originate? Researchers from the Australian National University found two common sources were Thailand (e.g. canned pineapple facilities) and South Africa (e.g. fruit processing factories), two countries that are notorious for not protecting workers' rights and for paying extremely low wages.

An investigation by Melbourne's newspaper, The Age, found the rate of imported food products is increasing at a rapid pace, as the only way for the big two supermarkets to provide their unfair low prices is to buy food produced in countries with cheap labour (Food Mag online, 2012).

One impact of this trend towards cheaper imports is that smaller farmers and industries can be forced out of business. The decline of the Australian canned-tomato industry is an example of what can happen.

Thirty years ago the canned-tomato industry in Australia involved 400 Australian growers and 7 canneries. Today there are just 9 growers and 1 processor. Around 80% of canned tomatoes on our supermarket shelves are now imported, with the majority coming from Italy (Fyfe & Millar, 2012). As well as being marketed for their 'romance', Italian tomatoes benefit from low wholesale prices (partly as a consequence of cheap, sometimes illegal, migrant labour, and European Union subsidies), making Australian canned tomatoes a less attractive choice.

The reality is that when production is taken off shore, we lose control of the farming practices used; the levels of pesticide used; and the wages and conditions of workers. At home, the negative effects on Australian farmers and producers trickle down to local communities and local economies.

Even when supermarkets do use Australian producers, with such a concentration of market power, they can deal directly with farmers and producers to secure the lowest prices and best terms possible. An example is the supermarket milk wars.



The recent supermarket milk wars have had a huge effect on the Australian dairy industry. Dairy processors are being paid less by the big supermarkets, so are paying farmers less for their milk. As Queensland dairy farmer Paul Roderick says 'This is on the back of an increase in everything else – an increase in water, power, fertiliser and fuel. All our costs have gone up by at least 50 per cent in the last 10 years.' Australian Dairy Farmers president Chris Griffin says 30 dairy farmers from Queensland have left the industry since the milk wars began (March 2011). 'We want a fair return for everyone in the price chain,' he said. "The last time milk was valued at \$1 was in 1992. No one can live on the same wage they did in 1992. Why should farmers have to?"

Cook, 2012

A Senate inquiry into the effect of the supermarket duopoly in 2012 found an indication of the bullying behaviour of the major supermarkets, ironically, lay in the reluctance of the suppliers to speak up, as they were terrified of the repercussions, including being relegated to a lower shelf, incurring more fees or being removed from the shelf altogether (Food Mag online 28 May, 2012).

As we see, smaller producers and retailers are constantly being put out of business, unable to compete with the massive buying and negotiating power of the large corporations. With the decline of local businesses, many local shops and neighbourhood shopping areas fall into disrepair. We are becoming more dependent on large shopping complexes, mostly full of chain stores rather than privately owned businesses. And they usually require us to drive to them, as they are often not within easy walking distance of our homes.

What can we do?

There are many alternatives to shopping at the large supermarkets. By supporting local bakeries, green grocers, butchers and small grocers, as well as farmers' markets and food co-ops, we help strengthen our local community and economy.

Buying local



Reduces our greenhouse gas emissions through decreased food miles.

CHECK SEASONAL HARVEST CALENDARS to see what produce is in season locally.

Preserves genetic diversity as small farms often grow a wider range of varieties.

SHOP AT A FARMERS' MARKET where you're more likely to be able to find out how food is actually grown.

Helps build community by creating positive social connections between producers, sellers and customers.

DON'T ASSUME THAT FOOD IS ALL CHEAPER AT THE LOCAL BIG CHAIN SUPERMARKETS.

Supports local farmers by increasing their ability to get a fair price for their products, and decreases their reliance on selling to large supermarkets.

SHOP AT YOUR LOCAL BUSINESSES where producers and sellers benefit, rather than shareholders.

Of course, not all food can be produced locally, but if we try to support the producers of food that we **can** access in our area, local production is likely to increase. If these producers are able to sell their produce without large transport costs, and for a fair price, they are able to support local employment and local food security.

When buying food from other areas in Australia or from overseas, try to ensure that it is produced fairly; for example, most tea and coffee consumed in Australia is imported, though there is some local production. There is now a wide range of Fair Trade labels. Just look for the Fair Trade logo on the packaging.



Getting started on growing your own

Getting started can be as easy as walking out into the garden, finding a sunny spot, digging the soil, adding some compost and planting some seeds or seedlings. If you haven't grown food before, starting small can allow you to gain confidence. Once you've started, see what works and what doesn't, learn about why or why not, and then expand.

If you're wanting to tackle something bigger, things you may wish to consider include:

- **The aspect of the site** – You will need as much sun as possible: fruit and veges like the sun as well as wind protection if possible. Remember that the sun is lower in the northern sky in winter, so the sun access in your garden may change.
- **Your soil type** – Soil type usually refers to the size of the mineral particles in your soil. Sand has the largest particles, through to clay, with the smallest. Sand is quick draining, but has trouble retaining soil particles. Clay is full of nutrients, but is slow draining. The ideal soil, loam, contains both nutrients and retains water. To improve soil, add organic matter such as compost and manures. Worms in your soil are a great indicator of soil health.
- **Starting a compost heap &/or worm farm** – Making your own compost for your garden is the best gift you can give to the soil and your plants. Continually being able to feed your garden with organic compost provides the nutrients and organic matter it needs to keep healthy.
- **Mulching** – Protecting your soil with mulch is the best way to retain water in the soil. It also helps keep down the weeds.
- **How you will water your garden?** Will you harvest water from your roof into a water tank? Will you set up a watering system? – Remember a drip system is more waterwise than a spray system.
- **Climatic zones** – Different parts of Australia are in different climatic zones that affect what you can successfully grow at various times of the year. The back of seed packets will give you information, or the seedlings available will give an indication of what's good to plant now. If considering trees, it is especially important to take into account the local climatic conditions.
- **You may also want to consider** biodiversity, ecosystems and multiple layers, as we see in nature. Permaculture recognises that there are many types of trees, plants, insects and animals living together in a system that continually strengthens itself. In an ecosystem each of the different components serves a function, or multiple functions.

Growing your own



Home food gardening may be the single most important environmental contribution we can make.

MAKE A START: find a patch of soil in the sun, or a pot, and try growing something simple, such as lettuce, or herbs.

Growing vegetables and composting waste produces oxygen and sequesters carbon into our soils. This reduces our eco-footprint, erosion, greenhouse emissions and the water used to produce our food.

JOIN A COMMUNITY GARDEN, meet like-minded people and help build local neighbourhoods.

Significantly reduces the food miles in the production of our food.

JOIN A PERMACULTURE OR GARDENING GROUP and learn with others.

It's fun, rewarding and it allows us to feel more connected to nature.

BE PART OF MAINTAINING BIODIVERSITY in your local area. Save and swap seeds and cuttings or get healthy seedlings from the farmers' market.

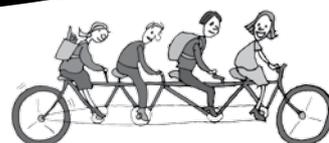
Reduces the waste that is normally associated with food production. Pick what you need as you need it, give the surplus away to friends and neighbours, swap for other produce or services or sell the excess!

CHECK OUT THE ABC'S 'GARDENING AUSTRALIA' program for inspiration and great stories on community projects being initiated throughout the country.

A great learning opportunity for you and the kids in your life; helps them understand and appreciate where food really comes from - not the supermarket, but the soil!

BUILD A COMPOST OR WORM FARM

The freshest food you can use in your kitchen. And it tastes great!



The cost of eating animal products

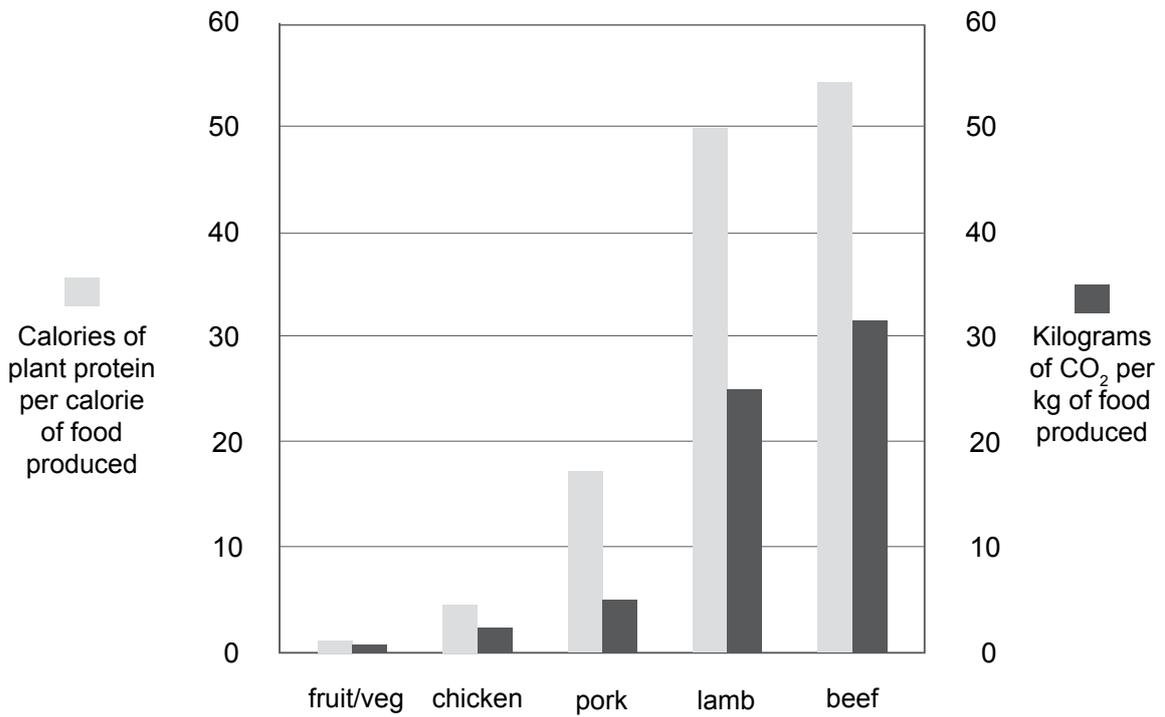
Our carbon 'hoofprints'

Raising animals for food generates more greenhouse emissions than all the cars, trucks, trains, ships and planes in the world combined (FAO, 2006) and accounts for nearly a fifth of global greenhouse emissions. It's also a very inefficient process. If you factor in the amount of grain needed to produce meat, a single hectare of land can produce 29 times more food in the form of vegetables than in the form of chicken meat, 73 times more than pork and 78 times more than beef (Cribb, 2010).

Australians are among the biggest meat eaters in the world, with each of us consuming an average of 111 kg per year (VDEP 2013). Based on current nutritional guidelines this is about 3 times as much as is recommended. One serve of meat should be 90-100 g (NHMRC 2014) raw weight, which is much smaller than most restaurant or cookbook portions.

Managing the demand for animal products by promoting a dietary shift away from a meat rich diet will be an inevitable component of the environmental policy of governments.

United Nations Food and Agriculture Organisation (FAO), 2006



Plant protein requirements and CO₂ emissions associated with meat production
 (Source: CSIRO *Balancing Act 2005 Report*)

'Eat food.
Not too much.
Mostly plants.'

Michael Pollan, Defence
of Food: An Eater's
Manifesto

Factory farming

According to a UN report, animal industries are one of the most significant contributors to the most serious environment problems, at every scale from local to global.

FAO, 2006

Factory-farming is the practice of raising large numbers of animals for meat in very confined spaces. It has come about due to the desire of corporations to rear animals in the fastest way possible, at the lowest 'monetary' cost. This in turn has led to an ever-increasing demand by consumers for 'cheap' meat.

This supply and demand scenario has meant that global meat production almost doubled between 1980 and 2004, and the United Nations Food and Agriculture Organisation (FAO) expects it to double again by 2050 (FAO, 2006). In Australia, most chickens (both egg layers and meat chickens), turkeys, pigs and about half a million cattle are reared in this way. 80% of beef sold in Australian supermarkets is sourced from Australian factory farms (Loughnan, 2012).

These intensive farming practices have various environmental, health and animal welfare impacts:

- Animals are unable to graze or forage on their natural food sources, but are instead fed on high energy grains, which are produced with their own environmental impacts.
- Factory farms are too small to allow manure to be absorbed. This contributes to the pollution of our waterways, and damages plant and animal life as a consequence of surplus nutrient runoff.
- Antibiotics are used extensively to control diseases in highly confined animals. As a result, stronger strains of bacteria are developing, which are becoming immune to antibiotics used to treat infection and sickness in humans as well as animals.
- High stocking densities provide a high-stress environment for animals designed to graze open pastures.

What can we do?

By reducing our red meat consumption, and animal products in general, we are able to significantly reduce our environmental footprint, save money on the weekly shop, and improve our health.





Reducing red meat consumption

- Probably the easiest way to reduce your carbon footprint.
- Reduces the embodied energy and water resources needed for meat production.
- Reduces methane production (a very potent greenhouse gas).
- Reduces the need for increasing deforestation to accommodate more animals.
- Although eating poultry is not without its impacts (with a higher eco footprint than plant-based protein), free-range white meat has a much lower footprint than red meat.
- Try reducing the size of meat portions.
- Try to reduce number of meals per week that you eat meat; substitute meat with plant protein (e.g. lentils, nuts, legumes).
- When buying meat, try to choose grass fed rather than grain fed.
- Instead of beef or lamb, try meats such as kangaroo, rabbit or goat.
- Try the 'Meatless Mondays' Challenge (see 'Challenges' section).

'There's plenty more fish in the sea'?

While fish may have a lower carbon footprint than red meat, eating fish comes with its own environmental issues and costs. Overfishing of wild fish is a big issue both internationally and nationally. According to a UN report (FAO Fisheries Department, 2010), around 85% of global fish stocks are over-exploited, depleted, fully exploited or in recovery from exploitation.

Australians consume about 16Kg of fish per person per year of which 72% is imported (WAFIC 2014 and Seafood Importers website), a big increase since the 1940s when we consumed 4.9kg per person per year (ABS 4306.0)

Despite dire warnings since 2006, overfishing continues. Many of the fish we see in our supermarkets or the local fish shops are on the endangered list.

One example is New Zealand's Orange Roughy (also called Deep Sea Perch), a very slow growing and a very long lived fish (up to 120 years) that does not breed until it is between 23 and 31 years old. The Orange Roughy has suffered years of over fishing, with less than 30% of their population remaining. With their extremely slow growth rate, it will take decades for Orange Roughy populations to recover. Furthermore, Orange Roughy is an example of fish caught by bottom trawling. This effectively bulldozes the sea floor demolishing corals and all seabed plant life, thereby destroying entire eco-systems. Deepwater sharks and other non-target fish species are also caught, which alters marine food web dynamics (Weeber et al Sept 2010).

Other endangered wild fish local to Australia include some of our biggest predators: shark (or flake in the local fish and chip shop), tuna, cod, and sword fish.

Aquaculture (farmed fish) now makes up 50% of all fish consumed globally. Ironically, rather than relieving pressure on wild fish stocks, the growth of aquaculture has actually exacerbated the problem. Thousands of tons of fishmeal, mostly anchovies, herring and sprats, are required to sustain farmed fish.

In Australia we produce, as well as import, farmed fish. Salmon farmed in Tasmania in 'sea cages' are fed a special diet including fish proteins and antibiotics, plus nutrients to make the flesh pink. Infections can spread rapidly amongst the populations and with bacteria developing resistance to the antibiotics; the impacts are then felt within human health also (Sustainable Seafood Guide). There are many sustainable fish options we can choose. For more information go to www.marineconservation.org.au





Reducing unsustainable consumption of fish

- Visit **www.amcs.org.au** to download a free 3-step pocket guide to choosing more sustainable seafood
- Try to avoid long-lived or slow-growing species.
- Try to avoid deep-sea (below 500 m) species as they can often take decades to reach maturity.
- Try to avoid imported fish as it's hard to know from where it is sourced.
- Okay fish to buy – Blue Grenadier (Hoki), Barramundi, Blue Eye Trevally (Blue-eye Cod), Bream, Yellowfin tuna, Flathead, Whiting, Mullet, Ling, Snapper, Tailor Calamari and Coral Trout.
- Fish to avoid – Blue Warehou, Eastern Gemfish (Hake, Silver Kingfish), Redfish (Nannygal, Red Snapper), Southern Bluefin Tuna, Silver/White Trevally (Silver Bream), Orange Roughy, Swordfish, Atlantic Salmon and Rainbow Trout.
- For more on fishing impacts of different species see **<http://www.amcs.org.au/>**

The cost of food waste

With our current industrial food systems, waste occurs throughout the production and distribution chain. From farmers ploughing their produce back into the ground when it costs them more to sell it, to supermarkets discarding 'imperfect' food, food spoilage during transportation, and throwing out unused or leftover food at home and in restaurants, the costs of this waste are enormous.

In Australia, 20% of all food bought is thrown out. This amounts to 345kg of food per household per year and accounts for 35% of Australia's municipal waste stream; commercial food waste makes up an additional 21%. (<http://www.lunchalot.com/foodwaste.php>).

Apart from wasting money, this wastage has serious environmental implications.

When organic waste is compressed in landfill, it results in large emissions of methane, a greenhouse gas with 21 to 25 times the impact of CO₂. According to the CSIRO, decomposition of organic waste in landfill is one of the main sources of Australia's greenhouse gas emissions. The impact of stopping this waste would be the equivalent of taking one in 5 cars off the road.

When we throw away food, we are also throwing out the resources that went into its production, processing, storage, packaging, refrigeration, transport and cooking.

Surveys show that most people don't see food waste as a big problem, yet reducing it can have significant environmental benefits, as well as save us money.

The most remarkable thing about my mother is that for 30 years she served the family nothing but leftovers. The original meal has never been found.

Calvin Trillin

These days, we throw a lot away, but where exactly is 'away'?

In Australia, \$5.4 billion worth of food is thrown away each year.

lovefoodhatewaste.nsw.gov.au

What can we do?

Reducing food waste saves us money as well as lessens our carbon footprint.



Reducing food waste

- Try to make sure leftovers are used rather than thrown out.
- Plan meals around the ingredients you have. Check the ingredients in your fridge and cupboards, then write a shopping list for just the extras you need.
- Start (if you haven't already) a compost or worm farm, or a worm tower that directly feeds your garden (see right).

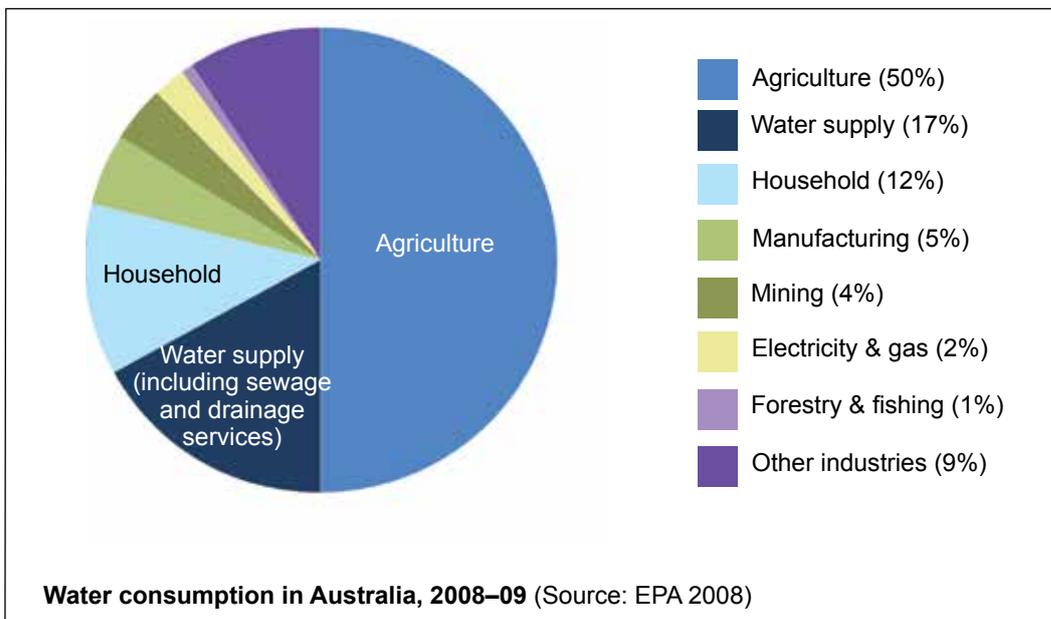


- Improve your knowledge about the best way to keep different types of food fresh, e.g. cucumber, capsicum and eggplant should be stored wrapped in the fridge. Potatoes should be kept in a cool dark place and will last much longer if they are unwashed and not stored with onions. When close together, potatoes and onions produce gases that spoil each other.
- Learn the art of preserving food, e.g. bottling or drying food when it is in season and abundant, for use when fresh is not in season locally.
- Try not to throw it away! e.g. fruit that is just going soft can be made into smoothies or fruit pies. Vegetables that are starting to wilt can be made into soup.
- Keep a healthy fridge. Check that the seals on your fridge are good and check the fridge temperature. The fridge section should be between 3°C and 5°C for maximum freshness and longevity.
- When you buy new food, bring older items in your cupboards and fridge to the front. You run less risk of finding something mouldy at the back of your food stores!
- Serve small amounts of food with the understanding that everybody can come back for more once they've cleared their plate. This is especially helpful for children.
- Every so often, check your cupboard and the 'use by' dates of what you have and plan around that.
- See www.lovefoodhatewaste.nsw.gov.au for other ideas on reducing waste.
- Ditch the plastic bags!

And what about water?

As well as the large amounts of energy and resources that go into food production, we also use and waste vast quantities of water. These amounts are much higher with modern agribusiness than with more traditional farming methods, as agribusiness practices do not include the mulching of crops, meaning water is lost to evaporation.

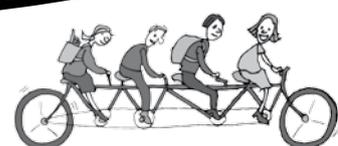
Food is the major user of water of all human activity. Agriculture accounted for 52% of our water usage in Australia in 2009-10, compared with 14% for direct household usage (ABS 2012).



As we found in the water chapter, the water we use in our homes is relatively easy to measure, but measuring the water footprint of things we consume, including food, is much more difficult.

The 'water footprint' of a product or service is a measure of the amount of fresh water required to produce it. Although this is not a true indication of the sustainability of production (for example, irrigated rice in a low rainfall climate is much more unsustainable than non-irrigated rice in an area of high natural rainfall), it can be helpful in giving us an idea of water usage in a range of products.

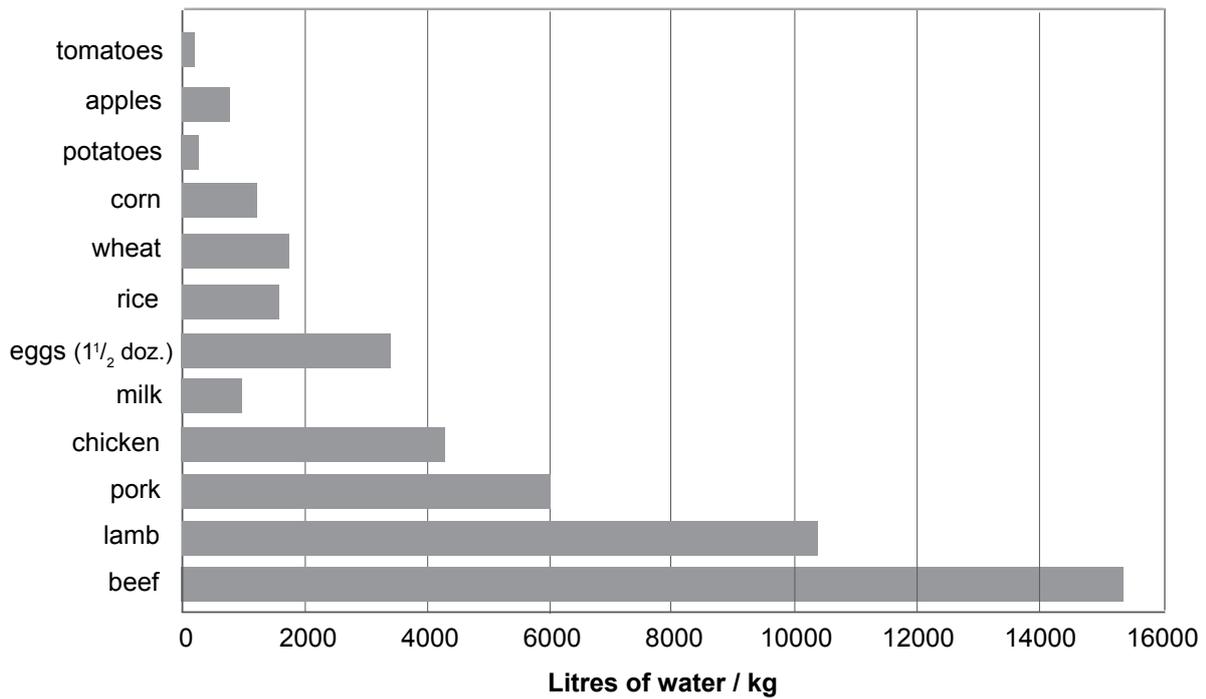
A 2004 Melbourne University study found that for every litre of water consumed directly in the average Melbourne household, nine more litres are consumed indirectly through the water used to produce food. (Rutherford et al, 2004). This amount is significantly less if the household is made up of vegetarians.



Replacing 50% of all animal products by an equivalent amount of high nutritious crop products such as pulses, groundnuts, and potatoes will result in a 30% reduction of the food-related water footprint.

UNESCO, 2010

The graph below shows figures for the water required to produce particular products. The largest amount of water in animal production is water for animal feed .



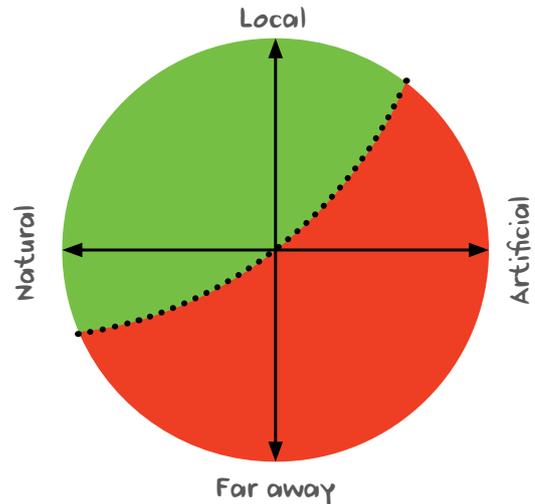
Water footprints in Australia (Source: data from www.waterfootprint.org)

Having a strong local food system and food produced without large amounts of chemicals, can make our community more self-reliant and connected, less oil dependent, healthier and less exposed to global price fluctuations that affect how much we pay for our food.

And remember!

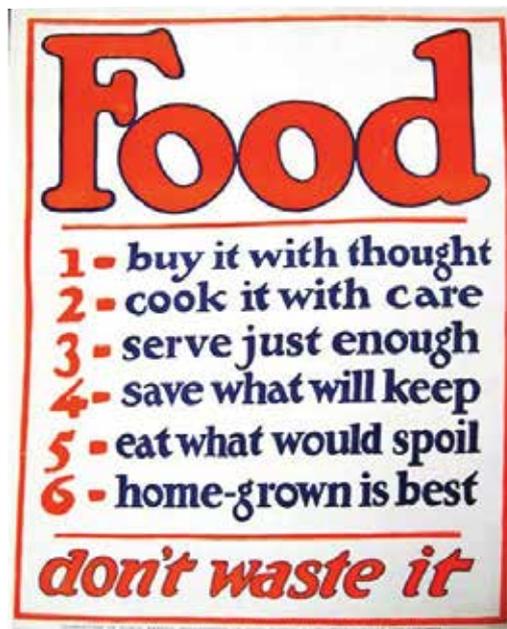
When deciding to change how you currently buy or consume food, it doesn't have to be all or nothing. We all start from a different place; some may already be members of food co-ops or community gardens, and some may never have tried their hand at gardening, or really considered these issues.

Essentially, if we head towards more local and more natural food, we're heading in the right direction. The diagram on the right is useful in understanding this. By trying to staying in the green zone, we're making gains!



Reconnecting with the sources of our food can be an exciting journey. It does require time and energy, but the rewards are well worth it.

In a
nutshell!



Poster used in the USA during World War I (Source: <http://bit.ly/NyMI46>)



My food action plan

	Will do	Have Done	N/A
FREE-\$ Buy more chemical free/organic food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE-\$ Buy more locally produced food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE Reduce number of meat meals per week	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE Reduce portion sizes of meat needs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE Ensure fish I buy is sustainable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE-\$ Support my locally owned businesses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE-\$\$\$ Start a vegetable garden	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE-\$ Start a compost	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE-\$ Start a worm farm or worm tower	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE-\$ Join/start a food co-operative	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE Shop more at a farmers' market	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE Join/start a community garden	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE Learn more about storing food effectively	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE Try to use up more left overs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE Refuse plastic shopping bags (inc. fruit)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE Buy less processed and packaged food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other ideas: _____

Challenges

These challenges are designed to be a fun way of exploring issues, making us aware of how reliant we are on the resources we have, as well as encouraging longer term behavioural change.

Below is a list of challenges, but we also welcome your ideas. We hope you will do at least one of the challenges, but feel free to have a go at more! If you have other ideas, we'd love you to share them with others in Transition Streets.

We encourage you to share your experiences of the challenges, through your Facebook page or Twitter, media interviews, or simply chatting with family and friends.

1. **For one meal (or more!)** – Organise a local food dinner in your street. Try to source all the food you use for the dinner locally (maybe from the Hunter region, or within a certain radius of Newcastle).
2. **For ever!** If you eat meat, try the 'Meatless Mondays' challenge (there's even a website! <http://meatlessmondays-australia.com/recipes/>)
3. **For one week** – Have a street Vegetarian Week and share your favourite vegetarian recipes.
4. **For as long as you like!** – Start a street recipe book to share your favourite local food and/or vegetarian recipes. Get the kids in the street to provide illustrations for each recipe.
5. **Each week (or fortnight)** – Attend the local fish market together, get to know which are good sustainable fish to buy there.
6. **For as long as you live in the street!** – Start or join a bulk-buying food group in your street.
7. **A few times** – Find a good gardener in your street and ask them to show the group around their garden, giving some gardening tips to everyone.
8. **Regularly** – Organise gardening days in each others gardens to share tips.
9. **Sometimes** – Start a food garden somewhere in your street, on the verge, in someone's front or back garden, or on some common land.
10. **Regularly** – Get together for a food-preserving day. Make preserves, jams, pickles or chutneys.
11. **For one week (or month)** – Every time you throw out food, estimate the cost of it, and put that amount into a jar. How much did you have at the end of the week/month? Did it make you try to reduce your waste at all? What did you change?



Suggested plan for your group discussion

Catch up – How has everyone’s week been?	(10 mins)
Discuss outcomes from the energy month <ul style="list-style-type: none"> • What has changed in your home? Street? • What challenges did people attempt, and how did they go? 	(20 mins)
Review Food chapter content <ul style="list-style-type: none"> • What was the main thing you gained from the chapter? • Did anything surprise you? • How did you feel about how/where you source your food currently? • Would you like to change how you buy your food? 	(20 mins)
Discuss your action plans <ul style="list-style-type: none"> • What do you want to achieve this month? • What assistance (if any) would you like from others in the street? 	(25 mins)
Explore ideas for action that you could do as a group? <ul style="list-style-type: none"> • What could you do together that you couldn’t do alone? 	(20 mins)
Decide on which challenges you want to try this month.	(10 mins)
Confirm details for the next time you get together.	(5 mins)



**GET THE
KIDS
INVOLVED!**

1. Give them a small food garden that they are responsible for designing and looking after. Simple food to start with include lettuces, radish or peas.
 2. Try a box or container food garden. Maybe they could paint a colourful foam box or use any crazy container like an old boot, shopping bag or juice box. Group some together and get creative.
 3. Forget Lucky Dips. Try Lucky Digs instead! By growing carrots and potatoes, kids can experience the surprise of finding a large veggie hiding in the soil. They could dig for their dinner, and hopefully they'll get lucky and find a big potato and carrot.
4. Ask them to choose a favourite vegetarian or local food recipe to put into a street recipe book, and do an illustration for the page.
5. Talk with them about why growing food is good to do, or why you choose to buy where you do. Involve them in choosing food at the market or fruit shop.

Further resources

DVDs

- **Dirt! The Movie** takes you inside the wonders of the soil. It tells the story of Earth's most valuable and underappreciated source of fertility – from its miraculous beginning to its crippling degradation.
- **The End of the Line** – the first major feature documentary film revealing the impact of overfishing on our oceans. In the film we see first-hand the effects of our global love affair with fish as food.
Watch online: <http://endoftheline.com/>
- **The Future of Food** offers an in-depth investigation into the disturbing truth behind the unlabeled, patented, genetically engineered foods that have quietly filled grocery store shelves for the past decade.
Watch online: <http://www.thefutureoffood.com/>
- **Food Inc.** For many people, the ideal meal is fast, cheap, and tasty. Food, Inc. examines the costs of putting value and convenience over nutrition and environmental impact. Warning: It does contain some graphic footage.
Watch online: www.filmsforaction.org/Watch/Food_Inc/



Websites

- Australian City Farms and Community Garden Network – for great info and resources <http://communitygarden.org.au/>
- Love Food Hate Waste – a NSW Government site helping you avoid food waste, have time and money and reduce your environmental impact by planning better, shopping smarter and storing food effectively. <http://www.lovefoodhatewaste.nsw.gov.au/>
- Kylie Kwong talks about food waste. Search for Kylie at: <http://foodwise.com.au/>
- supermarketfree.com.au

Books

- *The Conscious Cook: Sustainable Cooking and Living*, Giselle Wilkinson, 2008
- *Fast Food Nation: The Dark Side of the All-American Meal*, Eric Schlosser, 2002
- *Food Shock: The truth about what we put on our plates... and what we can do to change it*, Dianne Loughnan, 2012
- *Frugavore: How to grow your own, buy local, waste nothing and eat well*, Arabella Forge, 2010
- *Stuffed and Starved: Markets, Power and the Hidden Battle for the World's Food System*, Raj Patel, 2007
- *The Omnivore's Dilemma: The search for a perfect meal in a fast food world*, Michael Pollan, 2011

References

Australian Bureau of Statistics (ABS) (2000) Apparent Consumption of Foodstuffs, Australia, 1997-98 and 1998-99. Cat no 4306.0. <http://bit.ly/11X4Cwz>

ABS (2012) Year Book Australia 2012 Water 1301.0. <http://bit.ly/1z1cebq>

Australian Food Sovereignty Alliance (2013) The People's Food Plan. <http://www.australianfoodsovereigntyalliance.org/peoples-food-plan/>

Cahill, C., & O'Neil, S. (2010) Catering for the Environment: how to create an environmentally friendly event. <http://bit.ly/1tvbx5J>

Center for Food Safety (2013) Center for Food Safety and Save Our Seeds Investigate Role of Seed Patents in Consolidating Corporate Control of Global Food Supply. <http://bit.ly/1vn1WSE>

CHAPTER 4

Choice (2008) Food miles - why eat 'local'? The distance food travels. <http://bit.ly/1rxH07A>

Choice (2012) Supermarket special. <http://bit.ly/123mfK6>

Cook, H (2012) Skimming the dairy farmer dry. <http://bit.ly/1vne5aa>

Cribb, J. (2010) The Coming Famine: The global food crisis and what we can do to avoid it. CSIRO Publishing.

CSIRO (2009) Sustainable Agriculture: Feeding the World. Presentation by Dr Megan Clark. <http://www.csiro.au/Portals/Multimedia/On-the-record/Sustainable-Agriculture-Feeding-the-World>

CSIRO (2011) Food security explained: issues for Australia and our role in the global challenge. www.csiro.au: <http://www.csiro.au/Organisation-Structure/Divisions/Plant-Industry/Food-security-explained.aspx>

EPA Victoria (2008) Victoria's Ecological Footprint. <http://www.epa.vic.gov.au/~media/Publications/1267.pdf>

ETC Group (2008) Who Owns Nature? Corporate Power and the Final Frontier in the Commodification of Life. <http://bit.ly/1FveLNf>

Food and Agriculture Organization of the United Nations (FAO) Fisheries Department (2010) State of World Fisheries and Aquaculture (SOFIA). <http://www.fao.org/docrep/013/i1820e/i1820e00.htm>

FAO (2006) Livestock's long shadow: Environmental issues and options. <http://www.fao.org/docrep/010/a0701e/a0701e00.htm>

FAO (2014) Sustainable Agriculture: The Post-2015 Development Agenda and the Millennium Development Goals. <http://www.fao.org/post-2015-mdg/14-themes/sustainable-agriculture/en/>

FAO (2013) The State of Food Security in the World 2013. <http://www.fao.org/docrep/018/i3434e/i3434e00.htm>

Food Mag online (2012) Where does the food sold in Australian supermarkets really come from? <http://www.foodmag.com.au/news/where-does-the-food-sold-in-australian-supermarket>

Fyfe, M., & Millar, R. (2012), Canned: why local tomatoes cop a pasting. <http://www.smh.com.au/national/canned-why-local-tomatoes-cop-a-pasting-20120526-1zc2q.html#ixzz22rs7aop9>

Gaballa, S., & Abraham, A. B. (2007). Food Miles in Australia: A preliminary study of Melbourne, Victoria. CERES Community Environment Park, Melbourne. http://www.theage.com.au/ed_docs/food_miles.pdf

Garza, Eric (2014) Energy, Diminishing Returns and the Future of Food. <http://www.howericlives.com/resources/energy-diminishing-returns-and-the-future-of-food/>.



Knox, M. (2014). Duopoly Money: Coles, Woolworths and the price we pay for their domination. *The Monthly*, August, p. 26.

Loughnan, D. (2012) *Food Shock*. Exisle Publishing, Auckland.

MacKinnon, J.B., & Smith, A. (2008) *Plenty: Eating Locally on the 100-Mile Diet*. Clarkson Potter.

National Health and Medical Research Council (NHMRC) (2014) Lean meat and poultry, fish, eggs, tofu, nuts and seeds and legumes/beans. <http://bit.ly/1zYYkaN>

Rutherford, I., Tsang, A., & Tan, S.K. (2004). City people eat rivers: estimating the virtual water consumed by people in a large Australian city. University of Melbourne.

Seafood Importers Association of Australia www.seafoodimporters.com.au

Sustainable Seafood Guide <http://www.sustainableseafood.org.au/pages/aquaculture-in-focus.html>

Sydney Food Fairness Alliance & Food Fairness Illawarra (2006) The long journey of our well-travelled food: Understanding food miles. <http://bit.ly/1CkgBEI>

United Nations Conference on Trade and Development (2013) *Wake Up Before It's Too Late*. http://unctad.org/en/publicationslibrary/ditcted2012d3_en.pdf

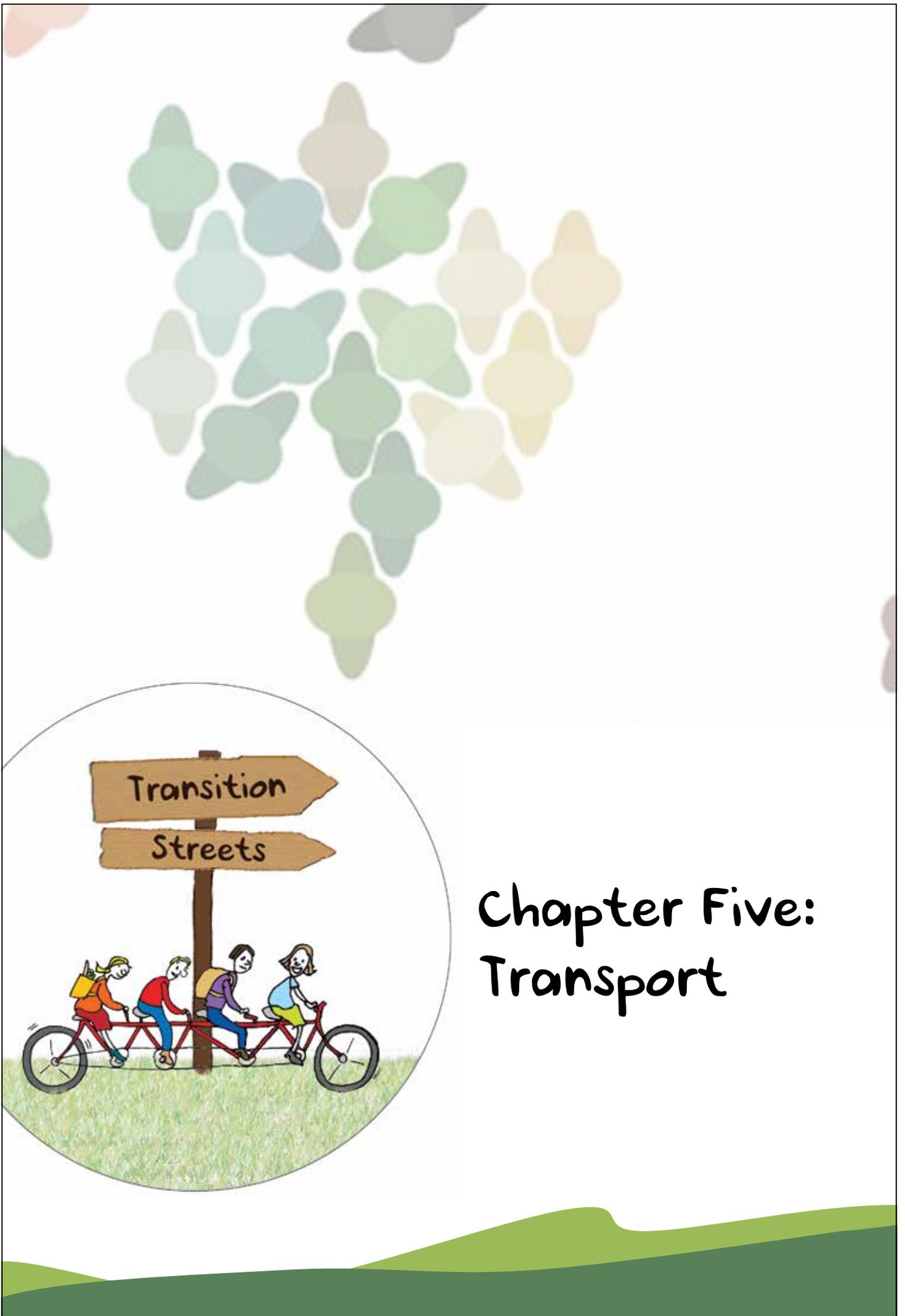
UNESCO (2010) Mekonnen, M.M. & Hoekstra, A.Y. The green, blue and grey water footprint of farm animals and animal products. <http://www.waterfootprint.org/Reports/Report-48-WaterFootprint-AnimalProducts-Vol1.pdf>

Victorian Department of Environment and Primary Industries (VDEP) (2013) *Victoria's Sheep Meat and Wool Industry*. <http://bit.ly/1pqE0hD>

Western Australia Fishing Industry Council (WAFIC) (2014) *Aquaculture*. <http://www.wafic.org.au/about-the-industry/industry/aquaculture>

Weber, C., & Matthews, H. (2008) Food-Miles and the Relative Climate Impacts of Food Choices in the United States. *Environmental Science & Technology*, 42 (10), pp. 3508-3513.

Weeber, B., Thomas, K., & Dorey, C. (2010) *New Zealand orange roughy: Species fact sheet*. Greenpeace International. <http://bit.ly/1zYZjaN>



Chapter Five: Transport

Why change the way we travel?

It wasn't the Exxon Valdez captain's driving that caused the Alaskan oil spill. It was yours.

Advertisement, Greenpeace,
New York Times, 25 February 1990

Just over 100 years ago Henry Ford developed the assembly line for the manufacture of automobiles. In 1935, less than 30 years later, the first DC-3 took to the skies. 1969 was a big year, with the first flight of the commercial wide-body jet engine aircraft, the Boeing 747, and of course the first manned moon landing.

Fast forward to 2015 where we can drive in air-conditioned comfort, with entertainment on demand (CDs, iPods, and DVDs for the kids), hands-free mobile connectivity, a GPS giving us directions, protected by inflatable air bags with our takeaway coffee stored safely beside us, even asking our vehicle to reverse park itself! We've come a long way in 100 years, thanks in large part to cheap, plentiful, energy-rich fossil fuels.

We live in times of unprecedented personal mobility. During their lifetimes, today's young adults will travel many times the distance travelled by their relatives of 100 years ago. Where 70% of children walked or rode bikes to school in the 1970s, the majority are now driven (or even drive themselves). Many primary-school-aged children have never travelled on public transport, apart from school excursions.

With increasing standards of living throughout the developed and developing world, the negative impacts of the growing use of personalised transport are considerable. These include:

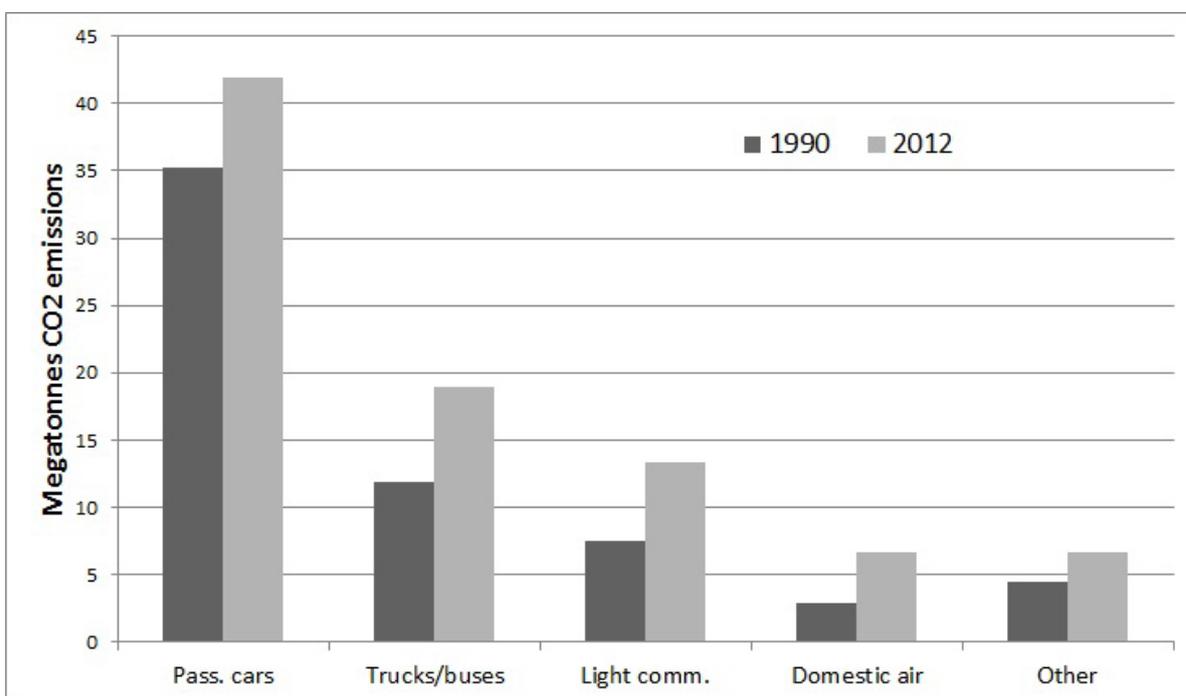
- Increasing Greenhouse Gas emissions
- Increasing demand for non-renewable fossil fuels
- Increasing air pollution
- Traffic congestion
- Ongoing requirements for infrastructure upgrades (such as widening of major roads; building of bridges, tunnels, overpasses and parking provisions) with resulting green habitat destruction and huge government expenditure
- Direct impacts on our health through air pollution and reduced activity levels.



Greenhouse gas emissions

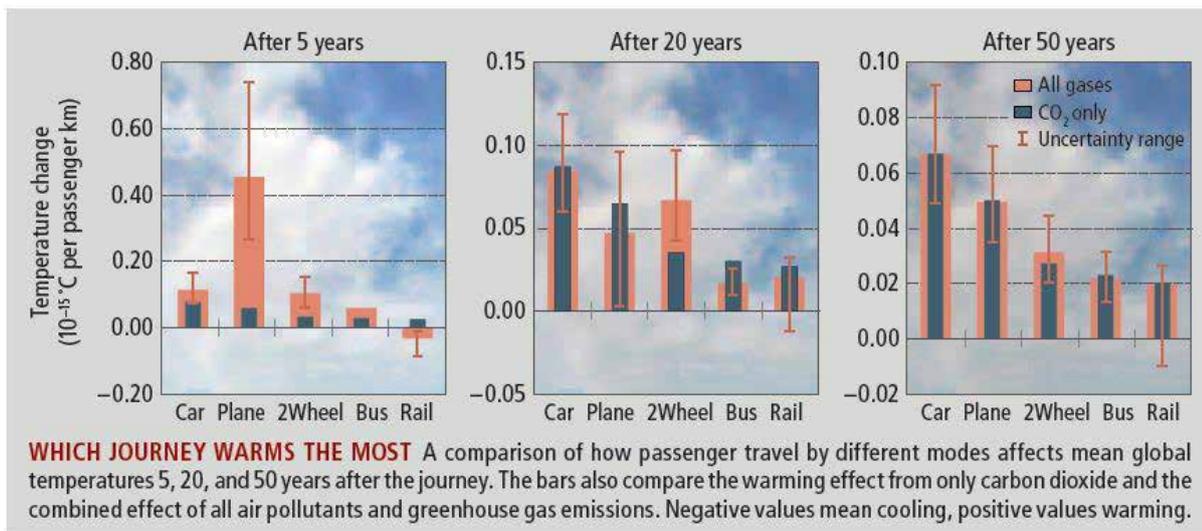
Transport in Australia was responsible for almost 16% of total Greenhouse gas (GHG) emissions in 2012. Despite efforts in Australia to reduce these emissions through nationally set targets, the increase in transport-related emissions continues to rise. Between 1990 and 2012 transport emission increased by just over 41% (Department of Climate Change and Energy 2012).

The Australian National Greenhouse Accounts reported the following increases in transport emissions between 1990 and 2012.



Megatonnes CO₂ emissions from transport in Australia

The choices we make about how we travel do make a difference. Different forms of travel vary greatly in their environmental impact. The following graphs show the impact of travelling by cars, planes, two-wheels (e.g. motorbikes and mopeds), buses and trains on global temperature 5, 20 and 50 years after the journey. Planes have 4 times as much impact as cars after 5 years, but cars actually have a greater impact after 50 years (because some of the pollution produced by cars remains in the atmosphere much longer).



Comparison of the effects of different modes of travel on global warming

(Source: Borken-Kleefeld, 2011)

Clearly, the more we can reduce our car and plane use, the better it is for our environment.

Peak oil

Peak oil is defined as the point in time when the maximum rate of oil extraction is reached, after which the rate of production declines. Although we're not about to run out of oil, according to the International Energy Agency, the production of conventional crude oil peaked in 2006.

Peak oil is now seen by some as being delayed because of technologies that are allowing oil to be extracted from previously inaccessible deposits. This is, paradoxically, deeply concerning. As George Monbiot (2012) suggests, 'There is enough oil in the ground to deep fry the lot of us, and no obvious means to prevail upon governments and industry to leave it in the ground.' With peak oil, the decreasing oil production would force us to find alternatives to oil-fuelled transport as a matter of urgency, which would help reduce GHG emissions. By prolonging our dependence on oil we also prolong the many negative environmental impacts of our reliance on oil. And of course, we will eventually HAVE to change.

Desperation to find more oil has led to huge investments in technologies to extract it from unconventional sources including from tar sands and shale rock through hydraulic fracturing (or 'fracking') and horizontal drilling. These technologies require larger amounts of energy to extract smaller amounts of oil, so the energy return on investment is lower and the financial costs for obtaining this oil are higher.

The age of cheap oil finished when oil prices increased tenfold between 1973 and 1979; the



peak of conventional oil was probably some years ago, and now we are moving our reliance in the future to unconventional oil, with still largely unknown environmental impacts.

Increasingly, oil is being extracted from environmentally risky locations (e.g. the Arctic Circle, deep water) or using environmentally risky processes (e.g. fracking and oil sand extraction). The 2010 Deepwater Horizon oil spill in the Gulf of Mexico – which killed 11 people, injured 17 and released 4.9 million barrels of oil – shows the potential devastation when things go wrong. Interestingly, a month after Deepwater Horizon exploded, the Australian Government reaffirmed its commitment to ocean drilling, putting 31 offshore blocks up for bidding, 17 of them in deep waters.

Air pollution

Air pollutant levels are not considered to be high in urban Australia when compared to other world cities. Despite this, according to NSW Health, air pollution causes 640 to 1,400 premature deaths and almost 2,000 hospitalisations per year in the Greater Sydney Metropolitan region, and costs New South Wales around 4.7 billion dollars per year in health costs. Nationally, motor vehicle-related air pollution is believed to be responsible for between 900 and 4,500 cases of cardiovascular and respiratory diseases and bronchitis each year in Australia, and between 900 and 2,000 early deaths.

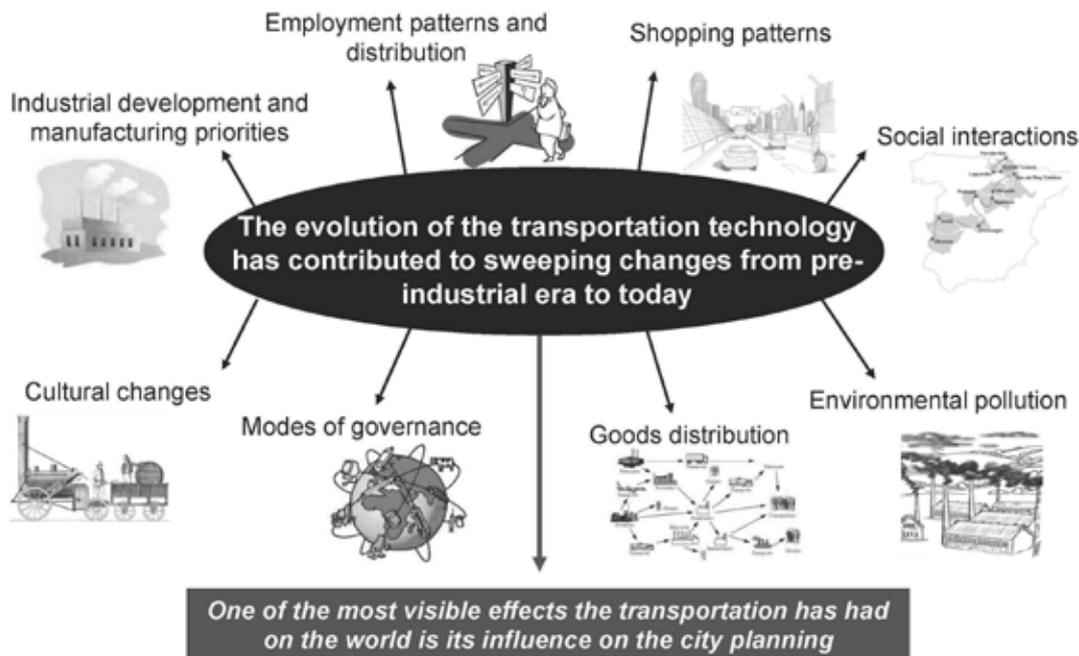
Although transport is not the only contributor to air pollution, and although there have been significant reductions in the amount of pollution created by individual cars since the mid 1990s, motor vehicles are still significant contributors to air pollution; for example, recent studies have suggested there may be links between early exposure to traffic pollution, and autism.

The pollution created by motor vehicles primarily consists of exhaust emissions and evaporative emissions (vapours of fuel which are released into the atmosphere, without being burnt). The pollution created by vehicle exhausts includes carbon monoxide, hydrocarbons, nitrogen oxides, volatile organic compounds and sulphur dioxide. Hydrocarbons and nitrogen oxides react with sunlight and warm temperatures to form ground-level ozone, a main ingredient in smog, which can cause upper respiratory problems and lung damage. A well maintained and tuned car is likely to emit less pollution (between 9–25%) as well as being more fuel efficient.

Fuel vapour (evaporative emissions) can often be seen coming out of a petrol tank when you fill up at the service station. Fuel vapour emissions can be reduced by making sure we don't spill petrol when filling up, don't overfill our cars and have properly fitting fuel caps.

Infrastructure for cars

The rise of modern transport has led to unanticipated changes to many areas of our lives.



(Source: Mendoza 2012)

Our lives – including the food we eat, the houses we live in, where we work, the holidays we take – are dependent on extensive transport systems. Our cities would be unworkable without massive infrastructure for private cars and public transport. Growth patterns in the latter part of the last century to the present day have been determined by the car. Many Australians live considerable distances from where they work, shop or socialise. An intricate network of roads ensures we can get to these places in reasonable times. We have been able to develop an ‘anywhere to anywhere’ approach to commuting, because personalised transport with the car is the default mode. However, in our larger cities travel times are escalating.

During the 1900s, Australia went from having world-class urban public transport systems and effective rural rail networks to becoming one of the most car-dependent nations on the planet (Australian Conservation Foundation, 2011). The extensive investment in infrastructure supporting car use, and the massive investment that would be needed to allow for alternatives, are significant challenges to reducing our reliance on cars.

Trying to cure traffic congestion by adding more capacity is like trying to cure obesity by loosening your belt.



Financial costs

Did you know?

According to the NRMA, the total weekly running costs for cars vary enormously (over the life of the vehicle, assuming 15,000 km annually). The following data is from the NRMA car costing calculator. It includes the cost of a new vehicle spread over 5 years.

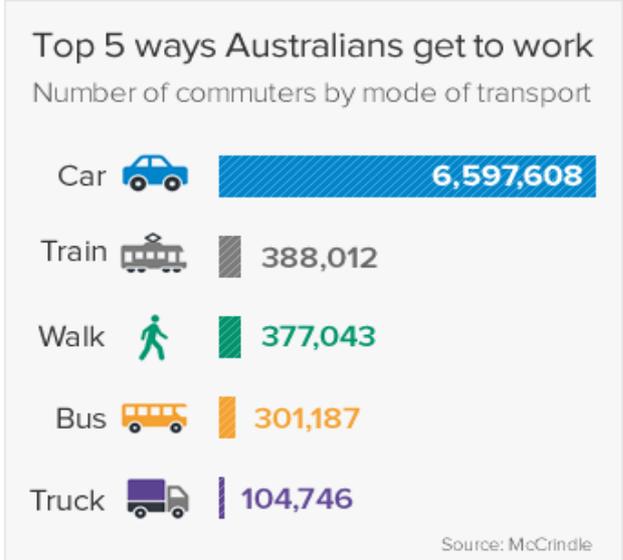
Vehicle type	Weekly running costs	Cost per km
Toyota Land Cruiser (Sahara)	\$630	\$2.19
Mitsubishi Pajero	\$373	\$1.29
Holden Commodore (Omega)	\$278	\$0.96
Toyota RAV4	\$246	\$0.85
Kia Grand Carnival (8 seater)	\$231	\$0.80
Mazda 3 (Hatchback)	\$167	\$0.58
Hyundai i30	\$149	\$0.52
Honda Jazz (Hatchback)	\$133	\$0.46
Suzuki Alto (Hatchback)	\$103	\$0.36

(These figures were current in 2014) You can calculate the cost of your own car at www.mynrma.com.au/mynrma/operating-costs-calculator.aspx. In the calculator you can change the price of your car and add your insurance costs.

How do Australians get to work?

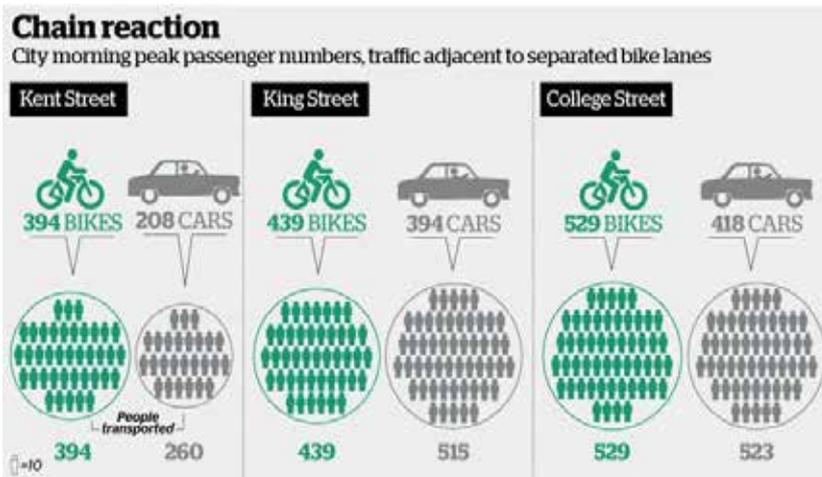
The 2011 census found there were 54% of households that had 2 or more cars, while less than 10% of households had no car. Over 10 million of us travelled to work each day, with almost 2 thirds doing so by car.

Even though Sydney had 400,000 more people than Melbourne, nearly 108,000 more Melbournians drove to work. Sydney, in fact, was the capital city with the lowest proportion of commuters driving to work (54%) compared to Adelaide, with the highest at almost 70%. Sydney, however, had more cars (over 1.2 million) than W.A., S.A., N.T and Tasmania combined. We must surely recognise that as our cities continue to grow, we cannot simply keep increasing the number of cars that fill our roads, and keep building more and wider roads to cater for them.



The Northern Territory was the 'walk to work' capital, with 11% of commuters walking, while Melbourne had more bicycle commuters than any other city (2011 census analysis, mccrindle.com.au).

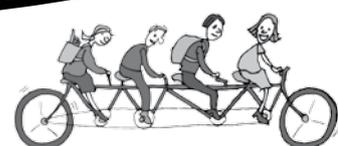
As good infrastructure for bike riding grows in our cities, people are increasingly using riding as a regular transport option. The graphic below shows the number of commuters on 3 roads in the Sydney CBD with separated bike lanes. Kent Street bike lane uses 25% of the road space, yet transported 34% of commuters on the day it was surveyed.



In Adelaide, there are new bike lanes on Frome Street and in Melbourne, installation continues in places such as St Kilda Road, William Street and Clarendon Street, while La Trobe Street now has a cycle way from end to end.

As is the case in Europe, these serious infrastructure changes address some of the environmental, health and social issues that increasing traffic congestion brings.

Source: City of Sydney Council, printed in Sydney Morning Herald, May, 2014



So, how do you travel now?

Our normal household transport usage for the past year 

Type of regular transport used in your household	Km per week (approximately)	Total km per year
Car 1		
Car 2		
Car 3		
Motorbike		
Bicycle		
Walking		
Bus		
Train		
Other		
Total km travelled		

N.B. Plane travel is considered later in the chapter.

If you want to keep a closer track of how much you use your car(s), it isn't difficult. You can keep a notebook in the car where you keep track of the date, speedometer reading, and any expenses (including petrol, oil, rego, insurance).

Date	Speedo	Petrol (Litres)	Petrol (\$)	Other expenses
<i>e.g. 1/1/13</i>	<i>69,099</i>	<i>43.24</i>	<i>\$66.55</i>	

At the end of each month add up how much the car cost you. Is it worth it?

How do we change how we travel?

The average Australian car is driven 12,881 kilometres a year, meaning Australians in their combined 13 million vehicles drive a combined 167 billion kilometres annually - the equivalent of driving to Pluto and back 20 times a year.

Most of us know about the benefits of reducing car travel as a society, so why are we so attached to our cars? And how do we change such entrenched habits? At times a car is the only obvious choice. Lack of public transport, poor mobility or the need to carry children or goods, pose problems that seem insurmountable. And if it's too hot, too cold, too rainy or too windy, for most of us, the car will be our first choice. There may be, however, many times we use a car when we really have an alternative. (How many people drive to a gym so they can get some exercise?)

Many studies have shown that up to half of all car trips are less than 2 km in distance. An article by Awake (2011) discussed some major barriers to us changing our car-using behaviours. It describes car use as a classic 'social dilemma'. Social dilemmas occur where there is a clash between immediate self-interest and long-term collective interests. We generally gain a lot of personal benefit from driving our cars. The car gives us flexibility, speed, privacy and comfort, all of which are highly desirable. When we are asked to give up our car for the sake of such things as reducing pollution and infrastructure costs, we are being asked to put our self-interest aside for the good of the whole community. This can be quite challenging

If, however, we could see how we can benefit directly from the alternatives (e.g. exercise, a chance to read a book on a train) it might become easier to change our habits.

In fact, many of our trips are based on habits. Sometime in the past, we decided that driving (or another form of travel) was the best way to get to the places we go to regularly. Now we don't really think about it anymore – we just do what we always do. Our situation, public transport routes, or something else might have changed without us considering changing our travel habits. We drive to work, the shops, school or wherever, because that is what we have always done.

Everything
in life is
somewhere else, and
you get there
in a car.

EB White, *One Man's Meat*,
1943

Restore
human legs as
a means of travel.
Pedestrians rely on food
for fuel and need no
special parking
facilities.

Lewis Mumford

Every time
I see an adult
on a bicycle, I no
longer despair for the
future of the human
race.

HG Wells



There are a number of things that can help us change our behaviour:

- Incentives can help us 'unfreeze' our behaviour; for example one study found that giving people a free one-month bus pass led to an increase in bus use even after the free pass had expired. Can you give yourself an incentive to leave the car at home?
- When people are in transition is a good time to change habits. If you have just moved, are changing jobs or your routines are going through a major change. This might be a good time to rethink how you get around.
- Gaining support from other people can reinforce change. If we have friends or neighbours who are encouraging us, and providing support, it can be easier to change. Of course, we can also encourage others and support them in changing their habits.

Alternatives to using the car

If you have 2 cars and only use the second one occasionally, could you consider getting rid of it? Could you walk, ride, car pool or catch public transport? How much does it cost you at the moment? Would you be better off using the money you save to catch a taxi or even hire a car when you need to? Is the convenience of a second car worth the extra cost?

Walking

Obviously, walking is a great environmentally friendly way of getting around. Obviously too, it's good for us!

Research shows that many people will walk 400 m to catch a bus or buy a newspaper and will walk double that distance to a railway station or a major destination, such as a large shopping centre. Good urban design, in using this type of information, can encourage walking as an alternative to car use.

The health benefits of walking are well known. Cardiovascular fitness, maintaining a healthy body weight, as well as maintaining mental health can all be aided by walking. By incorporating it into our travel modes, rather than seeing it as purely a separate exercise activity, environmental as well as health benefits are achieved.

Bike riding

While many people cycle as a leisure pursuit, making it a mode of transport is something quite different.

The popularity of cycling has grown steadily over a number of years, with bicycles now outselling cars in Australia. In fact, 2010 was the 11th year in a row that bicycle sales outstripped motor vehicle sales. Over 1.3 million bicycles were sold in Australia in 2010, an increase of 67% since 2001.

Despite this, cycling trips accounted for less than 2% of journeys in Australia in 2012.

How to get bike ready and make a bike your regular way to get around

Get your bike ready for action.

Keep it well maintained and somewhere easily accessible, along with your kit (a lock, lights, helmet, waterproofs and high-visibility vest)

Get used to cutting out the car and transform your bike into a transport option.

Work out your regular short trips and try them on your bike. Study the street directory before setting out to find routes that keep you on safer back streets if possible.

Use a bike for shopping trips.

Get some bike panniers, baskets and a rack so your bike is a realistic option for shopping trips.



It's not a race!

Leave enough time to get there in a leisurely fashion, so you don't arrive too hot and sweaty.

Carrying a child.

There are many options for carrying children of different ages while riding, from mounted seats, tandems, tag-alongs, and trailers. Check out your local bike shops.



Riding safely on your bike

Ride defensively.

- Assume that you are invisible until a driver's action shows that they have seen you.
- Wherever possible, gain eye contact with motorists and pedestrians to confirm what their actions are likely to be.

Be predictable.

- Travel in a relatively straight line – position yourself to avoid parked cars or other obstacles well in advance so that you don't weave in and out or swerve at the last moment.

Learn from experienced cyclists.

- Ride with a buddy or join a group ride – talk about and practise safe-cycling techniques.

Build respect and tolerance.

- Inadequate infrastructure provides opportunities for conflict between bikes, cars and pedestrians. Avoid conflict and save your energy for campaigning for better cycling infrastructure.

Avoid blind spots.

- You may not be visible in the rearview mirrors of a motor vehicle ahead of you so be prepared for it to turn in front of you to park or turn left.

Don't ride too close to parked cars.

- You may collide with a car door opening in front of you.
- Use your bell, horn or voice to warn drivers in parked cars as you approach, but still allow room to avoid an opening door.

Use designated bike lanes unless impractical or unsafe.

- Road rules in some states require cyclists to use signposted bike lanes when provided.
- Bike pictures painted on the road accompanied with a 'bike lane' signpost are intended to designate a bike lane but poor design or bad parking may mean that it may be safer, and legal, not to ride in these lanes.

Maintain the safest lane position.

- If the road is wide enough, keep left to allow motor vehicles to pass you safely.
- Inexperienced cyclists often 'hug the curb' and wonder why cars pass so close. Experienced cyclists let traffic pass when they can but occupy the lane when needed for safety.

Manage poor road conditions.

- Watch out for grates, potholes, stones and kerbs that can stop you in your tracks.
- In wet weather conditions regularly 'touch' your brakes to help keep them dry and working well when needed.

Use a hook turn to turn right at a busy intersection.

- To perform a hook turn, pull over to the left when entering the intersection, joining traffic approaching from the side street. Proceed through the intersection (to the street that was to your right) when safe to do so.

Give way to pedestrians.

- In some states it is illegal for cyclists to ride on footpaths unless younger than 12 or accompanying a child younger than 12.
- If you must travel along a footpath, dismount and walk your bike.

ObeY traffic rules.

- Cyclists must follow the same road rules as motorists. There are a small number of exceptions and some additional rules for cyclists.

Riding in wet weather

Cycling in the rain is not so much fun. You get wet, the brakes don't work as well, and motorist's visibility is worse, so it's good to have a rainy day back-up plan such as public transport or car pooling. If you do ride on a rainy day, get some good wet weather gear. Make sure you wear a high visibility vest over the rain gear. Mud guards are great for helping to keep you dry. Remember that your braking distance is much increased on wet roads.

Bikes on trains and buses

Each state has rules about taking your bike on the train. The rules may be different for urban and country lines. As for buses and trams, bikes may not be allowed at all, except for folded bikes, and then in some cases only in a bag. Some buses have a rack for carrying bikes, though this is still (in 2014) unusual in Australia.

Looking after cyclists

As car drivers, we need to be good sharers with cyclists on the road. We need to increase our awareness of bikes, allowing them room and time to manoeuvre. After all, they're making more room on the road for all of us, and they're not producing any pollution! In some European countries where bike riding is much more commonplace, car drivers are more accustomed to sharing the road with them and, therefore, help to create higher levels of safety for riders. We in Australia have lots of room for improvement.

There are peak bicycle organisations in states and local Bicycle User Groups that can provide a lot of information about good bicycle practices, routes and off road paths. Local government can also help in this regard. A number of abandoned country rail lines have been converted into bicycle routes (rail trails). Further information about them is available on the website, <http://www.railtrails.org.au/>.

Electric bikes

Cycling has been the transport of choice for the fit and healthy commuter, but with a large variety of electric bicycles becoming available, the not so fit and healthy may now be happy to commute by bicycle as well.

A basic electric bicycle (based on a conventional style bicycle with an electrical motor to assist when the going gets tough) can be purchased for around \$1,500 to \$2,000. Conversion kits for existing bicycles are also available, for about \$500.

Of course, you can spend more for something with more traditional motorcycle styling with gears and variable speed motor, which have a top speed of 55 km/h, a 50 km range and a 2-hour battery recharge from a domestic powerpoint. Electricity costs to run an electric bicycle can be as low as one cent per kilometre. With the technology changing far faster than government regulations can adapt, it is necessary to exercise caution and confirm that your



proposed bicycle can be ridden legally on the road before purchase.

Electric motorcycles are also now available, with battery and motor technology giving:

- Up to 120 km/hr top speed with a 120 km range
- A full recharge in maximum of 6 hours from a domestic powerpoint
- A recharge for just a few dollars (based on typical electricity pricing)
- 1/8 the CO₂ emissions/km (on coal-fired electricity), or zero if you use GreenPower
- One-hundredth of the nitrous oxide emissions
- No local exhaust gases.

Public transport

Public transport is effective in reducing emissions per person, and reducing transport congestion on our roads. It is most energy efficient in peak periods when operating at full capacity. As commuters usually drive alone in the car, a full bus load can take over 35 cars off the road, and a full train, 500 cars.

If you are fortunate enough to have access to a local bus network, particularly if you have bus routes within 400m of where you live and work, then using the bus, at least occasionally, could be part of your transport mix.

For a healthy society and 'liveability', it is imperative that our communities and activity hubs including CBDs become far more walking, cycling and public transport friendly. We need more train, tram and bus routes as well as walking and cycle paths. Town planners are now more aware of these requirements and their thinking is no longer dominated by car transport.

'Eighty percent of the people of Britain want more money spent on public transport - in order that other people will travel on the buses so that there is more room for them to drive their cars.'

John Selwyn Gummer,
The Independent, 1994



When you do use the car: Getting the most from it

Fuel-efficient driving has a large impact on our fuel use and hence our emissions, so much so, that since 2008 it has been included in driving tests in NSW. It's lots of little actions that add up: everything from checking your tyre pressures to taking a few kilometres an hour off your motorway speed. The way you drive can cut fuel consumption by 10%. Some possibilities include:

- Get your car serviced regularly for more efficient driving. A poorly maintained engine uses more fuel.
- Stay at or within the speed limit – at 110kph you use about 9% more fuel than at 95kph, and 15% more than at 80kph.
- Keep your tyres inflated to the correct pressures. Under-inflated tyres create more resistance when your car is moving, so your engine has to work harder.
- Improve aerodynamics and reduce drag by leaving the roof rack at home when not needed.
- Be gentle with your right foot. Rapid acceleration takes a heavy toll on your fuel tank. Anticipate road conditions and drive smoothly, avoiding sharp acceleration and heavy braking.
- Don't idle. This uses more fuel in 10 seconds than turning the engine off and on. Drive away immediately when starting from cold.
- Check your revs. Move up a gear before 2,500rpm in a petrol car and 2,000rpm in a diesel.
- Don't carry around unnecessary weight – empty your boot.
- Use air-conditioning sparingly as it significantly increases fuel consumption. For cooling, opening windows is more efficient than air-conditioning in city driving, but once on the freeway, this advantage is reduced.
- Plan your journeys to avoid congestion, road works and getting lost.
- Try combining your trips.
- Try to avoid short trips that could be done by walking or cycling. A cold engine gets through fuel almost twice as quickly as a hot one.
- If you're stuck in a jam, switch the engine off if you expect to be there for more than a minute or two.

Car pooling – Do you live near or on the same route as someone you work with? Or do you know someone who lives on your route to work? By sharing driving with others, the benefits are financial, environmental and even social!

Car-sharing services are starting to emerge in Australia. These types of services usually address all the legal, security and insurance issues for you.

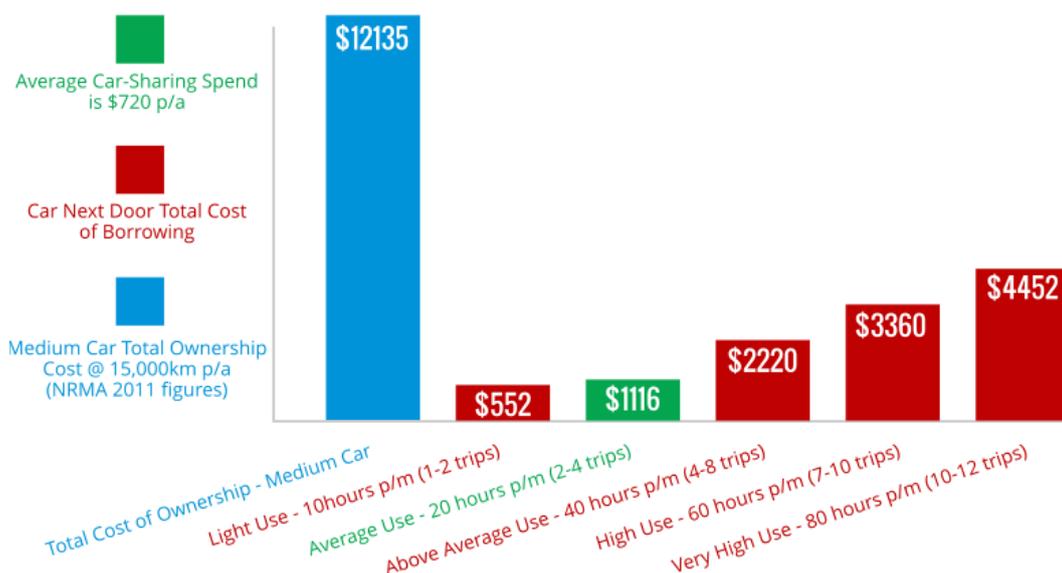


Have you heard of 'Car Next Door'?

Car Next Door is an example of car-sharing programs being established in Australia. People share cars with their neighbours on an hourly or daily basis, for the mutual benefit of both. See www.carnextdoor.com.au for detailed info.

According to their website (accessed 2013), you need to need your car a lot to justify the cost of owning it.

Annual Cost of Owning a Car vs Borrowing from Car Next Door



You'd need to borrow the Car Next Door for 220 hours a month before you are financially better off owning your own car.

What car will you buy next? (if any!)

There are various technologies being developed around the world that offer alternatives to the wholly fossil-fuel-dependent internal combustion engine. While we need to reduce the number of cars on the road, the reality is that cars are likely to remain an important part of our transport mix, so it is vital we explore alternatives to fossil-fuel-powered cars.

Hybrid cars

Hybrid cars (the Toyota Prius is an example in Australia at present) generally have 2 power sources, a fossil-fuel-powered engine supplemented by an electric-powered motor. Although they come in different configurations, the electric power source helps reduce the fossil fuel consumption by approximately 25%. Up-take of hybrid cars in Australia has been slow - a factor of the price premium, concerns over the cost of ownership associated with battery replacement, and lack of variety in models to choose from. Hybrid cars currently represent about 1% of new car sales in Australia, but with improvements in battery technology and a growing number of models to choose from, we are likely to see this percentage increase in the near future.

Electric vehicles

Fully electric vehicles (EVs) are coming to Australia, but slowly. Technology has certainly moved ahead in this area internationally, with all major car manufacturers looking at releasing, or increasing their range of electric cars on offer. They are looking like the technology of the future, particularly for urban commuter journeys.

EVs have been around since the early 1900s, but modern developments in battery storage systems, power control electronics and electric motor technology mean that the electric car can now match performance with fossil-fuelled equivalents.

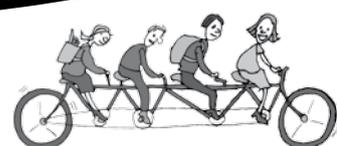
You may notice the occasional electric car on the road, but most are currently owned by government utilities and research organisations undertaking long-term evaluation. However, with a number of electric cars soon to be available for purchase, this situation may change rapidly.



The advantages of EVs are substantial: nil GHG emissions if run on green power, no particulate pollution, lower maintenance and longer life of the motor, and they are cheaper to run. However, as most of us obtain our electricity from coal fired electric power generation, a lot of GHGs and other polluting gases are still produced. And the embodied energy in the manufacture of all cars, electric or not, has an environmental impact.

For many of us though, the factors preventing us buying one tomorrow are also substantial. Top of the list is how high the purchase price is at present – around \$60,000 for a small one. Then there remain concerns about the battery life and replacement costs, recharging infrastructure (both at home and on the road), low driving range, and time to recharge.

All of these issues are being addressed at a rapid pace internationally, and at a slower pace here in Australia, where more policy and technology development is required.



High purchase price:

As with a lot of new technologies, the EV does not yet enjoy the economies of scale of conventional cars; however as demonstrated by modern electronic equipment, the cost will become far more competitive as popularity increases.

Some countries are attempting to increase uptake of EVs with policy incentives such as reduced registration fees.

Low driving range:

The majority of car journeys are less than 50km which is well within the range of an EV. And the range of some cars is now over 400km. Electric cars are therefore currently quite suitable for urban commuter runs to work and back, and may be recharged overnight. There is already a company marketing solar recharge stations that enable cars to be recharged by the sun whilst parked at work. The carport-like structure has the added advantage of shading the vehicle whilst charging takes place.

The problem comes with longer distance travel where it may be necessary to recharge the car mid journey. The challenge is to make it as convenient to recharge an electric car as it is to fill up a conventional vehicle with fuel. This is an area of significant research internationally. Various systems such as the leasing of batteries and having them exchanged while you wait, and faster recharging, are being explored as options. Infrastructure development is required in Australia, which lags significantly behind other western countries.

Battery life / replacement costs:

The thought of having to replace expensive battery sets every 5–10 years of a car's life is an obstacle to ownership. One option being explored by industry is the vehicle owner not owning the car battery but effectively leasing it and exchanging it for a fully serviced charged battery, just like taking your empty barbecue gas bottle to a service station and exchanging it for a full one. Battery maintenance and recharging will be undertaken by the battery provider at a fixed cost.

Lack of recharging infrastructure:

Charging units are becoming quite easy to source and install, with companies providing standard and fast charging systems suitable for domestic and commercial installations. With the availability of such systems, we should see widespread installation of charging infrastructure in the next few years.

Length of time to recharge:

The ability to exchange batteries will also address this issue. Where a car is parked up overnight it may not be a problem at all.

Stable energy price:

Pricing of electricity in Australia is an internal affair, unlike fossil fuels which are predominantly imported. Based on current electricity prices in Australia, it is significantly less expensive per km to run a car on electricity than it is on liquid fuel (in the order of 60%).

If as a society we transition to electric vehicles that rely on electricity generated by burning fossil fuels, the environmental problems we face are not being solved. With large-scale EV take-up, the power grid in Australia must be able to offer substantial amounts of electricity, and this electricity must be generated by renewable sources if we are to ensure that CO₂ emissions do not increase.

While this is an exciting new field with many new innovations being explored, the continuation of our heavy reliance on personalised transport does not address the issues of resource use for production of vehicles, traffic congestion and continuing upgrades in infrastructure (roads etc.) to accommodate larger numbers of vehicles.

Air travel and holidays

Our modern lifestyle has made air travel very attractive and very accessible to many of us.

It is cheap, convenient and has allowed us to explore our world in ways that previous generations could only dream of. This has come at huge environmental cost. GHG emissions from domestic air travel in Australia have increased 129% since 1990. In 2008, over 550 million tonnes of CO₂ were emitted from global air travel.

A return flight to Bangkok produces 3.5 tonnes of greenhouse gases per person. A return flight to London produces 7.8 tonnes of greenhouse gases per person, or over twice the emissions for a year of power use for a reasonably efficient household.

Our household’s number of flights taken in the past year

Type of flight	Number of flights (include a return trip as 2 flights)	Average GHG emissions/ person	Total GHG emissions
Domestic short (e.g. Syd-Mel, Bris-Can, Adel-Alice)		0.25 tonnes	
Domestic long (e.g. Perth-Mel, Darwin-Syd, Cairns-Mel)		0.5 tonnes	
International short (e.g. Asia)		1.4 tonnes	
International long (e.g. Europe, America)		3.5 tonnes	
Totals			





George Monbiot, author and environmental activist, concludes in his book *Heat* that to meet current environmental targets set by the British Government for 2050, almost all flying will have to stop and the current fleet of planes grounded. 'I recognise this will not be a popular message,' he writes (quoted in Rosenthal 2010).

This is a tough one, another social dilemma. We live in an affluent society (70% of Australians are within the wealthiest 10% of the world's population), and the cheap cost of air flights (even compared to 20 years ago) encourages us to take advantage of this convenient luxury. Finally, as a society we may need to reduce our reliance on air travel. As individuals, we may have to move on from the justification that 'the plane's going anyway'.

The plan below gives some suggestions of ways you may like to consider changing how you travel from now on. Feel free to add your own.



My transport plan

		Will do	Have Done	N/A
FREE	Walk more as transport	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE	Use my bike more as transport	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE-\$\$\$	Buy/borrow a bike	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE	Look into public transport options for my regular trips	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE	Make sure my car is operating efficiently	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE	Look into car sharing options	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE	Research alternative power cars before buying	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE	Consider low GHG emission holidays	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other ideas: _____

Challenges

These challenges are designed to be a fun way of exploring issues, making us aware of how reliant we are on the resources we have, and encouraging longer term behavioural change.

We encourage you to share your experiences of the challenges through social media, or simply chatting with family and friends.

- 1. For one day a week** – Choose one day (or more) per week that you decide to make ‘car free’. How many weeks can you do it?



2. For one week – As a group, see how many cars you can keep off the road for the week. Share your car with neighbours, offer to take them shopping when you're going, etc.

3. For one week – Break the habit! Find alternatives to using your car for all your trips for the week. What alternatives did you try? What worked well? Could you continue some of these new-found alternatives?

4. For one month – Record how much you use the car. For each trip, write down how far it was. How many of your trips were under 2km? How many trips you could have done differently if you had really needed to?

Suggested plan for your Transport group discussion

Catch up – How has everyone's week been?	(10 mins)
Discuss outcomes from the food month	(20 mins)
<ul style="list-style-type: none"> • What has changed in your home? Street? • What challenges did people attempt, and how did they go? 	
Review chapter content	(20 mins)
<ul style="list-style-type: none"> • What was the main thing you gained from the chapter? • Did anything surprise you? • How did you go with the estimations of your current travel? • What might contribute to differences in households? 	
Discuss your action plans	(30 mins)
<ul style="list-style-type: none"> • What do you want to achieve this month? • What assistance (if any) would you like from others in the street? 	
Explore ideas for action that you could do as a group	(20 mins)
<ul style="list-style-type: none"> • What could you do together that you couldn't do alone? 	
Decide on which challenges you want to try this month.	(10 mins)
Confirm details for the next time you get together.	(5 mins)



**GET
THE KIDS
INVOLVED!**

1. Enjoy a bike ride together, as transport rather than simply a leisure ride.
2. Ride to the shops, or to school, soccer training or the markets on a weekend.
3. Teach kids to read the speedo, and keep track of weekly kilometres, then see if you can reduce these over the next year.
4. Work out with them how much it costs in petrol to go one kilometre, measure how far regular trips are, cost them, and suggest they can keep the money if you ride or walk instead.

Further resources

Websites:

- *Road Rules for Cyclists - NSW*: <http://www.legislation.nsw.gov.au/maintop/view/inforce/subordleg+179+2008+pt.15+0+N/>
- - VIC: <http://www.vicroads.vic.gov.au/Home/Moreinfoandservices/Bicycles/>

Films:

- *Who Killed the Electric Car?* A 2006 documentary that investigates the birth and death of the General Motors EV1 in the mid 1990s.
- *The End of Suburbia*. A movie that explores peak oil and its implications for the suburban lifestyle that grew with the advent of affordable cars.

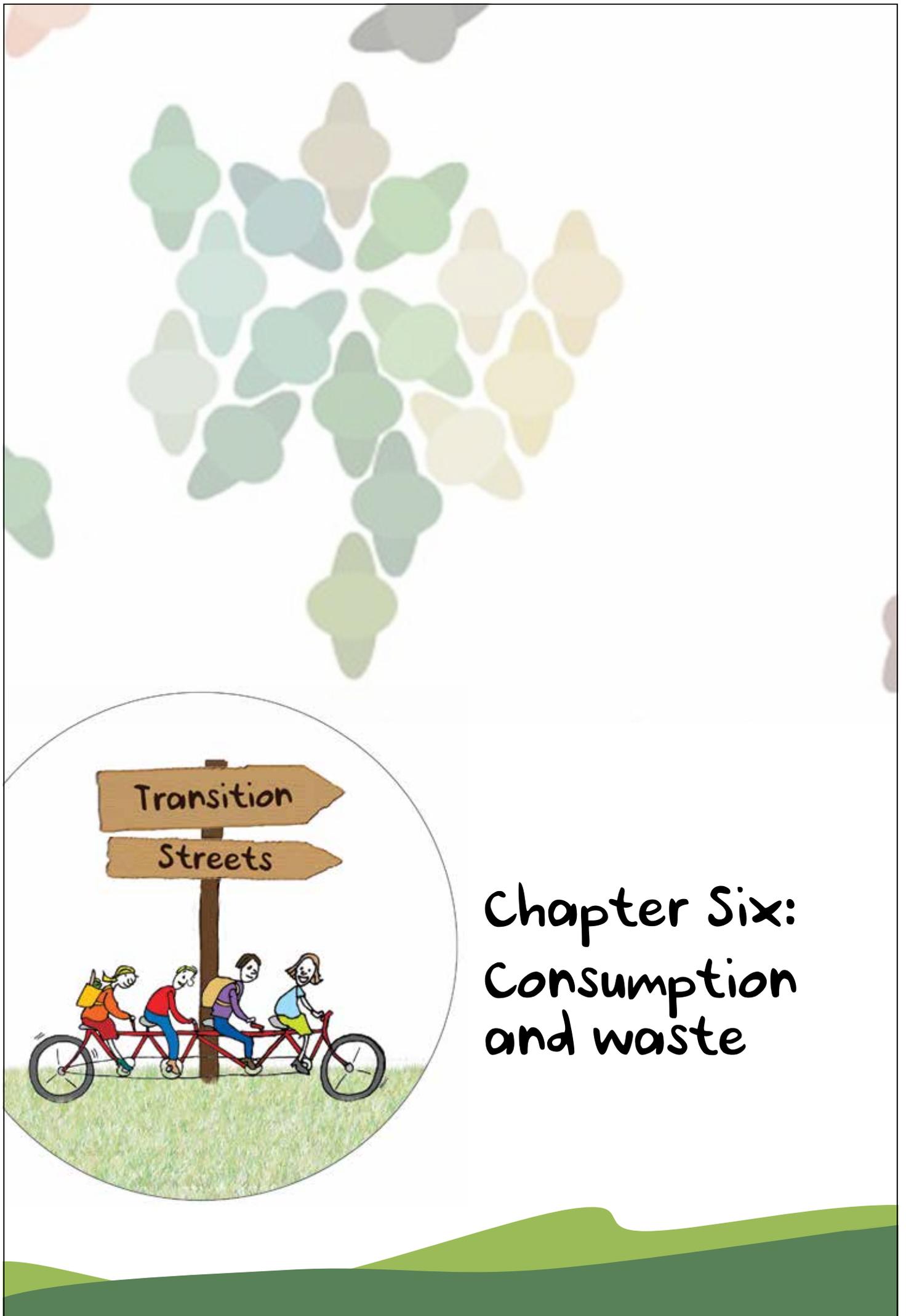
Articles:

- Rosenthal, E. (2010), *Toward Sustainable Travel: Breaking the Flying Addiction*. Available from http://e360.yale.edu/feature/toward_sustainable_travel/2280/.



References

- Awake (2011), *Encouraging Sustainability-Related Behaviours: Transport*. Available from <http://www.sustainablemelbourne.com/research/encouraging-sustainability-related-behaviours-transport/>
- Department of Climate Change and Energy (2012), *Quarterly Update of Australia's National Greenhouse Gas Inventory: June 2012*. <http://www.climatechange.gov.au/publications/greenhouse-acctg/national-greenhouse-gas-inventory-2012-06.aspx>
- King, S. (2013) <https://theconversation.com/better-place-how-the-chicken-and-egg-problem-can-kill-technological-change-15058>
- McCrimble analysis of 2011 census information on transport - <http://www.abc.net.au/news/2014-02-03/mccrimble-scribd/5234184>
- Monbiot, G. (2012), 'We were wrong on peak oil. There's enough to fry us all.' *The Guardian*. Retrieved from <http://www.guardian.co.uk/commentisfree/2012/jul/02/peak-oil-we-we-wrong>
- NSW health, http://www0.health.nsw.gov.au/publichealth/environment/air/air_pollution.asp
- Rosenthal, E. (2010), *Toward Sustainable Travel: Breaking the Flying Addiction*. Available from http://e360.yale.edu/feature/toward_sustainable_travel/2280/
- Sydney Morning Herald article - <http://www.smh.com.au/executive-style/fitness/on-your-bike/this-is-why-bike-lanes-are-working-20140528-394nq.html>



Chapter Six: Consumption and waste

Why reduce our consumption and waste?

Disposal of waste is seen as a growing environmental problem around the world, but it is the creation of waste that makes the modern market go round. We cannot solve the waste problem without solving the consumption problem.

Clive Hamilton and Richard Dennis, *Affluenza* (2005)

If you have managed to make cuts to your water and energy use, change how you eat, and reduce your fossil fuel intensive travel since starting this challenge, that's good news, great news in fact! There is, however, still more to do.

Our environmental impact

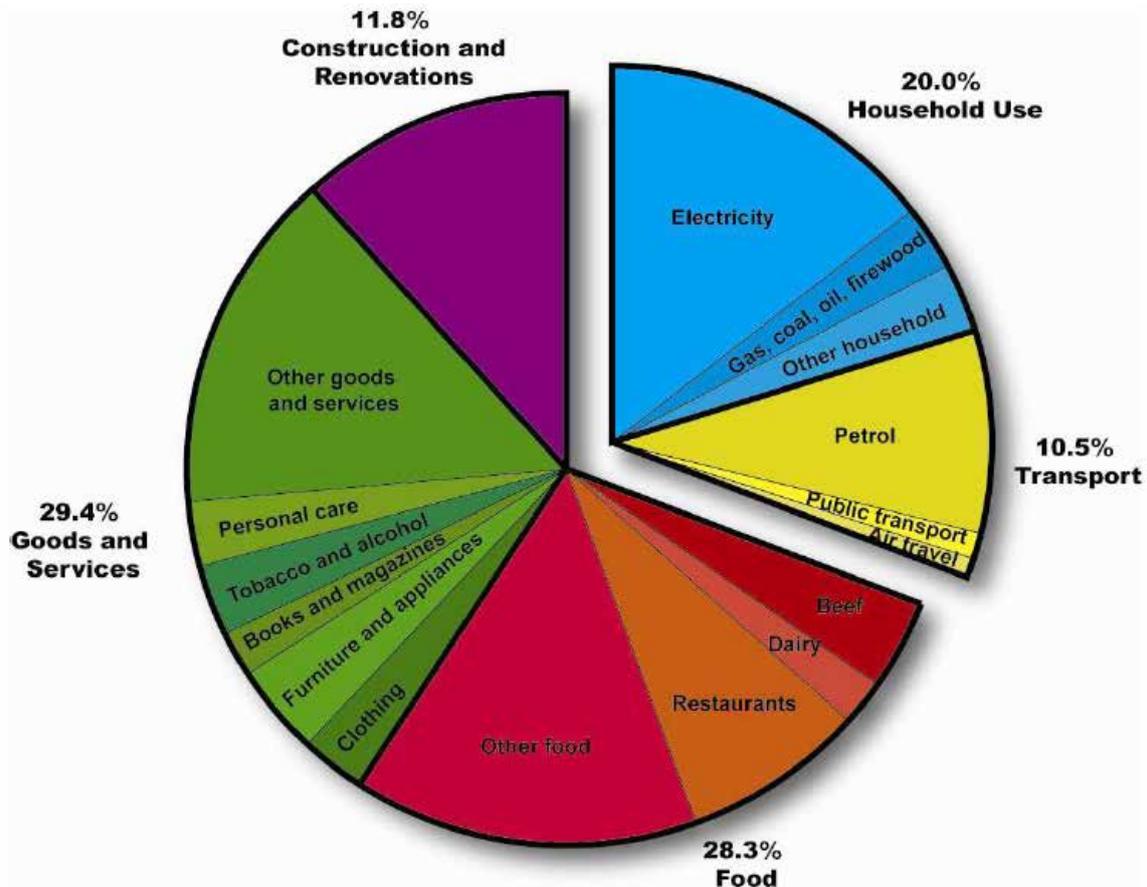
As seen in the graph on the right, for an average Australian household, direct household energy use accounts for 20% of their greenhouse gas emissions, or carbon footprint, transport a further 10.5% and food another 28.3%. The remaining 40% or so of their carbon footprint is the materials and energy that goes into producing the other stuff in their lives: homes themselves (including renovations), clothes, furniture, appliances, computers, books, magazines, kids' toys, baby products, CDs and DVDs, sporting and camping equipment, swimming pools, the pets in their lives with all the required goods and services, consumables including detergents, cosmetics, shampoos, skin-care products, alcohol, party essentials; and the services they receive – the hairdressers, health providers, gyms, art galleries, clubs, pubs, cinemas and sporting clubs.

Our personal consumer choices have ecological, social and spiritual consequences.

It is time to re-examine some of our deeply held notions that underlie our lifestyles.

David Suzuki





Average Greenhouse Gas Emissions per Australian household
(ACF Consuming Australia findings, 2007)

Apart from increasing our carbon footprint or greenhouse gas emissions, this consumption also increases our need for resources of all kinds, including water, land, metals and fossil fuels. And it increases the amount of waste our society must inevitably deal with.

Currently, we are consuming about 130% of our planet's ability to regenerate resources annually.

One way of understanding human environmental impact is:

Environmental Impact = Population × Consumption × Technology

So, environmental impact is affected by the number of us on the planet, the amount of consumption per individual, and the energy or resource intensity of the technologies we use. We can, therefore, reduce our environmental impact by controlling or reducing population, reducing the level of consumption per person, and/or changing technology to produce more from less energy and resources. While we can't, as individuals, influence population levels much, we can make choices about the technologies we use, and we can certainly reduce our levels of consumption.

Infinite growth

Our modern world is based on an economy that requires continual growth. We are told we need economic growth for job creation. We are bombarded with economic figures about all areas of our lives, and analysis on what this will mean for growth. Official interest rates go up and down, or stay stable, based on these growth figures and predictions. Interest rates may go down in an attempt to get people to spend, in the hope that this spending will stimulate growth in the economy. Many of us received cash payments from the government during the 2008 Global Financial Crisis, which we were encouraged to spend.

Not surprisingly, issues around general consumption are rarely addressed when discussing environmental sustainability. While it is safe to talk about new technologies, new forms of energy production and increasing efficiencies of energy and material use; our actual levels of consumption is a topic that governments and society in general prefers to avoid. Our whole economic system is based on consumption, and **growing** consumption. To question our consumption levels is to question the way our whole society is structured. But we live on a finite planet, so infinite growth is not possible.

The American advertising industry predicted recession for the United States' economy (Vale & Vale 2009): they thought businesses faced the real problem of not being able to sell any more goods since everyone in America clearly had enough of everything they could possibly want. And this was in the 1950s! Clearly they were wrong. The advertising and marketing industry has always been able to persuade us to be dissatisfied with what we have, and entice us to consume more to address this dissatisfaction.

There are serious areas of conflict between our current economic system and environmental sustainability. According to modern economics:

- Businesses and economies must grow (so in a finite world, we behave as if it were infinite)
- Things we don't pay for have no cost or value (so not factoring environmental degradation into the cost of goods and services means it is not the economy's concern)
- There should be an economic payback for actions taken (so if we do factor environmental harm or degradation into the price of goods and services, we expect a 'financial' return for these costs) (adapted from Vale & Vale 2009).

The need to move to a steady state economy (one not based on growth) is crucial, and inevitable.

Why do so many people believe in the fantasy of infinite growth on a finite planet? Is it because we can't come up with a better idea?

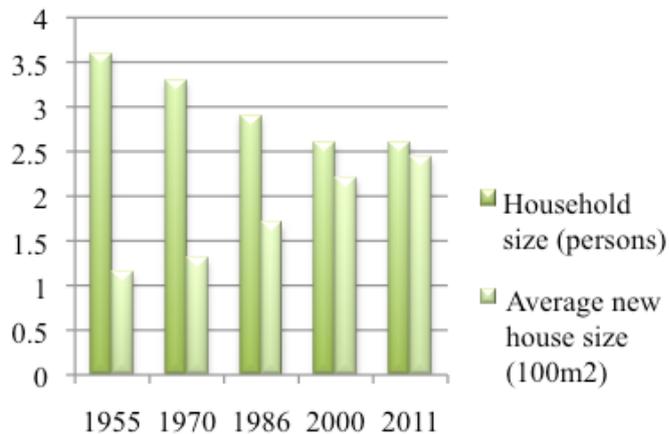
Rob Dietz



Higher incomes, higher consumption

Between 1994 and 2010, the average Australian household income (allowing for inflation) has risen by 48% (Australian Bureau of Statistics, 2011), and in real terms, incomes in Australia have more than tripled since the 1950s.

We tend to spend most of what we earn, so as income increases, so does our level of expenditure and our impact on the environment. Many of the products in our lives that we now consider necessities, didn't even exist when our grandparents were young. Research



Average Australian house and household sizes

Houses in Australia are getting bigger with more bathrooms, bedrooms and living areas, while households are getting smaller (see the above graph), so resource use per person is increasing. More homes per capita, and larger houses, demand more furniture, appliances and fittings, such as blinds and floor coverings, as well as more heating, cooling and lighting. Although many of us acknowledge that our homes are too cluttered, and that much of our stuff is rarely or never used, growth in consumption continues.

The storage industry has expanded rapidly in recent years – both storage containers for home, garage, roof spaces etc., but also storage facilities to cater for the overflow of stuff from our homes, not just to store household possessions when people travel or move house. The Australian self-storage industry was born in the 1970s and is 'a product that encourages a hoarding mentality' admits Maxine Polton, an industry executive.

in 2002 showed that 62% of Australians believed that they couldn't afford everything they really needed. Even of the richest 20%, almost half (46%) said they couldn't. And Australia is one of the richest countries in the world. We expect our incomes to provide a higher standard of living than any previous generation in history has experienced: bigger homes, more appliances and gadgets, more cars per household, more entertainment and more expensive and frequent holidays.

IS YOUR HOUSEHOLD BUSTING AT THE SEAMS?

Safe n Sound Self Storage Can Help!

• 24 hour access 24/7 • Video surveillance • Insertion locking sys



• Variety of sizes • Easy access • Resident Managers • Pin code entry

WALLSEND ONLY

Let Safe n Sound Self Storage take the frustration out of finding enough space for all of your goods. Our company is the highest award winners in self storage. With state of the art security and a large number of sizes, Safe n Sound Self Storage is the only storage solution you will ever need.

APN National Storage Fund Manager Paul Noonan has said: 'We see the self-storage market as having significant growth opportunities with provision of storage space in Australia on a per capita basis currently well behind that of Canada and significantly below the USA where it is a mature business.'

The knock-down, rebuild phenomena, where old homes are completely demolished and replaced with usually large new homes, is another worrying trend. While some of the materials are recycled (rather than reused), the waste created by this practice is significant.

Our growing need to extend and renovate is also continuing, with lifestyle magazines and TV shows showing us the higher standards of homes to be desired. Updating not only the bed linen and the paint job, but the kitchen, or adding an outdoor entertainment 'room' has become the aim of many Australian families.

Use of oil and other resources

Oil is at the foundation of our modern world. As well as use in transport fuels, oil is an ingredient in almost all products we use. Nearly everything in our lives is made from oil, made by machinery dependent on oil, and/or transported by oil. It is an ingredient in most plastics and present in electronic equipment, most furniture, carpets, clothing, shoes, toys, cosmetics and cleaners. Even natural fibres such as cotton are grown using oil-based pesticides and fertilisers. It is almost impossible to live in the modern world without consuming oil in some way in virtually everything we do. Yet we know that oil is a non-renewable resource, and is increasingly costly, both financially and environmentally, for our world.

Many other natural resources, which are critical to our way of life, are also being depleted by the manufacture of all the goods around us. Some other minerals that are used increasingly include indium used in flat screen devices such as TVs and mobile phones, lithium for batteries, and silicon used in computers and solar panels.

Imagine you are first in line at a potluck buffet. The spread includes not just food and water but all the materials needed for shelter, clothing, healthcare, and education. How do you know how much to take? How much is enough to leave for your neighbours behind you - not just the 7 billion people, but the wildlife, and the as-yet unborn.

Jim Merkel, *Radical Simplicity*



Cleaning and chemicals

Cleaning products containing toxic chemicals are often seen as essential in our modern homes. We have specific cleaners for kitchen benches, washing dishes in the sink and dishwasher, bathroom basins, showers, toilets, glass, stainless steel appliances, barbecues, furniture, tiled floors, timber floors, carpets, air freshening and sticky label removal! For our clothes, we have washing powders or liquids for hot water and cold, stain removal liquids, wool washes and fabric softeners. We have skin cleansers, toners, wrinkle creams, soaps, shower gels, bath gels, shampoos, conditioners, hand washes and different moisturisers for face, hands, feet, bodies, hair, and babies. The global market for women's beauty products is said to be growing at the rate of US \$202 billion a year.

The world of cleaning has never been so complicated or so toxic for us and our environment. Where our grandmothers would have known how to use soap, eucalyptus oil, vinegar, lemon juice and bi-carb soda expertly for any cleaning job, we seem to have lost this ability, and rely on experts in this ever-expanding industry to sell us a different product for every application.

A stroll down the cleaning aisle of any supermarket shows just how strong our current phobia of germs is. The obsession with antibacterial products for household use is fuelled by manufacturers using fear to sell products rather than any real concern for our health.

As well as cleaning products, many materials used in our lives such as clothing and textiles, furniture, floor and window coverings are petro-chemically based, and give off gases long after their manufacture. The smell of a new car or carpet is typical of this off-gassing. Chemicals released from solvents, dyes, glues and finishes are toxic in varying degrees, to our health

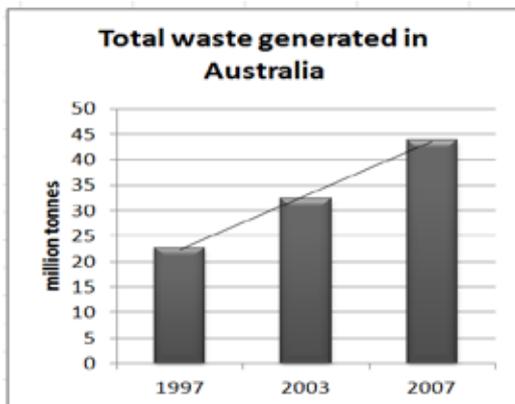


and to our environment. The US Environmental Protection Agency states that the air in our homes may contain 2 to 5 times the organic chemicals compared with outside air.

Most of the fragrances (95%) used in personal hygiene products, perfumes, aftershaves and indoor air fresheners are chemicals derived from oil. As these chemicals vaporise, they stick to the skin and hair and can be absorbed through the skin as well as breathed in. There is concern that long-term exposure to low levels of these types of chemicals may be as dangerous as short-term high exposure, that would be not be permitted in the workplace.

With significant amounts of these chemicals affecting our indoor air quality, creating more toxic waste-water and likely affecting our health, reducing them in our lives can have many benefits.

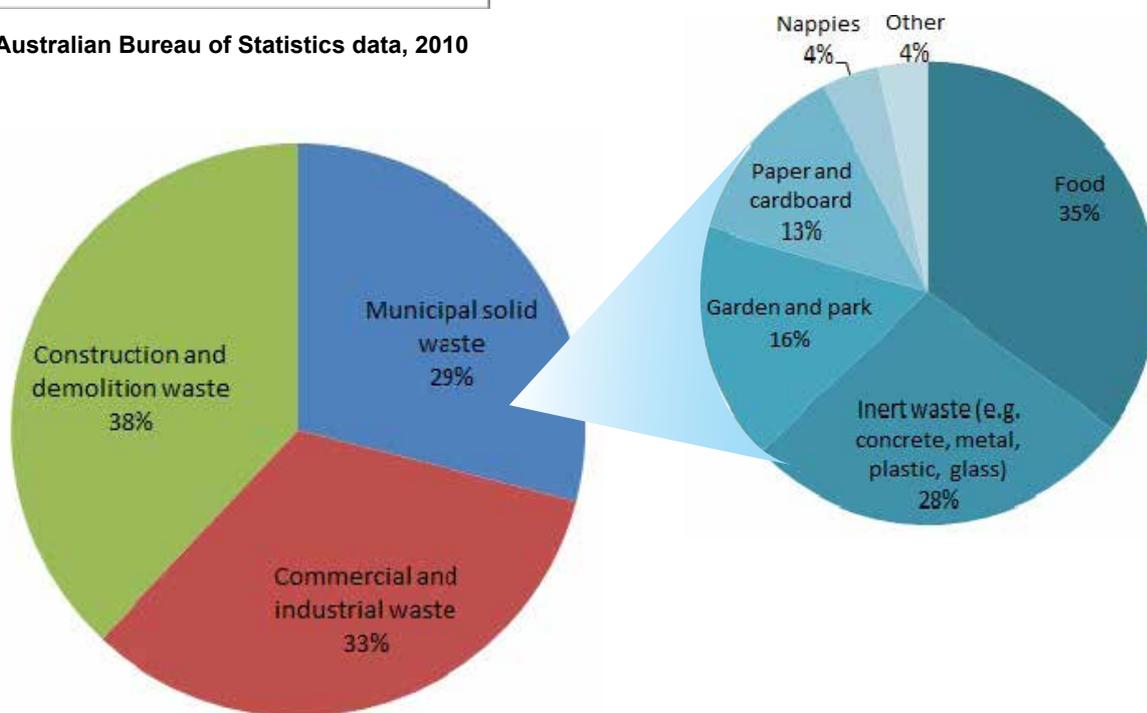
Managing our waste?



Australian Bureau of Statistics data, 2010

Between 1996-97 and 2006-07 the total volume of waste generated in Australia almost doubled from 22.7 million tonnes to 43.8 million tonnes. The largest proportion of this was construction and demolition waste, with 29% being local council collected waste.

These days we throw a lot away, but where exactly is 'away'?



Breakdown of Australian household waste

(Department of the Environment, Water, Heritage and the Arts, 2010)

This equates to 2,080 kg of waste per year for every man, woman and child in Australia in 2006-07, compared to 1,200 kg per year in 1996-97.

In 2004, a survey of 1,600 households in Australia was conducted on behalf of the Australia Institute. It found that \$10.5 billion (about \$5,000 per capita per year) was spent on things that were never used, or thrown away. Food accounted for about 36% of this. It also found that:

- Young people wasted more than older people,
- Higher income households wasted more than lower income households, and



- Parents with young children threw out the most fresh food (Hamilton, 2005).

While the environment obviously suffers from this level of waste, there appears to be little incentive to correct it, as our wasteful consumption is actually good for business. For the individual, increasing prosperity leads to increasing waste, and we are not really encouraged to think of the long-term impacts of this waste. Government bodies such as local councils are left to deal with the collection and management of this waste, with the resulting financial and logistical burdens.

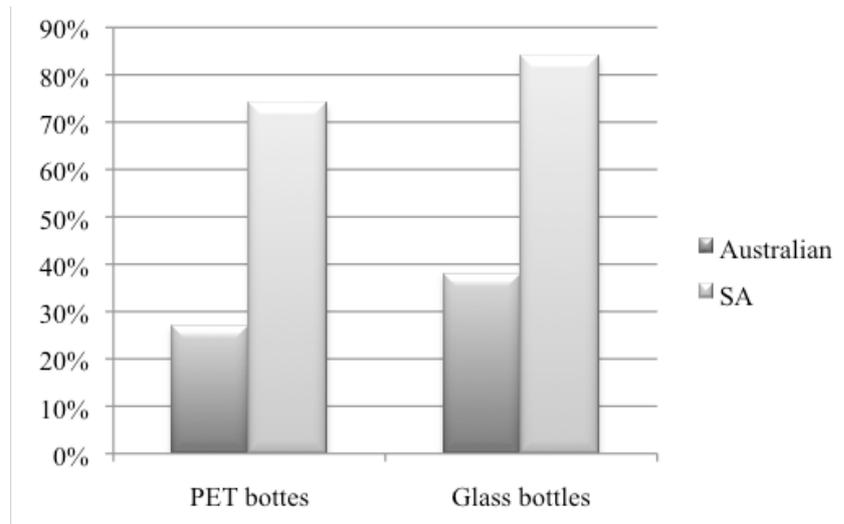
Recycling

Although Australia has higher rates of recycling than some countries, we still only recycle around 52% of our waste. The rest goes into landfill which, in 2008, contributed 11 million tonnes of Greenhouse Gas (GHG) emissions to Australia's overall GHG emissions. Choice reported in 2009 that although plastics recycling rates have more than doubled over the past decade in Australia, we are still recycling only a small fraction (15%) of the 1.7 million tonnes of plastics we use each year.

Interestingly, Japan, with its large population on a small land mass (and little land for landfill), has one of the most effective recycling systems in the world. Only 16% of solid waste goes to landfill compared to 48% in Australia and 70% in the USA.

There is, however, increasing support for recycling in Australia. In 2012, the ABS found that almost 80% of Australians claimed they always sorted their recycled waste from non-recycled waste, 45% always or often compost or recycle garden waste, and 34% do the same for food waste.

Legislation can help increase recycling rates. As the graph below shows, in South Australia, where container deposit legislation has existed since 1977, the recycling rate is 74% for PET (plastic) bottles and 84% for glass, whereas the national average is less than half of this. The recent failure of the NT government to introduce container deposit legislation was a clear example of the ability of big business to impede efforts of governments to force companies to take responsibility for the environmental destruction they help create.



Recycling rates for PET (plastic) and glass bottles (Boomerang Alliance, 2012)

e-waste (electronic waste)

Australians are among the fastest adopters of new technology in the world. Our love affair with new gadgets is generating a mountain of e-waste each year, to the point that it is one of the fastest growing waste types in the country. The Australian Bureau of Statistics found that 16 million units of e-waste reached their end of life in 2007–08, with 88% going to landfill, and in 2007 alone, Australians purchased 25 million electronic products, at a time when there were 123 million items of e-waste.

Disposal of e-waste in landfill has the potential to leach toxins and other hazardous substances such as lead, cadmium and mercury into the environment. This is creating a huge problem globally, with much of the developed world's e-waste being shipped, legally or illegally, to developing countries. Unsafe practices are then often used to separate materials for re-use, e.g., burning the plastic covering on wire to recover copper.

Some councils and businesses offer a free drop off site for e-waste recycling. See below for information on a recycling scheme being rolled out in Australia, and check with your local council about any e-waste services in your area.

National Television and Computer Recycling Scheme

In May 2012, the National Television and Computer Recycling Scheme, an industry-funded scheme, was launched. The Federal and state governments have joined with members of the TV and computer manufacturing industries to develop legislation for the establishment of this scheme, which will be rolled out nationally over 5 years. Basically, the scheme will mean that any company that makes and/or imports TVs and computers into Australia will be required to pay for the end-of-life recycling of these products.

Free collection points for used TVs and computers are being set up around the country. Consumers of TVs and computers will be responsible for ensuring that their TVs and computers are left at a designated collection point to be recycled. There will be no charge to drop off an item, though consumers may be charged a small fee when they purchase a new computer or TV to cover the future cost of collection and recycling. All the arrangements for the collection and recycling of end-of-life TVs and computers will be managed by the TV and computer industry. The new recycling scheme will prevent millions of old TVs and computers from being sent to landfill.

In 2011–12 an estimated 29 million TVs and computers reached the end of their useful life in Australia. In 2027–28, this figure is predicted to reach 44 million. The goal of the scheme is to lift the 2012 recycling rate for TVs and computers of 17% to 80% within the first 10 years of operation.



According to MobileMuster, if Australians handed in the 14-16 million unused or broken mobile phones (not including batteries) hidden in desks and drawers across the country, the materials could make . . .



- 160,000 plastic fence posts (enough to build a fence from Sydney to Melbourne)
- plus 3.2 million aluminium cans
- plus 31,000 gold wedding rings
- and avoid 13,867 tonnes of future greenhouse gas emissions which is equivalent to: planting 84,000 trees, or taking 5,180 cars off the road.

How many old mobile phones do you have sitting around at your place?

Encouraging us to consume more

If we know that our growing consumption produces more greenhouse gas emissions, uses more resources, and produces more waste than the world can cope with, why do we still keep consuming more?

There are many reasons, including:

- advertising and marketing techniques continually bombard us, encouraging us to consume
- the cultural practice of shopping has become a relaxation/leisure activity
- easy credit is available to us
- built-in and perceived obsolescence is rampant
- gifts and our 'giving' culture encourage consumption

Too many people spend money they haven't earned, to buy things they don't want, to impress people they don't like.

Will Rogers

Advertising and marketing

Ads everywhere – on TV, radio, billboards, buses, in print media, online, in our letterboxes as well as in shops.

We're promised: 'You'll be healthier, trendier or more beautiful, but always happier! if you buy this product'.

By marketing top end products, businesses are often able to push us up the scale of consumption, e.g. instead of buying a \$300 barbecue, we may see the \$5,000 one, and end up walking out with the \$1,000 model.

Hurry, this offer can't last!

'Fly Buy' cards and loyalty reward cards offer us discounts, but allow companies to gain details of transactions every time the card is used, to enable more targeted marketing to us.



Discounts – '50% off the second item' or 'Buy two, get one free' – encourage us to buy more than we need.

The new model has just been released, and is 'so cool'!

Product placement encourages us to impulse buy, by, a) making us walk to the back of the store to buy milk or bread past hundreds of other products, and b) locating small, usually cheap, items near the checkout, tempting to add to purchases.

Marketing aimed at children includes giveaways with food at fast-food outlets, packaging of goods with favourite characters, and branding of everything from raincoats to school bags and doona covers.

The use of celebrities to advertise goods can somehow give the product more value or validity.

We're told: 'You're worth it' or 'You've worked so hard that you owe it to yourself'.



Shopping as relaxation/leisure

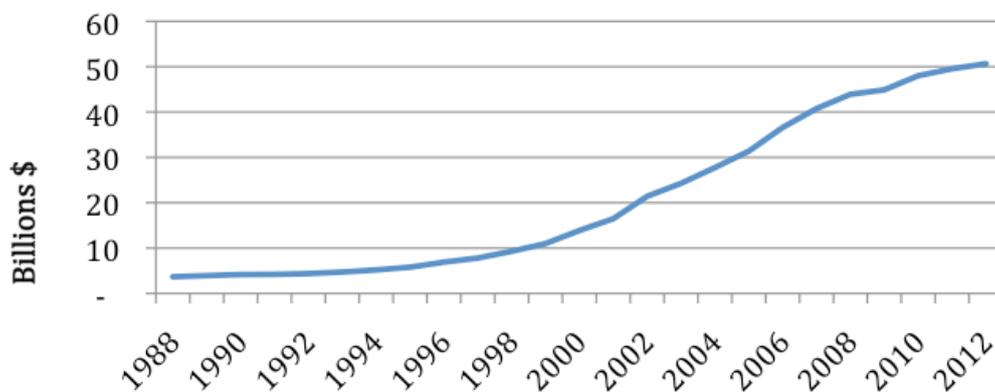
Shopping centres are designed to be attractive and exciting places to be. With beautifully designed shops, cafes and malls, playgrounds for the kids, air-conditioning and comfortable seating in 'meeting places' we are enticed to go to them. 'Retail therapy' has never been so good! Shopping has become entertainment, and children often learn from a young age about shopping as recreation.



Buy now, pay later - our credit binge

In these days of credit we can go shopping and come home with our goods without paying any hard cash. The disconnection between the money we earn and the money we spend is very effectively enabled by the credit card and has been, in part, responsible for increasing levels of bankruptcy in Australia. Australians have some of the highest levels of debt per person in the world. In June 2012, \$36.6 billion was owed on credit cards where interest was being charged (an average of \$4,700 per card holder) and a further \$14 billion with no interest being charged (RBA, 2013).

Even easier than getting a credit card is obtaining the in-store offer of credit – the 'no deposit, no interest for x number of months' offer. The '12 months interest free' has even now blown out to '50 months interest free' in some stores. It has never been easier to purchase goods without having to think about where the money will come from. With the increasing burden on our environment, 'buy now, pay later' seems to have even more relevance.



Credit card debt in Australia (interest and non-interest bearing) Source: RBA, 2013

They don't make things like they used to ... Built in, or planned obsolescence

Most of us have experienced buying an electrical appliance that stops working once the warranty has expired. Many items (such as toasters, DVD players or printers) are now unable to be repaired, or have such a low replacement cost that they are cheaper to replace than repair. Built-in obsolescence is part of most production processes now, so while items were previously made of higher quality parts and designed to last, this is often no longer the case. Getting 25–30 years out of a fridge or vacuum cleaner was not unusual in previous generations.

And a broken item is the perfect excuse to go shopping.

The new style/model has just been released ... Perceived obsolescence

The cycles of fashion are a perfect match, in fact needed, for a growth economy. Fashions change constantly (and technology almost as quickly) so, as well as built-in obsolescence, we have perceived obsolescence. Of course, the desire to update is as true for homewares, technological gadgets and cars as it is for clothing. A couple of decades ago mobile phones barely existed; now (2014) more than one in every two Australian adults not only has a mobile phone, but a smart phone to give us internet access, take photos, play music and more, as well as be a phone. New models are released by many phone companies every 6 months. When fashions change or the current model is superseded, the new item becomes very appealing, trendier, or able to do more, contain more data, go faster etc. It becomes very tempting to upgrade regularly. Lifestyle magazines and TV shows such as *Better Homes and Gardens*, *The Block* or *Getaway* can feed our dissatisfaction with what we have in our homes or our current lifestyles, and are very effective at helping us create increasingly long lists of desires.

Only 10 shopping days till Christmas!

In 2012, Australians spent about \$32 billion, or about \$1,200 per person, in the lead-up to Christmas. Many people feel pressure to spend up big at Christmas, and to try to find the perfect present for family and friends. Retailers encourage this, and even gifts 'for the person who has everything' are created. With emphasis on presents and creating special occasions for family and friends with large quantities of food, drink and decorations, a huge amount of waste is generated at this time of year.

The retail industry is good at linking consumerism to our love for family and friends, so as well as Christmas, other celebrations of birthdays, Mother's and Father's Days, Easter, and Valentine's Day are promoted as occasions where we should buy presents, and all the party essentials to create that special occasion.



Gift-giving creates its own waste issues. According to a Choice survey conducted in 2011, one in 5 people had received an unwanted gift in the past year. It also found that about 49% of these unwanted gifts are returned, 31% are kept or thrown in the bin, and 20% re-gifted, in a 'pass the parcel of worthless things' trend (Choice, 2011).

How much do you use?

Our household consumption for the month

Start date

Type	No. of items purchased	Total amount spent
Clothing / accessories		
Homewares / appliances		
Entertainment / leisure		
Pet supplies / services		
Gifts		
Consumables – household (cleaning)		
Consumables – personal (hygiene, cosmetics)		
Take away drinks / food		
Other		
Total		

Our household bins are usually ...



Type	Fullness (circle closest answer)				
General waste	FULL	$\frac{3}{4}$ FULL	$\frac{1}{2}$ FULL	$\frac{1}{4}$ FULL	NEARLY EMPTY
Recycling	FULL	$\frac{3}{4}$ FULL	$\frac{1}{2}$ FULL	$\frac{1}{4}$ FULL	NEARLY EMPTY
Garden waste	FULL	$\frac{3}{4}$ FULL	$\frac{1}{2}$ FULL	$\frac{1}{4}$ FULL	NEARLY EMPTY

Our household packaging use for the month



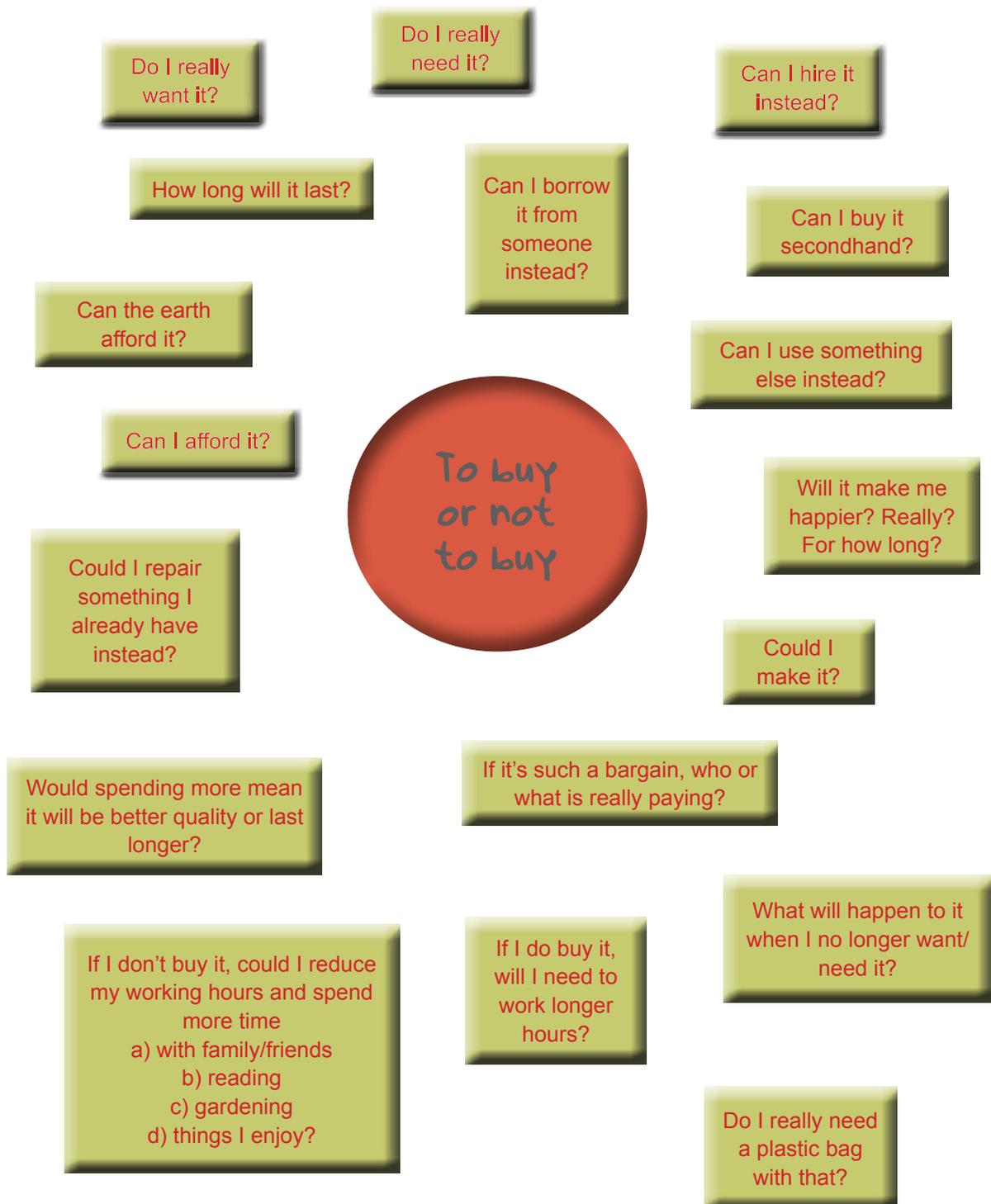
Start date

Type	Tally number
New plastic carry bags	
Small plastic carry bags and plastic wrap (e.g. fruit and veg, cling wrap, pasta or rice bag)	
Plastic food containers (e.g. take-away, yoghurt, margarine, strawberries, meat)	
Cardboard boxes (e.g. cereal, biscuits)	
Single-use cold drink containers (bottles, cans)	
Take-away coffee cups	
Other (e.g. wrapping on non-food items)	



Reducing consumption and waste

When about to buy something (think shower cleaner, shirt, book, coffee table, electric saw, boat or holiday), consider these questions:



A useful waste and resource management hierarchy

The diagram to the right is one way of thinking about the end use of everything we purchase. If we can avoid or reduce the purchase as the first option, waste is avoided. These are ideally the largest slices of action in managing waste. By reusing and recycling items, we can prevent adding to landfill. Disposal into landfill should always be the last option, and for the smallest amount of our purchases.



Avoid and reduce

The 'reduce, re-use, recycle' mantra has been widely adopted, yet almost all the effort has gone into the 'recycle' and 're-use' messages and very little into the 'reduce' message. We are after all, a consumer society!

Not purchasing things in the first place is the obvious answer to reducing our consumption and level of waste. A closer look at how we can actually do this means thinking twice before purchasing, and essentially asking ourselves if there is another option. A lot of what and how we purchase is based on habits, so questioning the assumptions behind our buying is a great place to start. Do we really need different cleaners for our kitchen benches, bathroom basins, mirrors, showers and toilets?

Try to resist the marketing hype - don't buy magazines or watch shows that encourage dissatisfaction with how you look, or what your home looks like.

The following areas of consumption are just a few examples of how we could start thinking about changing how we consume.

Use it up, wear it out, make it do, or do without.

New England proverb

Babies and kids

These little people seem to accumulate a huge amount of 'stuff' – clothes, toys, furniture, bikes, books etc. They also grow and change very quickly, often outgrowing clothes and toys in a few weeks or months. This means that there are a lot of barely used baby's and children's products available on the secondhand market.

The best things in life aren't things.



Many new parents love buying matching furnishings that the baby will have outgrown before they are old enough to notice that it all matches and is pretty! And remember that babies and kids won't care (or even know) if their clothes and toys are new or secondhand.

There is a huge amount of marketing of children's toys directly to the children themselves, through TV shows. By limiting your child's exposure to advertising that directly targets them, this can reduce the impact of advertising, and feelings of dissatisfaction with what they have.

Disposable nappies currently make up about 4% of the total domestic waste in landfill in Australia. Cloth nappies have gone through a real revolution in the past few years. Instead of the old towelling squares that needed plastic covers and were soaked in dangerous nappy buckets full of water, modern cloth nappies are as easy to use as disposable nappies. They are shaped like disposables and do up with snaps or Velcro. They don't need to be soaked, just thrown in the wash with the other clothes and hung on the line. Best of all they can be used on more than one child. It is estimated that one baby in disposable nappies will use about 6,000 nappies before they are toilet trained, creating about 2 tonnes of landfill. Typically it will cost between \$1,500 and \$4,000 in disposable nappies per child, compared with \$700–\$1,000 for a full set of cloth nappies which can be used for more than one child. A cloth nappy business, IttiBitti, was started by a Newcastle mum in 2005 and now delivers Australia wide. Visit: www.ittibitti.com.au.

Spoilt pets

Australia has one of the highest rates of pet ownership in the world, with an estimated 33 million pets nationwide. The pet industry is now worth about \$6 billion annually to the Australian economy, and research shows that an average Australian can spend \$25,000 on their dog over its life.

We tend to be good at thinking of our pets as humans (anthropomorphising), with all our desires and sources of enjoyment – high quality and varied food, comfy beds, plenty of toys and leisure options, beautiful clothes – being transferred to them. As Paul McGreevy, an animal behaviour specialist at the University of Sydney, believes, 'Nigella-type language' that increasingly fills pet-food labels and advertising reflects human, not animal, desires (*SMH Good Weekend* – 26/01/2013)

The environmental and waste impact of all these things is, of course, part of this picture.

Maybe regular basic food, pats and walks in the park is really all they want and need.

Did you know?

There is a 'pets only' cafe in Sydney that serves gourmet food, including heart-shaped tuna-pressed sushi, a series of 3-course organic meals for \$16.50–\$25.50, as well as jellies, cupcakes, drinks and waffles. It hosts doggy Christmas and birthday parties with creamy heart-shaped cakes and 'treat bags' for doggy party guests. (Cats are allowed, but only by reservation.)

!!!!!!!

*Sydney Morning Herald,
Good Weekend, 2013*



Bottled water

In 1990, you would have struggled to find a single serve bottle of water to buy in a take-away shop. It wasn't until the mid 1990s when PET bottles were produced on a massive scale, and, according to the Australian Consumer's Association, 'One of the cleverest gold mine products of all' caught on. The success of selling bottled water is deemed to be one of the greatest advertising triumphs ever. With images of glaciers, ice mountains and sparkling blue water, we are seduced into believing that this water is cleaner

and healthier than that which comes out of our taps, and we are willing to pay up to 5,000 times as much for it.

But as Russell Howcroft, an advertising professional from *The Gruen Transfer* (ABC TV show examining the advertising industry) says, bottled water is convenient and 'cool'. Consumers know it doesn't taste any different from tap water. They aren't buying the water itself, they're buying the image, the brand, the dream!

Yet bottled water is a huge environmental issue, creating water access problems for many communities near the sources of extraction, and the bottles contributing to unnecessary consumption of oil, production of green house gases, and waste disposal problems.

Recognising the problems associated with this industry, some places in Australia are taking action. Bundanoon, a town in the southern highlands of NSW, decided in 2009 to stop selling or giving away bottled still water within the town precinct. In addition, they expanded drinking-water facilities in the town with fountains as pictured above. Visit <http://www.bundyontap.com.au/bottledwater.html> for their story.

Some Sydney councils have banned the use of bottled water within their own council buildings. Australian National University in Canberra, Monte Sant' Angelo Mercy College in Sydney and Victorian College of the Arts in Melbourne have also independently instigated bans on their premises.

When will you ban it from your life?

A NSW Government study in 2006 found that more than 450,000 barrels of oil went into making and transporting bottled water in Australia (or 200ml of oil per bottle)

Australians spend over \$500 million each year on bottled water, in a country where our water supply is one of the best in the world, and these bottles generated 60,000 tonnes of GHG emissions. (Green & Minchin, 2010).

And 65% of bottles in Australia end up in landfill.



Drinking fountain at Darling Harbour



Cleaning stuff

There are alternatives to using the environmentally damaging and unhealthy cleaning products that are commonly available in our supermarkets. The following products are just to get you started. There are also books and websites that are dedicated to this whole area, for example <http://www.back-to-basics-cleaning.com> and 'Chemical free home' by Robin Stewart.



- **Bicarb soda** – will remove stains, help take away odours, soften water, polish, and act as a toothpaste and a deodorant.
- **Borax** – a mineral salt which acts as a stain remover, deodorant, fabric and water softener and soap booster. It bleaches and disinfects, and is effective as a pest controller. It is, however, poisonous when swallowed.
- **Eucalyptus oil** – A penetrating oil that evaporates rapidly and is useful as an antiseptic, disinfectant and deodorant. It is a good cleaning agent, can remove grease, gum and stubborn stains from clothes, is an important part of most wool washes and is useful as an insect repellent. It too is poisonous if swallowed.
- **Lemon juice** – A mild bleach, a deodorant and a cleaning agent.
- **Pure soap** – Good old-fashioned soap – useful in the bathroom, kitchen and laundry, as well as in the garden, as a spray.
- **Salt** – An antiseptic, disinfectant and helps prevent colours running in the wash. An excellent scouring agent.
- **Vinegar (white)** – A mild acid, able to neutralise grease and soap residues. An anti-mould agent, a mild disinfectant, a bleach, deodorant and a general purpose cleaner.
- **Washing soda** – Useful as a water softener, stain remover, degreaser, silver tarnish remover and as a drain cleaner.

A damp microfibre cloth will clean kitchen benches, cupboards, bathroom basins, showers, mirrors, glass and stainless steel appliances to sparkling, and an open window is one of the best air fresheners available!

Hire, rent or borrow (Do we each really need our own lawnmower?)

In previous generations, borrowing items from the neighbours was common practice. It makes sense to share a lawnmower (and lots of other tools which tend to be used for short periods at a time) amongst a few neighbours or friends who could all contribute something to upkeep and fuel costs.

There are of course many lending organisations or hire companies that already exist. Libraries now have much more than just traditional books. They also have audio books, DVDs, CDs, kids' toys, internet/Wi-Fi access as well as the daily newspapers. There are also private toy libraries in some areas, and there are many hire companies who will rent tools, trailers, campers, exercise equipment etc.

Gifts and celebrations

Think of the gifts you have been given for birthdays or Christmas, and think about how many of them you really appreciated. How many times have you pretended to be excited about a gift you have been given? Now think about how stressed you can become trying to find the perfect gift for someone.

Consider these alternatives:

- Could you stop exchanging gifts with particular friends or relatives? They may be as relieved as you!
- Secret Santas, where each person in a large group buys for only one other. While many people may do this at work, why not try it for family groups?
- Non-material presents – take someone out for a meal or a trip to the movies/beach/picnic. Give a gift voucher for a service such as babysitting or a morning's work in their garden. Or, ask them to choose a night where you deliver a meal to their home to give them a night off cooking.
- Homemade gifts such as chocolates or biscuits, a painting or a cushion.
- Consumables, as these are more likely to be used, such as chocolates or wine.
- A charity donation on behalf of someone else, e.g. Oxfam have cards that represent gifts such as a duck, a mosquito net or educational supplies for a person in a developing country. Visit <http://www.oxfamunwrapped.com.au/> or <http://www.caregifts.org.au/> or the charity of your choice.
- Secondhand gifts – either re-gift something you have been given or buy from secondhand shops and call it retro!
- Try to modify the level of stuff that gets used at children's parties, and consider more sustainable gifts for your child to give to others. The explosion of plastic toys, trinkets and lolly bag gifts is likely to lead to increased landfill more than increased happiness.

Packaging

There are many ways to reduce the packaging (particularly plastic) in our lives:

- Buy fruit and vegetables loose or in paper bags
- Choose goods (and sellers) where you can use your own reusable containers
- Take bags with you, even ones for fruit and veg – keep them handy, get into the habit
- Have a foldable carry bag in your handbag or backpack for anything you buy, including non-food items



- Choose recyclable packaging over non-recyclable if possible, e.g. paper or glass over plastic
- Avoid individually wrapped serves of anything if possible
- Avoid bottled water
- Use a reusable coffee cup for take-away coffees.

Reuse and recycle

While recycling (meaning to re-use the **materials** in an item) is good, re-using (using the item again in its current form) is better, as no energy or new materials are required to continue the use of the item.

Consider how you can reuse or recycle other people's goods, as well as passing on things you no longer want or need.

Secondhand shops (either charity or privately run) are good places to take good quality stuff, as well as buy it. They will take items such as good quality clothing, homewares, books, toys and furniture. Some will also take working electrical items. The range and quality of goods in op shops varies of course. Charity-run op shops put money back into helping the community, so it's also a good way of supporting their work. Check www.opshop.org to find op shops near you. Just remember, they don't want things that really are just rubbish. Increasingly now, charity shops have hefty rubbish disposal fees themselves as a result of things being dumped on them.

The Online **Freecycle** network has over 9 million members across the globe. It's a grassroots and entirely non-profit movement of people who are giving (and getting) stuff for free in their own towns and thus keeping good stuff out of landfills. Membership is free, and everything posted must be free, legal and appropriate for all ages. To view the items being given away or sought in a particular area, you must be a member of the local group. Check it out at www.freecycle.org.

You could consider garage sales in your local area, markets, car boot sales and online auction and trading sites such as ebay.com.au and gumtree.com.au where you can search specifically for what you need, or sell your stuff.

You can use your local council website to become familiar with what can go into your recycling bins. Knowing what can and can't go into them is important to prevent 'contamination' and make the whole load unusable. Become familiar with other services in your area for recycling items such as light globes, ink cartridges and gas bottles.



'My mum was in South Korea as a missionary in 1955 (only a couple of years after the Korean War) and lived in Busan. She lived with four or five other women and sometimes one of them would go to Seoul about 450km away, which (in those days) was a day's travel. Buying lunch on the train wasn't an option, so they normally took a sandwich wrapped in greaseproof paper.

'On one trip to Seoul, Mum stayed with a North American family and when they made her lunch for the trip home, they used plastic wrap (or cling wrap). Mum and her friends had never seen it before, and thought it was fantastic. That one piece of cling wrap became a treasured possession. It travelled back and forward between Busan and Seoul dozens of times, being shared by everyone in the house. After each use, this lone piece of cling wrap was wiped clean and put away in their shared kitchen.

'How things have changed. How many of us would consider cleaning cling wrap or plastic bags? How annoying! We now take plastic so much for granted that we see it as a totally disposable product. Yet this stuff that was seen as so amazing only a generation or two ago is produced using an amazing, non-renewable resource - oil. For some reason we think it is acceptable to use plastic cutlery, plates and bags once only and then throw them away. We think it is acceptable to make plastic toys that are used once or twice as an incentive to buy junk food. When will we realise that this is not how every other generation has lived; that it is in fact an extremely recent phenomena? When will we wake up to the damage this behaviour is wreaking on our planet, and stop wasting oil and creating mountains of garbage?'

Graeme Stuart

Recover

Try to buy products that contain recycled content where possible, such as paper products (including toilet paper, paper towel and office paper), outdoor furniture, building materials, and clothing. By creating a demand for products with recycled content, we encourage their economic viability.

Totally wrong place for waste

Illegal dumping of waste is an increasing problem for councils. If you see it, please phone your local council and report it.

Charities are also facing an increasing problem with receiving (and then having to pay for disposal of) unsaleable items dumped on them. This can be intentional or unintentional. If donating to a charity op shop, make sure the items are saleable – clean, unbroken and useful.



Ethical shopping - social and economic sustainability for others

Questions to consider:

- If the product is imported, is it Fair Trade labelled, ensuring workers have been paid fairly, and work in decent conditions?
- Is the item produced or sold by a small business, or a multinational company?
- What other products does this company make, and are you happy to support them?
- Are other species suffering because of production of this product, e.g. palm oil for chocolate bars affecting habitat for orang-utans or fish stock depletion for fish oil tablets?
- For wooden or paper products, is the item made of sustainable plantation wood or old growth forest?
- Are conflicts involved in production of this product, e.g. blood diamonds in Africa?

While lists like this can be overwhelming, you may find that some of these topics matter more to you than others. A guide is available that rates common brand name companies on their environmental and social records. Visit www.ethical.org.au.

Challenges

As before, these challenges are designed to be a way of exploring issues and longer term behavioural change. Please share your experiences of doing any of these challenges, or ideas for any more, with others.

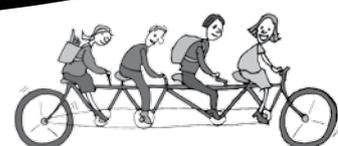
1. **For one week** (or month or year) – Buy nothing new (apart from essentials like food, hygiene and medicines). For inspiration to do this, check out www.buynothingnew.com.au or www.littlecofootprints.com.
2. **For one day a week** – Choose one day (or more) per week that you decide to make 'purchase free'. How many weeks can you do it?
3. **Forever** – Create an inventory of tools and equipment amongst your street (or group of friends) that you can all share. Create a system of keeping track of where stuff is and participation guidelines, and start sharing!
4. **For one week** – See how many houses can get their rubbish into the one general waste (red) bin.
5. **Sometime soon** – Organise a garage sale or swap fest in your street. You might even decide to donate any proceeds to an environment group (e.g. Transition Newcastle!) or a charity, or buy something communal for your street.



My consumption and waste action plan

		Will do	Have Done	N/A
FREE	Reduce the amount of new stuff I buy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE	Use secondhand buying as a shopping option	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE	Avoid bottled water	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE	Reduce amount of toxic chemicals in my home	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE	Offer my things to others on loan if needed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE	Re-assess my gift-giving practices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE	Know what is recyclable and where	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE	Recycle/reuse what I can appropriately	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE - \$\$	Start a compost or worm farm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE	Refuse plastic shopping bags	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FREE	Reduce amount of packaging where possible	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other ideas: _____





1. Give your child a small amount of money, say \$5 to spend at an op shop, or secondhand market. Then see if you can find the equivalent items new in a shop. Discuss the environmental benefits (as well as financial) of shopping secondhand.
2. Get creative! Make gifts together - either food or craft items.
3. When your child has unused toys or books, help them sort through them and let them decide which things they will give away; maybe to a family friend, or an op shop.
4. Help them organise a garage sale or stall at a secondhand market with friends or family, letting them keep the money or choose a charity to donate it to.
5. Discuss advertising with them, particularly ads or marketing that specifically targets them. Ask them questions about why they would be trying to sell in this way and whether it is a good thing.
6. There's heaps of ideas in 'Honeycomb Kids: Big picture parenting for a changing world . . . and to change the world' by Ann Campbell (<http://honeycombkidsparentingbook.com/>).

Suggested plan for your group discussion

Catch up – How has everyone's week been?	(15 mins)
Discuss outcomes from the Transport chapter, what has changed, plans.	(20 mins)
Review chapter content	(20 mins)
<ul style="list-style-type: none"> • What was the main thing you gained from the chapter? • Did anything surprise you? • How did you go with estimating your current consumption and waste levels? • What might contribute to differences between households? 	
Discuss your action plans	(30 mins)
<ul style="list-style-type: none"> • What do you want to achieve this month? • What assistance (if any) would you like from others in the street? 	
Explore ideas for action that you could do as a group?	(20 mins)
<ul style="list-style-type: none"> • What could you do together that you couldn't do alone? 	
Decide on which challenges you want to try this month.	(10 mins)
Confirm details for the next time you get together.	(5 mins)

Further resources

Films:

- *The Lorax* – Also the book by Dr Seuss (1971)
- *Tapped*, <http://www.tappedthemovie.com/> – examines the role of the bottled water industry and its effects on our health, climate change, pollution, and our reliance on oil. Produced by Atlas Films.
- *Waste Land* – <http://www.wastelandmovie.com/>
- *Waste Not* – <http://www.tec.org.au/wr-latest-news/928-waste-not-amazing-film-on-recycling>

Websites/Blogs:

- *Becoming minimalist* – <http://www.becomingminimalist.com/becoming-minimalist-start-here/>
- *Graham Hill: Less stuff, more happiness* (TED talk) – http://www.ted.com/talks/graham_hill_less_stuff_more_happiness.html
- *Little Eco Footprints* – <http://littleecofootprints.typepad.com/>
- Natural cleaning information - <http://www.back-to-basics-cleaning.com>
- *Slow your home (The simpler life you want)* – <http://www.slowyourhome.com/>
- *The Story of Stuff*. The series also includes other stories, of Electronics, Cosmetics, Bottled Water, of Broke, of Change and of Solutions - <http://www.storyofstuff.org/>

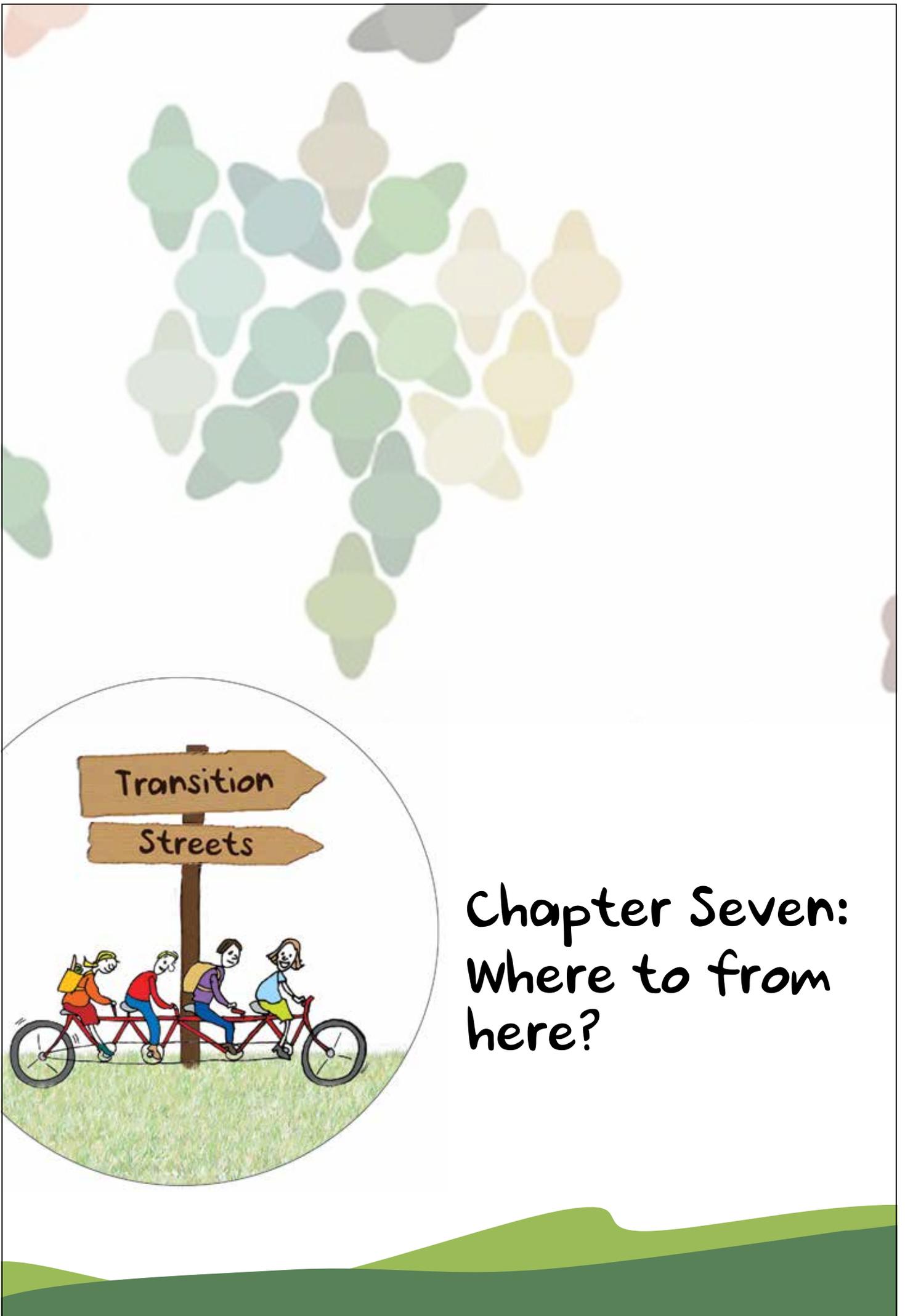
Books:

- *Affluenza* – Clive Hamilton and Richard Denniss (2005), Allen & Unwin
- *Enough* – John Naish (2008), Hodder & Stroughton
- *Honeycomb Kids* – Anna M Campbell (2012), Cape Able
- *Radical Simplicity* – Jim Merkel (2003), New Society Publishers
- *Screw Light Bulbs* – Smarter ways to save Australians time and money – Donna Green and Liz Minchin (2010), The University of Western Australia
- *Time To Eat The Dog? The real guide to sustainable living* – Robert and Brenda Vale (2009), Thames & Hudson



References

- Australia Conservation Foundation (2007), *Consuming Australia: Main Findings*. Available from http://www.acfonline.org.au/sites/default/files/resource/res_Atlas_Main_Findings.pdf
- Australian Bureau of Statistics (2011), *Household Income and Income Distribution*, Australia, 2009–10 (6523.0). Available from <http://www.abs.gov.au>
- Australian Bureau of Statistics (2010) - <http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/1370.0~2010~Chapter~Waste%20per%20person%20%286.6.3%29>
- Basel Action Network; United Nations Environmental Programme
- Boomerang Alliance (2012), *Cash for containers*. Available from <http://www.boomerangalliance.org.au/cash-for-containers.html>
- Choice (2011), *Unwanted Christmas presents binned*. Available from <http://www.choice.com.au/media-and-news/media-releases/2011%20media%20releases/unwanted-christmas-presents-binned.aspx>
- Department of the Environment, Water, Heritage and the Arts (2010), *National Waste Report*. Available from <http://www.environment.gov.au/wastepolicy/publications/national-waste-report.html>
- Environmental Protection Agency of South Australia. Available from <http://www.epa.sa.gov.au/page.php?page=905#litter>
- Green, D and Minchin L (2010), *Screw Light Bulbs – Smarter ways to save Australians time and money*. The University of Western Australia, Crawley
- Hamilton, C & Denniss, R (2005), *Affluenza: When too much is never enough*. Allen & Unwin, Crows Nest.
- Mobile Muster (2010), *Australia a nation of hoarders*. Available from http://www.mobilemuster.com.au/media/5924/mobilemuster_ebay_report_vfinal.pdf
- Reserve Bank Australia (2013), Statistical Tables. Available from http://www.rba.gov.au/statistics/tables/index.html#assets_liabilities
- Stewart, R (2002), *Chemical free home* (2nd ed). Bookman Press, Melbourne
- Vale, R and Vale, B (2009), *Time To Eat The Dog? The real guide to sustainable living*. Thames & Hudson, London.



Chapter Seven: Where to from here?

Congratulations for taking on the Transition Streets program

Never doubt that a small group of thoughtful, committed citizens can change the world. Indeed, it is the only thing that ever has.

Margaret Mead

Well, you might not have changed the world yet, but hopefully you're on your way!

Now that you've worked through the Transition Streets program in your street, where do you go from here, individually, as a household and as a neighbourhood?

In this chapter we hope to inspire you to continue your journey to increasing sustainability in your own life, but also to continue your involvement in your street community, local neighbourhood, and the wider community.

We hope that through this program you have gained extra knowledge and insights around living sustainably and this has motivated you to make changes, large and small, in your life. We hope that you know your neighbours a little (or a lot) better, and are enjoying an increased sense of community where you live.

The most remarkable feature of this historical moment on Earth is not that we are on the way to destroying the world - we've actually been on the way for quite a while. It is that we are beginning to wake up, as from a millennia-long sleep, to a whole new relationship to our world, to ourselves and each other.

Joanna Macy



What have you achieved so far, and what do you want to achieve in the future?

Take a moment to look back at your involvement in Transition Streets. Think about things that may have changed for you in this time. You can use the following table to list specific achievements and goals, both personal and as a group, for the future. You can also do the eco-footprint calculator again (at end of this chapter), to see what's changed.

Area	Achievements	Goal - Personal	Goals - Group
Relationships with neighbours			
Water			
Energy			
Food			
Transport			
Waste/ consumption			

It's up to all of us

There are many ways that you can make a difference. While some people may feel comfortable taking on an 'activist' role, others can be as, or more effective, in less confrontational ways. Bill Moyer (who was active in many social change and environment groups) identified 4 broad roles people tend to adopt within social change movements: the Citizen, the Reformer, the Rebel and the Change Agent.



Check the table below to see which roles you feel comfortable with.

<p>The Citizen</p> <ul style="list-style-type: none"> • Upholds a widely held vision of the democratic, good society • Demonstrates ordinary people support social change • Gives the movement legitimacy • Makes it harder for authorities to discredit the movement • Reduces the potential for violent attitudes and actions within the movement 	<p>The Reformer</p> <ul style="list-style-type: none"> • Transmits movement analyses and goals to authorities • Performs parliamentary and legal efforts – lobbying, referenda, lawsuits • Works to create and expand new laws and policies • Acts as a watchdog to ensure the new laws and policies are actually funded and carried out • Mobilises movement opposition to backlash efforts
<p>The Rebel</p> <ul style="list-style-type: none"> • Puts issues on the social and political agenda through dramatic, nonviolent actions • Dramatically illustrates social issues • Shows how institutions and official authorities violate public trust by causing and perpetuating critical social problems • Forces society to face its problems • Promotes democracy 	<p>The Change Agent</p> <ul style="list-style-type: none"> • Supports the involvement of large numbers of people in the process of addressing social problems • Promotes a new social and political majority consensus favouring positive solutions • Promotes democratic principles and human values • Supports the development of coalitions • Counters the actions of the authorities • Moves society from reform to social change by promoting a paradigm shift



Each of these roles plays an important function. We need people who are challenging power structures, who are at the cutting edge of social change. We also need people who make it easy for 'ordinary' people to join the movement for change. If we are going to create lasting change, we need to welcome everybody's contribution and to have the courage to get involved.

So what can you do? Here's just a few ideas:

- Get active in a local group – search out the groups in your vicinity and support their events, or join their committee and help drive change in your area.
- Keep up the changes you've made so far.
- Build on these changes to decrease your environmental footprint even further.
- Share what you've learnt with others.
- Support your local community garden.
- Get active online with such groups as Avaaz.org, GetUp! and 350.org.
- Keep up-to-date on the issues by joining free email lists such as Making Environmental News (www.makingenvironmentalnews.com) and Climate Spectator (www.businessspectator.com.au/climate), read books or watch films on the issues.

Most of what our leaders, governments, local councils and industrialists are saying about sustainability is a little like making sure the deckchairs on the Titanic are made from recycled timber – a good idea as far as it goes, but really missing the point.

Vale and Vale, *Time to eat the Dog*



Working together longer term

Hopefully you now know other people in your street a whole lot better. You might have felt a strong connection with some of them, while you might have found others quite difficult. This is what communities are like – we might share something in common (e.g. a neighbourhood, some common values) but it doesn't mean that we will necessarily be best friends with everybody.

Resilient communities have strong connections, support each other, are inclusive and focus on what they have (not what they don't have). An important aim of Transition Streets is to help build resilient communities, with neighbours able to support each other, particularly in times of need, such as in electrical blackouts, floods or damaging storms.

When small groups of people come together, sometimes amazing things can happen.

Hulbert Street, a local street in South Fremantle, Western Australia, has hosted a Spring Sustainability Fiesta, for the last 5 years. In 2011, 2 homes, 5 artist's studios and 6 gardens were open to the public and nearly 6,500 visitors enjoyed the day. The following years have been even bigger. (see www.ecoburbia.com.au)

Other streets share a variety of resources (e.g. camping equipment, lawn mowers and even a car), have a community garden, buy bulk food together, or have a monthly book club. What can you do together that you can't do alone?

Now the program is over, you have the opportunity to think about what you want to happen with your group. You might decide you would like to continue meeting on a regular or irregular basis. You mightn't meet formally but you might get together every now and again over a BBQ or afternoon tea. You might decide you would like to do something practical together (possibly including other people from the street) like start a vegie garden, car pool or create a neighbourhood open shed. You might decide that you don't want to do anything specific (but hopefully you will be more likely to wave to neighbours when you see them).

If you want to explore possibilities for the future, some discussion points are suggested here:

- Thinking back on the program, what were the things that really motivated you to take action?
- What were you motivated to do?
- What particular skills and interests are there in your group?
- What type of action [or project or something] would capture your interest and enthusiasm?
- What could you do individually and together to make a difference?

We hope that the Transition Streets program was just one part of a longer journey, and that you will keep exploring sustainability together.



IS ONE PLANET ENOUGH?

How many Earths would be needed if everyone on the planet enjoyed your standard of living? Find out how much land is needed to support your lifestyle - your ecological footprint

OzGREEN

Questionnaire © NewScientist Used with permission”

Questions

Pick the answers that best apply to you

WATER

- Have you had a bath every day this week? If yes, score 14
- If you have a bath just on Sunday night—or twice a week, score 2
- Do you shower every day rather than have a bath? If so, score 4
- Do you think we're too obsessive about personal hygiene? If you take a shower once a week, score 1

Score

And...

- If you use your dishwasher every day or every other day, score 6
- On hot, sunny summer days, do you water the garden or wash the car with a hosepipe? Score 4

Score

FOOD

- When you last went shopping, did you buy only locally produced fresh products—such as bread, vegetables and meat? If yes, score 2
- Alternatively, do you buy more heavily packaged and processed items and not even bother to look at where food comes from? If the answer is yes, score 15
- Or, do you search out food that comes from closer to home? If you are successful at least part of the time, score 5

Score

And...

- What sort of food do you eat? Do you insist on meat with every meal? If so, score 85
- Or do you eat mostly vegetarian dishes? If so, score 30

Score

WHERE YOU LIVE

If you share your home, divide the score by the number of people sharing and round up the answer.

If your home is...

- a flat with just enough room to swing a cat, score 7
- a terraced house, score 15
- a large and spacious flat, score 12
- a semi-detached house, score 23
- a detached house, score 33

Score

HEATING & COOLING YOUR HOUSE

If you have no heating or air conditioning, score 0 and skip to the next section.

For everyone else, the energy to heat or cool your home probably comes from burning fossil fuel, which releases carbon dioxide. To soak up this greenhouse gas, a wood will have to be planted, using up precious land. *So, start this section with a score of 45.* On the bright side, you get to subtract some points

- If you prefer to add another layer of clothes before turning up the heating, subtract 5
- If you use natural ventilation rather than the air conditioning, subtract 15
- Do you only turn on the heating or air conditioning when absolutely necessary rather than keeping it on the timer all year round? If so, subtract 10

Score

ELECTRICITY

If your power comes from only renewable sources, score 2 and skip to the next section. For everyone else, generating your electricity releases carbon dioxide, so start this section with a score of 75

- Do you always switch off the lights if a room is no longer in use? If yes, subtract 10
- Computers, TVs and hi-fis can now be left on standby. If you shun this setting and switch these devices right off, subtract 10

Score

HOLIDAY (and business)

Where did you go last year?

- If you flew as far as Europe, score 155
- If you flew to Asia or the Americas, score 85
- If you flew within Australia, score 20
- If, instead, you went by road or rail somewhere in Australia, score 10

Score

OzGREEN PO Box 301, Bellingen, NSW 2454

Tel: 02 6655 2180 - Fax: 02 6655 1964 - email: ozgreen@ozgreen.org.au - www.ozgreen.org

DAILY TRAVEL

- Did you drive to college or work today? Is your car a modern, small-engined car? If so, score 40
- Or do you drive a big 4-by-4? Score 75
- If your car is something between these two, score 50
- Do you take a bus or train, rather than travel by car? If so, score 25
- If you are fortunate enough to cycle to work or college, score 3

Score

PAPER

The last book you read, did you borrow or buy it?

- If you always buy, score 2
- If you always borrow, score 0
- If it's half and half, score 1
- Do you always share your newspapers and magazines? If so, score 5

• If you bin your newspapers when you have finished with them, score 10

Score

WASTE

To dispose of waste, you're once again going to use up valuable land. So, start this section with a score of 100.

- Do you return your bottles for recycling? If you do, subtract 15
- If you separate out waste paper for recycling, subtract 17
- If you keep used cans apart and recycle them, subtract 10
- Do you recycle your plastic containers? If so, subtract 8
- Are you keen on composting the organic waste left over from the kitchen and garden? If so, subtract 5
- If you avoid generating waste by, say, buying less or reusing things then subtract 15

Score

TOTAL SCORE

SCORE

Many of the amenities you use every day, from roads to shops and buildings, make their own demands on land. People who consume more tend to rely more on these amenities. So, to take account of this, double your score

Each "point" in your score is equal to one-hundredth of a hectare. So, for example, a score of 350 is equal to about 3.5 hectares

FINAL SCORE

Name: _____
Phone: _____
Email: _____
Postcode: _____
Organisation/School _____

PLANET CHART



200 or under Well done, you are living within or close to the average Earth share. If everyone lived like you, then human and non-human existence could be sustainable and equitable. Around two-thirds of the global population have a footprint lower than 200



200 - 400 Your footprint is below the Australian average. However, this is still around twice the average Earth share. If everyone on the planet lived like you we would need at least one "extra" planet to support consumption. About 15 per cent of the world's population falls into this category



400 - 600 Your footprint is close to the European average. This is about three times greater than the Earth share. If everyone lived like you we would need two additional planets to support us! About 7 per cent of the world's population falls into this category



600 - 800 Your footprint is just below that of the average Australian and still below that of the average North American. If everyone lived like you we would need to find three additional planets! About 3 per cent of the world population falls into this category



Over 800 Your footprint is now close to that of the average Australian and North American. If everyone consumed the same we would need at least four extra planets to live sustainably. About 5 per cent of the world's population have a footprint this big

Not convinced? This quiz gives only a crude estimate of your personal footprint
For a more detailed online calculator, go to www.ecologicalfootprint.com

Further reading: *Sharing Nature's Interest* by Nicky Chambers, Craig Simmons and Mathis Wackernagel, published by Earthscan



OzGREEN PO Box 301, Bellingen, NSW 2454

email: ozgreen@ozgreen.org.au - www.ozgreen.org - Tel: 02 6655 2180 - Fax: 02 6655 1964

Suggested plan for your group discussion

Catch up – How has everyone’s week been?	(15 mins)
Discuss outcomes from the Consumption and Waste chapter, what has changed, ongoing actions and future plans.	(20 mins)
Complete the Eco-footprint calculator again, and Fill in data questionnaire to record any changes since the beginning of the program. Discuss in the group.	(20 mins)
Review the Transition Streets program <ul style="list-style-type: none"> • What was the main thing you gained from it? • Did anything surprise you? • How do you think it could work better for future groups? 	(20 mins)
Discuss <ul style="list-style-type: none"> • Thinking back on the program, what were the things that really motivated you to take action? • What were you motivated to do? • What particular skills and interests are there in your group? • What type of action (or project or something) would really capture your interest and enthusiasm? 	(30 mins)
Explore ideas for action that you could do as a group? <ul style="list-style-type: none"> • Who would like to continue meeting formally or informally, how could this happen, and what do you want to achieve?? • What could you do together that you couldn’t do alone? 	(20–30 mins)
Celebrate your achievements, have a meal or party together.	Hours!

Thank you!

Thanks for being part of this project. We continue to learn a lot through this project, and hope you have benefitted through your participation.

Thank you to organisations who have supported the development of this program.

We are particularly grateful to the Street Contacts – without you this project could not happen. We recognise that it may have been a time-consuming as well as a somewhat daunting task, and we are very grateful to you all for taking the leap of faith with us.

We wish you all the best for a sustainable future.



