

The Converging World: Climate change, Planetary limits, What can/should we do?

David Teather

U3A Acton Discussion Group, 8 April 2011.

Today I'd like to begin with the story of the British charitable organisation, "The Converging World" (TCW), and what it is achieving in co-operation with the Indian charity, Social Change and Development (SCAD).

I'll then introduce four important issues that arise out of a consideration of "The Converging World":

- The climate change debate in Australia: Are public or private interests being served?
- Climate change and planetary limits (or Biochemistry, the Industrial Revolution and Exponential Growth)
- One, converging world?
- What can/should we be doing?

The Converging World

This is the name of a small, locally-based organisation, which originated in a village with the rather improbable name of Chew Magna, near Bristol, in southwest England.

One of the leading lights, and co-founder of The Converging World, is John Pontin – a successful businessman, with money, and a long-standing association with the Schumacher Society (UK). The same Schumacher who, in 1973 wrote the bestseller, "Small is Beautiful: a study of economics as if people mattered."

This small group of people, neighbours in Chew Magna, came together around the common concern to make a difference in tackling climate change. Pontin's book begins:

According to an overwhelming majority of the planet's leading scientists, there is no longer any doubt that climate warming is a reality. Nor can we seriously doubt who's to blame: we, and perhaps six generations of our families. But blame is a useless tool when it comes to climate fixing. The sheer scale of the looming crisis demands a new way of thinking, new lifestyles and, crucially, unprecedented international co-operation.

Tackling climate change has two quite different meanings: to tackle the cause, and to tackle the effects. Clearly it's necessary to do both, but as Ross Garnaut has pointed out, a relatively small investment in tackling the cause now could pay huge dividends in minimising the costs of tackling the effects later. The Chew Magna group decided to tackle the cause.

This is defined as the increasing concentration of greenhouse gases in the atmosphere. These are, in order of importance, carbon dioxide (from burning fossil fuels and forest clearance), methane (agriculture/ livestock, mining) and nitrous oxide. The concentration of carbon dioxide in the atmosphere has increased from about 280 parts per million before the Industrial Revolution to 380 ppm today – an increase of about one third.

The Chew Magna group made a key observation: it doesn't matter where in the world carbon dioxide is emitted, the effect is the same. A ton of CO₂ emitted from a coal-fired power station in the Hunter Valley has the same effect as a ton of CO₂ emitted by forest clearing in Indonesia or a ton of CO₂ emitted from gas guzzling 4WDs on the streets of trendy suburbs of Birmingham or Beijing.

But the cost of abating those emissions may well vary from place to place, and according to the methods used. So by shopping around, you may be able to get more benefit from the time and effort and money spent.

The Converging World chose to reduce CO2 emissions by building renewable power generators in Tamil Nadu, southern India. Specifically they chose to build a wind power generator in a highly suitable location; wind maps of the area show high wind speeds for much of the year. There are already some wind-farms in Tamil Nadu, but the main alternative source of power is coal-fired electricity. So if wind turbines are not installed to meet the growing demand for electricity, coal-fired generators would be and would emit large quantities of CO2.

The Converging World donated funds to build one turbine in Tamil Nadu, and then used that as collateral for a bank loan to purchase a second.

Income from the sale of electricity from these two generators maintains the turbines, pays off the bank loan, and supports social development for the disadvantaged in Tamil Nadu through TCW's partner organisation, Social Change and Development. SCAD is a long established, Indian charitable group, whose initiatives include providing school places and healthcare. They also support women's self-help groups, sustainable agriculture, and measures to mitigate and adapt to climate change.

The turbines also earn carbon credits, which are sold in the UK and go to fund TCW's work in helping local communities in the UK (schools, parish councils and other groups) to help them understand their energy needs and reduce their carbon footprints. There's useful information on the TCW's website on their work with UK community groups: www.theconvergingworld.org

TCW's website this week announced the appointment of an Indian management team to grow its renewable energy business, with the former Secretary of the Ministry for New and Renewable Energy as a member of the board. Their aim is to increase the generating capacity to 100 MW in the next five years – more than a 10-fold increase.

Convergence:

Helping the poorest in the developing world, the emphasis has to be on meeting the most basic needs – clean water, food, shelter, health, education. About 450 million of the very poor live in India (Singer 2009), and SCAD caters to the needs of some of these. As their lives improve, at least in the short term their carbon footprint will increase. As Ed Miliband, Secretary of State for Energy and Climate Change in the former British Labour Government, made clear in 2009, part of any settlement between developed and developing countries on climate change must involve flows of finance from developed to developing countries to assist climate change mitigation and adaptation.

If there is to be convergence, over time, in the carbon footprints of the developed and developing worlds, the carbon footprints of developed countries, such as Australia, must contract sharply.

But the assumption that this will compromise the quality of life in developed countries may not be true. Clive Hamilton, in his book “Growth Fetish” and elsewhere, argues that many people in countries like Australia have lifestyles characterised by overconsumption. As a broad generalisation, while there is a reasonable correlation between income and perceived quality of life up to incomes of approximately \$10,000 per annum, further increases in income show little correlation with perceived quality of life. Many downshifters are finding that simpler lives, less influenced by the wants created by commercial advertising, are more beneficial.

Voluntary initiatives in neighbouring countries:

Members of the Alternative Technology Association (Australia and New Zealand) supply and install solar panels to provide electricity to remote villages in East Timor. The Timor Leste national electricity grid is supplied by dirty oil-fired electricity generators imported second-hand from China (as China itself upgrades to use cleaner technology). It is anticipated that Timor Leste will have no shortage of oil in the coming years, but using it to generate electricity increases CO₂ emissions. And, of course, many villages are not connected to the national grid.

In Vanuatu, members of the Forest and Bird Protection Society (New Zealand) helped two village communities, Matantas and Sara, to preserve 4500 ha of pristine, lowland, tropical rainforest. When this project began, 15 years ago, loggers had offered the villagers money for the right to clear the forest. The primary aim of the conservation project was to preserve the forest and its species diversity. And this forest also fulfils an important role in storing carbon (perhaps as much as 9 million tons of CO₂). The eco-tourists who visit, and by so doing provide the villagers with an alternative source of income for school fees, cause the emission of 90 tons per annum in their flights from Australia or NZ.

The Climate Change Debate in Australia: Are public or private interests being served?

If we are talking about a scientific matter, we can never rule out the possibility that today's explanations of the natural world will not, sometime in the future, be replaced by better explanations. That is the nature of science.

As the documents from the Australian Academy of Sciences and from the Royal Society (UK), referred to under “Climate Change: The Science” in the reference list, make clear, the majority view of the scientific community is that the world's climate is changing, that the main cause over the last 50 years has been the emission of greenhouse gases (carbon dioxide, CO₂; methane, CH₄; nitrous oxide, N₂O), and that this in turn is largely due to human activity. Adequate policy responses are needed.

A minority of scientists genuinely take a contrary view. But some at least of those who feature in the general media are not working in relevant fields, and some appear to have little current credibility with their peers.

The position I take on climate change is related to my background. I had 10 years of scientific training and research, mostly at University College London, in the biological sciences – specialising in plant ecology, plant physiology and biochemistry. But I'm not a climate scientist and claim no expertise in this area.

Because I experienced the way science works, I find the idea that climate change is some sort of conspiracy by the world's scientific community to delude the public as highly improbable. A conspiracy concerning an issue of this importance would not survive in the open, international system that science is.

Much of the controversy about climate science presented in the Australian media arises because to tackle climate change seriously threatens the short-term, vested interests of large and powerful commercial organisations, mainly those concerned with coal, oil and aluminium. The companies concerned are typically multi-nationals, and have important interests and links outside Australia.

What's happened in Australia has been well documented by Guy Pearse, in his Quarterly Essay "Quarry Vision", and by Clive Hamilton in "Scorcher: The dirty politics of climate change."

The strategy of industry lobbyists has been:

- To prevent action to reduce greenhouse gas emissions;
- If prevention fails, to delay action;
- If delay fails, to shift the burden of emissions cuts elsewhere, so that someone else pays.

Prof Ross Garnaut, an adviser to governments over several decades, referred early in 2009 to "the most expensive, elaborate and sophisticated lobbying ever seen in this country."

As I wrote in the *Australian Financial Review*, in January 2009: "the raison d'être of lobbyists for the high carbon economy is to advance private, corporate interests above the public interest."

We are seeing in Australia a re-run of campaigns of the 1970s by the tobacco industry: powerful international companies putting private interests before the public interest, and using every trick at their disposal to confuse, to obfuscate, to delay action, and if all else fails to shift the costs away from their bottom line and to blame anyone but themselves.

Climate Change and Planetary Limits (or "Biochemistry, the Industrial Revolution and Exponential Growth")

The Biochemistry:

I'm going to take us back to 4th-form biology and the basic biochemical equations that sustain life on Earth:

Photosynthesis: (pages 42 and 258 in Tim Flannery's book, "Here on Earth").

This equation represents how plants trap energy from the sun. During daylight hours:



carbon dioxide + water + light energy → carbohydrate + oxygen

Respiration: This equation represents how plants (and animals that have eaten plants, or animals further up the food chain that have eaten other animals) access the energy stored in carbohydrates, and use it for other purposes (other chemical reactions, movement):



carbohydrate + oxygen → carbon dioxide + water + energy

Notice that the reaction for respiration is the reverse of that for photosynthesis.

Respiration is, of course, independent of light. It makes available at other times and places the energy originally stored by the plants in photosynthesis.

Both these reactions occur at normal temperature and pressure, and are catalysed by enzymes (complex protein molecules that bind temporarily the smaller molecules in particular orientations in order to make them more reactive).

Photosynthesis occurs in sub-cellular structures called chloroplasts, respiration in mitochondria.

Notice also that the reaction for respiration represents the same chemical transformation that occurs when plant or animal material is burnt. If the material is dry, once ignited it will continue to burn until all the material is used up. The material that is burning raises the temperature of the adjacent non-burning material until the latter burns also. Energy is released in the process.

The Industrial Revolution:

We are now going back some tens of millions of years. Simple plants have evolved into large, multicellular organisms, which grow profusely in swampy conditions where there is plenty of light and water. When some of these plants die, they do not decay completely and there is a build up of wet, partly-decomposed plant remains. In time this is compressed, overlain by silt or sand, and eventually becomes a formation which geologists call the coal measures. Oil and natural gas also originate from partly-decomposed biological material.

Fast forward now to late 18th-century England. Up to this time human civilisation has depended on various forms of energy: muscle power (of humans, and of draft animals such as horses and bullocks), on wind power (used for grinding corn, and draining the Fens in Holland and eastern England), and on water power (also for grinding corn, but also for powering the new woolen and cotton mills).

Then in 1774 James Watt produced the first workable steam engine. In this, water was heated to produce steam, which drove a piston in a cylinder, and which provided a much more reliable source of power for pumping water out of mines, grinding corn, spinning wool and cotton in mills, and the transport of people and goods in ships and trains.

Exponential growth:

Today we use huge quantities of coal, oil and natural gas, collectively known as fossil fuels. The amount of carbon, emitted as carbon dioxide, in this process is about 10 billion tonnes each year.

This compares with about 100 billion tonnes being absorbed by plants throughout the world through photosynthesis each year, which is balanced by about the same amount being emitted by plants and animals through respiration.

So the scale of our use of fossil fuels has grown to be sizeable, even compared with the whole of the earth's natural carbon cycle.

It's important to put this growth in our use of fossil fuels into a time perspective.

The large-scale use of fossil fuels began with the industrial revolution – less than 250 years ago. Since then we have been drawing on the Earth's store of coal, oil and gas at an ever-increasing rate. And whenever you have an exponential increase in anything in the real world, it has a natural limit; it can't continue indefinitely – unlike, a topical example, the production of financial derivatives. (That's what comes of dissociating the finance industry from the real economy.)

We have already used about half of all our planet's known reserves of oil in the blink of an eye.

I use that phrase, the blink of an eye, advisedly.

Mankind has been on earth for about 2 million years. The time that has elapsed since the beginning of the industrial revolution, less than 250 years, is about 0.01% of our time on earth.

It's about 10,000 years since the agricultural revolution, the initial transition from hunting and gathering to settled agriculture, began. This formed the basis of the world's first cities, in what is now Iraq. The time that has elapsed since then is only one two-hundredth, half of 1%, of the time mankind has lived on Earth.

Looking at the timescale of these events in another way, imagine that mankind has been on earth for a single day, or 24 hours on the dial of a clock. The agricultural revolution is represented by 6 minutes to midnight. The start of the industrial revolution is represented by 9 seconds to midnight.

This has all happened in a blink of an eye!

Whether we phase out our use of oil in Australia over the next 10, 20 or 40 years makes little difference; we have to learn to get by without it. So the sooner we start, the better.

That's the conclusion of examining the problem of Peak Oil from a resource use perspective. But the problem becomes much more urgent when we consider that the by-product of burning fossil fuels is carbon dioxide, a potent greenhouse gas.

Australia may have many years of coal still in the ground, at present rates of extraction. But it's highly unlikely that we will be able to use much of it for energy generation. Alternative energy sources are commercially available. Trade sanctions and embargoes on the use of fossil fuels for energy production will surely follow.

As we have discussed before in this U3A course, we have two major problems:

1. The world's population has grown, and continues to grow, staggeringly fast. When most of us in this room were born, the world's population was around 3 billion. Today it is nearing 7 billion.
2. We are consuming non-renewable resources much too quickly, and producing waste at a rate that the life-support systems of our environment can't cope with.

Fossil fuels and climate change would appear to be the most pressing case. But this is by no means the only problem there we're likely to face.

In the section of the reference list headed "Climate Change: The Science", there's a paper published 18 months ago that doesn't really belong there. In this paper, entitled "Planetary Boundaries", Johan Rockström and his co-authors identify, along with climate change, eight other areas of concern.

They point out that human pressures on the Earth have reached a scale where abrupt global environmental change can no longer be excluded. They propose a new approach to global sustainability in which we define planetary boundaries, or limits, within which we expect that humanity can operate safely. Transgressing, or going beyond, one or more of these planetary boundaries may be damaging or even catastrophic due to the risk of triggering worldwide, abrupt environmental change.

The nine planetary boundaries identified are:

- Climate change
- Ocean acidification
- Stratospheric ozone
- Biogeochemical nitrogen and phosphorus cycles
- Global freshwater use
- Land system change
- Loss of biological diversity
- Chemical pollution
- Atmospheric aerosol loading

The authors make the point and that their proposed boundaries are "rough, first estimates only, surrounded by large uncertainties and knowledge gaps." But the proposed concept of "planetary boundaries", or planetary limits beyond which we should not venture, is aimed to shift the debate towards the estimation of the safe space for human development. Planetary boundaries define, as it were, the boundaries that we need to keep within if we want to be sure of avoiding major human-induced environmental change on a global scale.

The leading Canadian environmentalist, David Suzuki, in September 2010 put it this way:

We have become a force of nature Not that long ago, hurricanes, tornadoes, floods, droughts, forest fires, even earthquakes and volcanic explosions were accepted as "natural disasters" or "acts of God." But now we have joined God, powerful enough to influence these events."

One, Converging World.

Let's recap for a moment the two problems I summarised a moment ago:

1. The world's population has grown, and continues to grow, staggeringly fast.
2. We are consuming non-renewable resources much too quickly, and producing waste, by-products, at a rate that the life-support systems of our environment can't cope with.

I need to add two more considerations:

3. Industrialisation initially widened the difference between the haves and the have-nots. Some countries have been advantaged; others are now catching up. There are still huge inequalities, both between and within countries, but modern communications are making these more obvious. They are growing sources of tension.

A bright spot:

4. There is increasing realisation that we are all sharing one planet.

In the words of the English poet, John Donne, written about 500 years ago:

"No man is an Island, entire of itself; every man is a piece of the Continent, a part of the main; if a clod be washed away by the sea, Europe is the less, as well as if a promontory were, as well as if a manor of thy friends or of thine own were; any man's death diminishes me, because I am involved in Mankind; And therefore never send to know for whom the bell tolls; It tolls for thee."

I don't have time to develop this theme today, but I recommend two excellent books under the heading "The Global Context" in the reference list.

Timothy Gorringer, an English Professor of Systematic Theology at Exeter University, wrote "Fair Shares: Ethics and the Global Economy", in 1999.

Peter Singer, from Melbourne wrote "One World" in 2002. At the time of writing, he held a chair at Princeton, and "One World" is based on lectures he gave at Yale.

The chapters in "One World" are headed:

- A Changing World
- One Atmosphere
- One Economy
- One Law
- One Community
- A Better World?

What can/should we be doing, as concerned individuals, about these issues?

1. Individual action to reduce greenhouse gas concentrations in the atmosphere

There are many sources of information, from books and from the www, on the steps one can take to reduce greenhouse gas emissions. But often it is difficult to quantify the likely effects, and therefore to judge the relative merits of one course of action against another.

In 2009 I attended a U3A course with the evocative title “Healthy People, Healthy Planet? Challenges and Opportunities”. The course leader, Brian Furnass, distributed a very useful list of suggestions to reduce greenhouse gas emissions, compiled by a medical group. I downloaded the latest version and it appears here (with small amendments) as an appendix.

The previous version of this list of suggestions gave prominence to buying renewable energy. There are currently over 800,000 electricity users, residential and business, purchasing Greenpower in Australia.

You will see that areas covered in the list include travel, temperature control in the home, water heating, electronic appliances, food, refrigeration, waste, and clothing.

Some of the tips seem to come straight out of Mrs Beeton’s Book of Household Management, which indicates that some actions taken for the good of the planet can be good for the pocket too!

One can’t immediately remember to put into effect all the items on a list like this. A good approach is to do what you can; some items will be easier to implement than others. My wife and I adopted the solution of switching to Greenpower as a default option, after the problems of retrofitting our townhouse with a solar water heater seemed – like the roof – insurmountable! (Actually, getting the pipes down the wall cavity between adjacent houses was the real difficulty.)

We also found useful the ACT Government’s “Home Energy Action Kit”, which you can borrow from the ACT Library, to assess the energy efficiency of your home. It contains useful checklists and suggestions, a thermometer for measuring fridge temperature, and so on. We found we were already doing many of the things suggested, but some ideas were new to us.

If you have the opportunity, in order to increase the rate of uptake of carbon dioxide from the atmosphere in the crucial next few decades (in the jargon, carbon capture and storage), plant some trees; and nurture them over their first few vulnerable years.

2. Action as a member of a group

As well as acting individually, one can act as a member of a group in which one is already involved. This could be in the workplace, or in a residential community such as a body corporate, a local community organisation, or an organisation of people who share a mutual interest. Take the opportunity to get issues of resource use, sustainability, waste management and greenhouse gas emissions on the agenda.

One can join groups concerned with climate change and/or the environment. Groups that come to mind include Climate Action Canberra, the Conservation Council of the ACT, The National Parks Association (ACT and/or NSW); the Melbourne-based research and advocacy group, Beyond Zero Emissions; national bodies such as the Australian Conservation Foundation, The Wilderness Society; national/international groups such as Greenpeace; a political party of your choice, and/or an advocacy group such as GetUp.

Don’t forget to write personally, and regularly, to your parliamentary representatives.

3. Supporting change financially

There are various opportunities to make a difference, including:

1. By *your choice of purchases*, of energy and many other goods and services.
2. By *socially responsible investing*, through fund managers such as Australian Ethical or Hunter Hall, or via a financial adviser who is properly equipped to advise in this area.
3. By *charitable donations*, for example to “The Converging World”.

A key question is: *How much money and/or time is it reasonable to give?* Peter Singer discusses this in his recent (2009) book, "The Life You Can Save". In this book he explores how to tackle global poverty, i.e. to achieve the UN Millennium Development Goals, by persuading the rich to voluntarily donate to charitable causes associated with poverty alleviation.

Writing primarily for an American audience, he stresses the importance of re-directing charitable donations off-shore.

Singer observes that in today's world the number of people unable to meet their basic daily needs, though still sizeable, is smaller than ever before; while the number of people with far more than they really need is unprecedented. So, by the redistribution of existing wealth, we can realistically expect to be able to "make poverty history".

To the question: how much is reasonable? He gives two answers. First, a stringent, demanding answer: "There is a moral case to give until, if we give more, we would be sacrificing something nearly as important as the bad things our donation could prevent."

But Singer also makes the point that advocating goals that many people might deem unreasonable would be counterproductive, so he suggests a voluntary, progressive tax to be paid by the top 10% of income earners in USA and similar countries. He suggests that those with incomes above \$100,000 should donate 5% of their income, rising by increments to a rate of 33% of income for those receiving over \$10 million per year.

He calculates that such a voluntary tax, paid by the world's rich people, would yield \$1.5 trillion for development aid. This is 8 times what the UN task force estimated would be needed to achieve the Millennium Development Goals by 2015. And if the lower 90% of taxpayers give, on average, just 1% of their income as donations, this would increase the amount available significantly.

Singer suggests that if you are persuaded by the moral argument but not sufficiently motivated to act accordingly, instead of worrying about what you'd have to do to live a fully ethical life, do something that is significantly more than you have been doing so far and see how that feels.

My own conclusions:

1. I accept the mainstream science on global warming. The risks associated with business as usual are unacceptable.
2. We know how to mitigate climate change; it is within our scientific, technical, financial and logistical capabilities (if it is not already too late to act).
3. There are many ways for each of us to make our contributions. I suggest we each play to our strengths, and do what we're good at doing.
4. To find a way forward*, try to achieve significantly more than we have been doing already, and (in Singer's words) "see how it feels".

[*I'm reminded by this of a Chinese saying: "Cast a stone to find a way forward!" The picture this conjures up is of casting a stone into a still pool, and watching the effects of the ripples to see where they lead.]

Appendix to “The Converging World: Climate change – Planetary limits - What can/should we do?”

“The Converging World”, by John Pontin, Piatkus Books, London, 2008
Extracts from a review of this book, by David Teather.

A tonne of carbon dioxide emitted by burning fossil fuels has the same effect on the Earth’s atmosphere no matter where the fuel is burnt. This simple observation was the starting point for a remarkable collaboration between a UK environment group and an Indian social change agency, described in this book.

The Converging World (TCW), a UK charity based near Bristol, raised financial donations from people there in order to reduce global CO2 emissions. It partnered with Social Change and Development (SCAD), an NGO based in the south Indian state of Tamil Nadu.

Demand for electricity is growing rapidly in Tamil Nadu and coal-fired generation is the usual response. But conditions are very favourable for wind power, and TCW has built two wind turbines in Tamil Nadu capable of producing 8,000 megawatt hours of electricity each year.

John Pontin explains that donations from UK were used to purchase one turbine, which was then used as collateral for a loan to buy the second. The steady stream of cash from the sale of electricity maintains the turbines, services the debt and, through SCAD, supports social development for the disadvantaged in Tamil Nadu. School places and health services are provided. Women’s self-help groups, sustainable agriculture, and measures to mitigate and adapt to climate change are supported.

The wind turbines in Tamil Nadu also earn carbon credits, which are sold in UK and help to fund TCW’s work with UK community groups – parish councils, transition groups, schools and others – to help them understand their energy needs and reduce their carbon footprints. To update the information in the book on TCW’s community-based work in UK, access www.thecommunityworld.org

John Pontin describes the collaboration between TCW and SCAD as a win-win situation. In this book he also weaves in a persuasive justification of the mission and places it in the broader context of convergence globally.

Because convergence is about creating equal access to the earth’s resources, developed nations need to reduce both the amount of resources they consume and their carbon footprints. But, as Hamilton and others point out, using fewer resources need not mean compromising quality of life; it can bring many benefits.

The partnership between TCW and SCAD brings to mind collaborations in our own region, including the Alternative Technology Association’s initiative to install solar panels in villages in East Timor, and Forest and Bird’s 15-year collaboration with Matantas and Sara villages in Vanuatu to conserve 4,500 hectares of tropical lowland forest – preserving both species diversity and stored carbon.

Climate Change: A Summary of the Science

The Royal Society, London, September 2010

[Downloaded 26 March 2011 from www.royalsociety.org]

“Concluding Remarks

There is strong evidence that changes in greenhouse gas concentrations due to human activity are the dominant cause of the global warming that has taken place over the last half century. This warming trend is expected to continue as are changes in precipitation over the long term in many regions. Further and more rapid increases in sea level are likely which will have profound implications for coastal communities and ecosystems.

It is not possible to determine exactly how much the Earth will warm or exactly how the climate will change in the future, but careful estimates of potential changes and associated uncertainties have been made. Scientists continue to work to narrow these areas of uncertainty. Uncertainty can work both ways, since the changes and their impacts may be either smaller or larger than those projected.

Like many important decisions, policy choices about climate change have to be made in the absence of perfect knowledge. Even if the remaining uncertainties were substantially resolved, the wide variety of interests, cultures and beliefs in society would make consensus about such choices difficult to achieve. However, the potential impacts of climate change are sufficiently serious that important decisions will need to be made. Climate science – including the substantial body of knowledge that is already well established, and the results of future research – is the essential basis for future climate projections and planning, and must be a vital component of public reasoning in this complex and challenging area.”

See Also:

The Science of Climate Change: Questions and Answers

Australian Academy of Sciences, Canberra, August 2010

[Particularly the “**Summary**” of this document, on pages 2-3;

Download from www.sciencemuseum.org.au/reports/climatechange2010.pdf]

Think climate change is a problem? Realize we need to act now? Need some direction on what you can do to help? Here are some areas where you can make changes that help from Doctors for the Environment Australia.

[Downloaded 26 March 2011 from www.dea.org.au]

Travel

Transport is one of the largest contributors to the carbon footprint of an individual.

- When purchasing your next car, consider its environmental impact and safety ratings. Include hybrid and electric cars, and vehicles that use alternative fuels to petrol or diesel. www.greenvehicleguide.gov.au is a useful reference.
- If you need to use your car, try to combine trips (trip-chaining) or share with others.
- Avoid start-stop traffic and stick to the speed limit. Accelerating and decelerating abruptly increases greenhouse gas emissions and wear-and-tear on your vehicle.
- Use public transport, cycle or walk where possible. This is especially important for short trips, as cold car engines generate approximately 40% more greenhouse gases than when warm.
- Consider train travel for interstate trips and when you must fly, buy carbon offsets to help reduce the impact of your travel.

Switch to green energy sources

See – www.greenpower.gov.au

Temperature control in the home

The carbon emissions produced by heating and cooling of homes are dramatically altered by the target temperature. Every degree warmer in winter and degree cooler in summer will increase energy use by around 10 percent.

- Change the set-point of your thermostat. Temperatures of 25-27°C in summer and 18-21°C in winter are comfortable for most people.
- Add extra layers to keep warm in the winter, rather than increasing the temperature on your air conditioning.
- Only heat or cool the rooms you are using.
- Consider installing evaporative air-conditioning, rather than refrigerated.
- Install insulation in walls and additional insulation in your roof space.
- Open your windows on fine days and on cool evenings in the summer. This will not only reduce the need for artificial temperature control but also reduces indoor air pollution which has a range of health consequences.

Hot water

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Heating water is energy expensive. Many of the changes you make will not only reduce your electricity bill but also your water consumption.

- Take shorter showers.
- Wash your clothes in cold water.
- Lower the set point of the thermostat of your hot water service, especially in summer. (Note that thermostats should be set at or above 60°C to prevent growth of *Legionella pneumophila* which causes Legionnaire's Disease.)
- Turn your hot water service off if you are going to be away for more than a few days.
- When replacing your hot water service consider the energy star rating – see www.energyrating.gov.au

Electronic appliances

Appliances on standby and computers on sleep continue to consume electricity.

- Turn electronic appliances off at the wall when they are not in use.
- Shut down computers after you have finished using them.

Food

The food choices we make have a dramatic impact; from product selection to preparation and waste.

- Choose locally produced and grown foods.
- Avoid products that are packaged. When you have to buy packaging, ensure it is recyclable.
- Reduce the amount of red meat you consume in a week and change to sources that produce less greenhouse gases in production, such as kangaroo meat.
- Bring your water with you rather than buying bottled water.
- Only buy what you will use and make a food plan for the week to avoid throwing away food.

Compost your food scraps. This will save you money as well as saving the planet – in 2004 Australians threw away \$5.3 billion of food.

Refrigeration

Refrigeration was a huge advance for food storage, however it can be environmentally costly.

- Ensure that your thermostat is appropriately set using a thermometer.
 - Your fridge should be 3°C to 5°C.
 - Your freezer should be between -18°C and -15°C.
- Try to only use one fridge.

When buying a new fridge, choose one that has a good energy rating.

Use www.energyrating.gov.au to research your new appliance.

- Place your fridge in a cool spot, away from heat sources like direct sunlight and ovens.

Waste

Despite recycling, each Australian sends 880kg of waste to landfill every year.

- Avoid additional packaging or bags when shopping.
- Attach a 'no junk mail' sign to your letter box.
- Use local recycling services provided by your local council, Scouts and other community groups.
- Have a compost bin – not only will you be reducing methane production at rubbish dumps, but it is a great organic fertilizer for your garden.
- Use recycling programmes like Mobile Muster to dispose of your unwanted electrical items.
- Buy products built to last and only buy what you need.

Clothing

The energy put into the manufacture and transport of clothing is significant. To help offset this, make sure your clothes are well cared for and live their full life.

- Use biodegradable detergents.
- Use a wash cycle that utilizes cool water with low water and energy consumption.
- When you need a new wardrobe, donate your unwanted clothes to an op-shop.
- Fix small holes in your clothes before they become large and un-repairable.
- Use clothes that can no longer be mended as rags and dusters.

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