CLIMATE AND HEALTH ALLIANCE

Submission in response to

Climate Change Authority

2012 Renewable Energy Target Review

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About the Climate and Health Alliance

The Climate and Health Alliance (CAHA) is a not for profit organisation and a national alliance of organisations and people in the health sector who work together to raise awareness about the health risks of climate change and the health benefits of emissions reductions.

CAHA's members recognise that health care stakeholders have a particular responsibility to the community in advocating for public policy that will promote and protect human health.

The membership of the Climate and Health Alliance includes a broad cross section of the health sector with 27 organisational members, representing health care professionals from a range of disciplines, health care service providers, institutions, academics, researchers, and consumers.

For more information about the membership and governance of the Climate and Health Alliance, please see Appendix A. For further information see www.caha.org.au

Overview

The Climate and Health Alliance wishes to make a submission for consideration in the Climate Change Authority 2012 Renewable Energy Target Review.

The submission includes the Climate and Health Alliance and The Climate Institute joint publication ***Our Uncashed Dividend*** (attached) that outlines the health benefits possible from reducing pollution associated with fossil fuels.

This report reviews the expert literature on health, pollution reduction strategies, and climate change. It has been written to raise awareness of the health co-benefits from strategies that also reduce greenhouse gas emissions, and to encourage support for a better understanding of the potential benefits for Australians. This submission includes additional evidence about the harm caused to human health from climate change and fossil fuelled energy generation.

The Climate and Health Alliance urges Climate Change Authority to consider these findings in its 2012 Renewable Energy Target Review.

Key points

1. Climate change poses serious risks to health and requires a rapid transition to renewable energy technologies to reduce the risks and impacts of an unstable climate
2. Current energy systems in Australia are posing serious risks to health and contribute to emissions growth and subsequent climate change
3. Australia is well positioned to make a transition to a clean renewable energy future from which it can benefit economically and which will reduce risks to health
4. Energy policy must be developed cognisant of the broader consequences of energy choices and consistent with the best interests of all Australians
5. The Renewable Energy Target has worked effectively to deliver safe low cost power generation to substitute for polluting technologies and should be expanded to 40% by

2020 to deliver a more rapid transition to clean health and safe power generation for Australia

6. A comprehensive suite of polices are needed, in addition to an expanded renewable energy target, to develop a healthy, safe, sustainable energy future for Australia, such as feed-in-tariffs for renewable energy, removal of subsidies for fossil fuels, and phasing out of coal fired power stations. New renewable energy infrastructure should be supported by a range of financing options to encourage investment. Taxation incentives should be reformed to ensure clean technologies are encouraged, while polluting technologies are discouraged.

Climate change poses serious risks to health

The international medical journal *The Lancet* in May 2009 described climate change as the biggest global health threat of the 21st century. Climate change poses serious immediate and long term threats to the health and wellbeing of the Australian and global population.

Average global temperature has increased almost 1°C over the last century.[1] Emissions to date have likely committed us to an increase beyond 2°C,[2] a level considered to pose "unacceptable risks to key natural and human systems, including significant loss of species, major reductions in food-production capacity in developing countries, severe water stress for hundreds of millions of people, and significant sea-level rise and coastal flooding".[3]

The World Health Organisation estimates that even the modest warming that has occurred since the 1970s to 2004 was responsible for more than 140,000 extra deaths each year.[4] By 2009 climate change was responsible for the deaths of 300,000 people each year.[5]

There is however strong evidence that action on climate change can improve, even promote health. When presented in a health context, climate change is more likely to be considered an issue of personal significance, and lead to support for mitigation and adaptation.[6]

Climate change poses serious health risks to Australians. More frequent and more severe extreme weather events, including heatwaves, floods, fires and storms will increase illness, injury and death. Other effects include an increased incidence of infectious diseases, vector borne diseases, air pollution, mental illness, poor water quality and food insecurity.[7] Children, the elderly, Indigenous Australians, people with chronic illnesses, and those in coastal as well as rural, remote and regional communities are being disproportionately affected and are expected to continue to be severely impacted.

**See endnotes for references for this section.*

Our current energy systems are harming our health

Current energy systems in Australia are posing serious direct risks to health and contribute to emissions growth and climate change.

Ill health and deaths associated with fossil fuel use is costing the community billions of dollars annually from respiratory, cardiovascular and nervous system diseases caused by exposure to

the extraction, transportation and combustion of coal, oil and gas. Air pollutants account for a huge proportion of the health costs, contributing to: respiratory diseases such as asthma and lung cancer; cardiovascular diseases which lead to heart attacks; while mercury contributes to developmental delay and permanently reduced intellectual capacity in exposed children.[1]

Heavy metals and carcinogens released during the processing of coal also contaminate water and food sources which can lead to long term health problems. In addition, the mining of coal exposes workers and local communities to dangerous coal dust, and it is a dangerous occupation in terms of health and safety.

Research from Europe published in the prestigious medical journal *The Lancet* estimates that 24 people die for every TWh of coal combusted, from the harmful effects of the airborne particulates, nitrogen oxide, and toxic metals such as mercury and lead released.[2] The International Energy Agency estimates that more than 7,500TWh of coal were burnt for electricity generation in 2009.[3] A recent study from the Harvard Medical School estimates the economic, health and environmental costs of the life cycle of coal is costing the US public a third to one half of a trillion dollars annually.[4] The Harvard study looked at the lifecycle costs of coal, including mining, transport, processing and combustion, which are not accounted for by the coal industry and the costs for which fall onto the rest of the community in increased health costs, injuries, illnesses and deaths. This study found if the estimated health and environmental costs of coal were included in the price of coal-fired electricity it would double or triple its cost, and make safer renewable energy generation cost competitive.

A recent study published in *American Economic Review* found that the gross external damages (largely from increased deaths) caused by coal fired power generation in the US amounted to $53 billion annually. Even more significantly, it demonstrated coal is costing the US economy more than the industry generates.[5] This latter study arrived at a lower estimate of the external costs of coal combustion than the Harvard study due to lower estimates of air pollution damages, as well as significant differences in their assumptions of the cost of climate impacts.[6] Despite this, both studies firmly conclude that due to the externalisation of health and climate costs, the true cost of coal is not reflected in its current price. Stricter regulation and a cost that reflects these damages would therefore benefit the economy.[7]

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[1] Physicians for Social Responsibility, *Coal's Assault on Human Health*, November 2009.
[2] Markandya, A., and Wilkinson, P. Energy and Health 2: Electricity generation and health, The Lancet, Sep 15-Sep 21, 2007; 370, 9591.
[3] International Energy Agency, Emissions From Fuel Combustion, IEA Statistics, 2011 edition, page 122. Available at http://www.iea.org/co2highlights/co2highlights.pdf
[4] Epstein, P. Full cost accounting for the life cycle of coal, *Annals of New York Academy of Sciences*, 1219: 73-98.
[5] Muller, N et al. Environmental Accounting for Pollution in the United States Economy, *American Economic Review,* August 2011, 101, pp.1649–1675
[6] Skeptical Science, *True Cost of Coal Power - Muller, Mendelsohn, and Nordhaus*, 7 October 2011.
[7] Skeptical Science, ibid.

Somewhat outdated estimates put the health damage from Australian coal-fired power stations for the Australia community at $A2.6 billion annually. Studies from overseas indicate the costs may be even greater.

The available evidence suggests that the health benefits from reducing pollution from fossil fuels through strategies to reduce emissions could substantially offset the cost of emission reductions.[8,9,10]

The huge contribution of coal-fired power generation to global warming and the strong evidence of its significant detrimental effects on human health must mean that coal for power generation is rapidly replaced by renewable energy technologies.

The harm to human health from fossil fuels extends well beyond its immediate health impacts, with climate change posing serious risks to health – and the timeframe for taking effective action rapidly dwindling.

The International Energy Agency has warned that the world has just five years to dramatically alter the way it uses energy, and that unless we stop investing in fossils fuels and begin the wide-scale and rapid deployment of renewable energy technology, we will lose the opportunity to prevent irreversible climate change.[8]

"The door is closing," Fatih Birol, chief economist at the International Energy Agency, said in November 2011. "I am very worried - if we don't change direction now on how we use energy, we will end up beyond what scientists tell us is the minimum [for safety]. The door will be closed forever."

Clean green energy systems will secure a healthier future

Australia is well positioned to make a transition to a clean renewable energy future from which it can benefit economically.

Australia has abundant renewable energy resources that are the envy of the world. A 2010 report from Geoscience Australia and the Australian Bureau of Agricultural and Resource Economics (ABARE) confirms Australia has a very large and widely distributed renewable resource base, which includes wind, solar, bioenergy, geothermal, wave and tide as well as hydro resources.[9] According to this report, Australia's wind resources are “among the best in the world, primarily located in western, south-western, southern and south-eastern coastal regions but extending hundreds of kilometers inland”.

[8] Harvey, F. World headed for irreversible climate change in five years, IEA warns, The Guardian, 9 November 2011. Available at http://www.guardian.co.uk/environment/2011/nov/09/fossil-fuel-infrastructure-climate-change

[9] Geoscience Australia and ABARE, Australian Energy Resource Assessment, 2010, Canberra. Available at https://www.ga.gov.au/image_cache/GA17412.pdf

Our solar resources are also unparalleled: Australia has the highest average solar radiation per square metre than any other continent.[10] The amount of the Sun's energy falling on Australia in one day is equal to half the total annual energy required by the whole world.[11]

Despite these abundant energy resources, Australia has failed to capitalise on securing our energy future by investing in technologies to harvest the clean, renewable, (and free) energy provided by sun and the wind and the waves.

The Zero Carbon Australia 2020 Plan was developed by the Melbourne Energy Institute (MEI) and research consultancy Beyond Zero Emissions (BZE) in 2010. This plan demonstrates that not only does Australia have sufficient non-fossil renewable energy resources to power its entire stationary energy sector, but shows the transition to 100% renewable energy is affordable and can be accomplished in a short time frame.

These findings are supported by research from Stanford University that shows that the world could be powered entirely with renewable energy within 20-40 years, using technology that is available today and at a cost comparable to that of conventional, fossil-fuel-based energy.[12] Like the MEI/BZE report, the Stanford modelling uses wind and solar as the predominant resources, finding that the barriers to the implementation of policy to deliver this scenario are not technological or financial but social and political.[13]

Despite the claims of detractors from the fossil fuel sector, as identified in the 2010 report on renewable energy by the Australian Academy of Science, reliable renewable energy technologies such as wind and solar are commercially available right now for electricity generation.[14] Wind can achieve of capacity factor of up to 50% in Australian conditions, and solar thermal can provide base load power due to its ability to store power for up to 16 hours.

A landmark study published in *The Lancet* in 2009 found there are significant health gains possible from decarbonising electricity generation.[15] The health gains possible are large: a 2010 study from the University of Wisconsin evaluated the health co-benefits associated with improvement in air quality from strategies to reduce greenhouse gas emissions at an average benefit of $50 per tonne of CO2 avoided.[16]

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[10] Geoscience Australia and ABARE, chapter 10.
[11] Australian Academy of Science, *Australia's renewable energy future*, December 2009.
[12] Bergeron, L. The world can be powered by alternative energy, using today's technology, in 20-40 years, says Stanford researcher Mark Z. Jacobson, *Stanford Report*, 26 January 2011.
[13] Delucchi, M. and Jacobson, M. Providing all global energy with wind, water, and solar power, Part II: Reliability, system and transmission costs, and policies, Energy Policy 39 (2011) 1170–1190.
[14] Australian Academy of Science ibid
[15] Markandya, A. Public health benefits of strategies to reduce greenhouse gas emissions: low carbon electricity generation, *The Lancet*, Health and Climate Change Series 3, November 2009.
[16] Nemet, G.F. et al. Implications of incorporating air-quality co-benefits into climate change policymaking, Environmental Research Letters, 2010, Volume 5, number 1.

A 2010 report from Europe found the European Union could save €80 billion a year in health costs from cutting emissions through moving to cleaner energy systems.[17]

The *Acting Now for Better Health* report found that improvement in air quality from moving to cleaner energy systems would deliver significant improvements in population health and lead to more productive workplaces. These benefits are considered to be "only a small proportion of overall health benefits arising from climate policies", as this report focuses only on the health impacts of reducing several air pollutants (fine particles, NOx and SO2), nor did it account for the direct benefits of reducing climate change.

The above evidence demonstrates the harm being caused by current energy policy that privileges and prioritises fossil fuels at the expense of human health and a clean renewable energy industry in Australia.

Shifting to clean renewable energy systems is better for health, and can save billions of dollars annually in avoided ill health and productivity gains.[18]

Wind and solar power in particular offer viable, clean, healthy and safe energy options for Australia. Wind power does not pose health risks, with over 17 international reviews concluding that there is no credible peer reviewed scientific evidence that demonstrates a direct causal link between wind turbines and adverse health impacts in people.[19] While a small number of people do claim adverse effects, these effects are thought to be related to stress associated with annoyance than any physiological factors.[20,21]

National energy policy should be focused on preparing Australians for that transition. In addition to developing the policy settings to incentive clean energy and discourage harmful and polluting energy technologies, this requires public engagement and education regarding the current implications of our energy supply systems to counter the misinformation from the industry regarding the inability of renewables to supply our energy needs.

Policy to encourage renewables needs to start with removal of perverse policy incentives such as existing subsidies to fossil fuels, but must include positive incentives such as an expanded renewable energy target to bring forward investment in renewable energy infrastructure development as well as hasten the innovation process by supporting and investing in research and development initiatives.

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[17] Health Care Without Harm (HCWH) and the Health and Environment Alliance (HEAL), *Acting Now for Better Health*, 2010, Brussels.
[18] Armstrong, F. *Our Uncashed Dividend*, Climate and Health Alliance and The Climate Institute, 2012.
[19] Climate and Health Alliance, Wind turbines and health, Position Statement, January 2010. Available at: http://caha.org.au/wp-content/uploads/2012/01/CAHA_Position_Statement_on_Wind_final_240112.pdf
[20] Chapman, S. 17 reviews on wind turbines and health ... and not a single one referenced, *British Medical Journal*, 11 March 2012. Available at: www.bmj.com/content/344/bmj.e1527/rr/572780
[21] Bowdler, D. Wind Turbine Syndrome – An Alternative View, *Acoustics Australia*, Vol. 40, No. 1, April 2012.

Clean, healthy and sustainable: policy for the 21st century

From the perspective of health stakeholders, the Climate and Health Alliance asserts that there are sufficient grounds on the basis of protecting human health for governments to:

- introduce policies to rapidly increase the deployment of renewable energy;
- ban the further development of coal-fired power generation;
- correct the failure of markets to include the externalised costs of power generation through penalties for harm; and
- establish incentives to encourage technologies that do not cause harm.

The renewable energy target is one such tool to support the wider deployment of renewable energy. It has worked effectively to deliver safe low cost power generation to substitute for polluting technologies and should be expanded to deliver a more rapid transition to clean health and safe power generation for Australia.

The removal of the floor price for the carbon price in Australian may lead to a diminished incentive to reduce emissions through this mechanism therefore the expansion of the Renewable Energy Target is even more important in delivering emissions reductions. Australia should consider following the lead of countries such as Northern Ireland which, despite significantly fewer renewable energy resources and a less robust economy than Australia, have established a Renewable Energy Target of 40% by 2020.

A range of other policy mechanisms is also needed however to stimulate wider deployment of renewable energy technologies.

Policies that have been demonstrated to effectively stimulate a transition to renewable energy include the feed-in tariff, successfully used in Germany to deliver its 2020 renewable energy target ten years ahead of schedule.

Other important policy tools include emissions standards for power stations and transport, as well as energy efficiency standards for buildings and appliances. New renewable energy infrastructure should be supported by loan guarantees to encourage the financial sector to invest and taxation incentives reformed to ensure clean technologies are encouraged, while polluting technologies are discouraged.

Cleaner, safer, and healthier energy options exist. We need energy policies in Australia that will actually reduce emissions and reduce risks to people's health.

Therefore in addition to the carbon price and an expanded Renewable Energy Target, a suite of comprehensive policies must be developed to ensure Australia’s future energy security in light of a substantial and imminent carbon liability and to ensure Australia’s emissions reductions trajectory is consistent with Australia’s fair share of the global responsibility to reduce emissions.

APPENDIX A

Climate and Health Alliance Committee of Management
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Australian Medical Students Association of Australia
Australian Physiotherapy Association
Australian Institute of Health Innovation (AIHI)
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ENDNOTES

[1] Spratt, D, and Sutton, P. *Climate Code Red*, 2008.
[2] Karoly, D. The latest climate science and global impacts, in *Victorian Government Climate Change Green Paper*, 2009. p. 23.
[3] W. L. Hare, leading author of the IPCC 2007 report, quoted in Worldwatch Institute, *State of the World 2009: Into a Warming World*, Washington.

[4] World Health Organisation, *Climate change and health*, Fact Sheet no. 266, January 2010.

[5] Vidal, J. *Global warming causes 300,000 deaths a year*, guardian.co.uk, 29 May 2009.

[6] Maibach *et al. BMC Public Health* 2010, 10:299.

[7] Horton, G., and McMichael, T. *Climate Change Health Check 2020*, Report prepared by Doctors for the Environment for the Climate Institute, April 2008.

Our Uncashed Dividend

The health benefits of climate action

A briefing paper prepared by the Climate and Health Alliance and The Climate Institute

August 2012

CLIMATE AND HEALTH ALLIANCE

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The health benefits of climate action

Executive Summary

There are significant immediate health benefits and substantial economic savings possible from taking action on climate change.

This health 'dividend' is a significant but currently unrealised opportunity from action on climate change. To date, climate action has mainly been talked about as a cost when in fact there can be and are many benefits, including:

- Improvements in health and life expectancy
- Fewer days off work or with restricted activity
- Fewer medical consultations
- Fewer hospital admissions
- Reduced use of medication
- Increased productivity

Building support for climate action in Australia would be greatly assisted by a wider understanding of the significant improvements in human health possible from cutting emissions.

As things stand, these opportunities—and the economic, social and environmental rewards associated with them—are largely untapped here in Australia. Yet by reducing greenhouse gas emissions we can deliver immediate, and potentially large improvements in population health.

Moreover, if policies across the health, energy, transport, agriculture and housing sectors are designed to complement one another, the benefits are likely to be even greater.

Many of the biggest health care challenges today, and the greatest drains on the public purse, are preventable chronic diseases associated with carbon-intensive lifestyles.[1]

At the same time, it turns out that many of the most effective methods of reducing greenhouse gas emissions will also reduce the incidence of these diseases, bringing substantial improvements in public health and wellbeing.

Australian society is reliant on fossil fuels and it's costing us billions annually. For example:

- Coal-fired power in Australia burdens the community with a human health cost—from lung, heart, and nervous system diseases—estimated at $2.6 billion annually.[2,3]
- The annual health cost of pollution from cars, trucks and other modes of fossil-fuelled transport is estimated at around $3.3 billion.[4] In Australia, air pollution is estimated to kill more people every year than the road toll.[5]

These conservative estimates suggest the shift to clean energy and transport could save the Australian community up to $6 billion annually in avoided health costs. Studies overseas indicate the potential savings are even greater. Moreover, the available evidence suggests that the health benefits from cutting emissions could in part offset the cost of emission reductions.[6,7,8]

Aside from the economic benefits, strategies to reduce emissions can also reduce the incidence and severity of many debilitating chronic and avoidable diseases associated with our high-carbon lifestyles:

- Reducing the burning of fossil fuels for electricity and transport can reduce the incidence of heart and lung diseases, including lung cancer, as well as neurologic disorders.
- Improving the thermal efficiency of homes and commercial buildings can reduce emissions, improve air quality, and protect health.[9]
- Where alternatives are available, shifting from private cars to active forms of transport such as walking and cycling has the potential to substantially reduce obesity, lung disease, heart disease, breast cancer, and depression.[10,11]
- Moderating the amount of animal products in the average Australian diet can reduce the toll of heart disease and diet-related cancers.
- Protecting and restoring natural ecosystems helps keep carbon stored in the landscape, prevents the spread of disease,[12] and provides important psychogical and mental health benefits.[13]

A failure to take effective action on climate change will continue to have significant effects on human health. However, it is possible to act effectively to prevent further harm from climate change, and doing so will reap many public health benefits. Current approaches to climate policy in Australia fall far short of what is required to help prevent further climate change to protect health. While the recent introduction of federal legislation is a welcome beginning, a comprehensive and integrated set of policy measures across all sectors is needed.

The development of a national strategy for health in relation to climate change is needed to help manage the risks to people's health and to promote health through emissions reductions.The public policy response should include the development of integrated strategies to reduce emissions and improve health across the energy, transport, housing, and food and agriculture and land use sectors.

Given both the tremendous health risks of a more hostile Australian climate and the substantial benefits of action, the development of a coordinated national approach should be prioritised. Such an approach would help communities, businesses and government better prepare for climate change, take advantage of the opportunities provided by low-carbon initiatives, and take actions that cut emissions and promote better human health.

The earlier emissions reduction strategies are implemented, the greater the health benefits. That is, cumulative savings and health gains will be greater if action begins now. Economic evaluation of the health benefits of emissions reductions in Australian juridictions would provide economic, social and political incentives for action and help build public support for climate mitigation.

Introduction

In December 2011, representatives of more than thirty health organisations—the World Medical Association, the International Council of Nurses, and the World Federation of Public Health Associations amongst them—met in Durban, South Africa, alongside the United Nations climate change conference. They cited 'strong evidence that action on climate change can deliver significant and immediate benefits to health', and issued a Declaration calling on governments to:

> “Recognise the health benefits of climate mitigation and take bold and substantive action to reduce global greenhouse gas emissions in order to protect and promote public health.”[14]

This statement follows years of research and a growing appreciation of the interconnectedness of health and climate change. It has been understood for some time that a warming world would spell, overall, a more hostile climate. Indeed, a 2009 report prepared jointly by prestigious British medical journal *The Lancet* and University College London put it bluntly:

> “Climate change is the biggest global health threat of the 21st century. Effects of climate change on health will affect most populations in the next decades and put the lives and wellbeing of billions of people at increased risk.”[15]

Climate change is already contributing to increasing public health problems: injuries and deaths associated with more extreme weather events such as fires, storms and droughts; worsening of chronic illnesses; the spread of infectious diseases; deteriorating water and food quality and availability; declining air quality; and the displacement of populations—all will impact on human health and well-being.[16]

The ongoing impacts on public health will depend greatly on the population in question and on the extent of mitigation. In general, it is world's poor who will suffer most. In Australia, the elderly, the very young, and rural and regional communities—including Indigenous Australians—are particularly vulnerable.[17]

Less well known, however, are the documented health benefits from actions that reduce carbon pollution: smarter transport, healthier diets, more efficient home heating, switching to clean power. These have recently been the subject of study by the health care community, although the research is yet to percolate into the mainstream media and policy discussion, and more work is needed in Australia.

To date, action on climate change has largely been communicated in the language of sacrifice, loss, and disadvantage. Where significant public health co-benefits can be demonstrated, however, communities may be more inclined to accept mitigation strategies, regardless of people's appreciation for the risks of climate change itself.

This document reviews the expert literature on health, emissions reduction strategies, and climate change. It has been prepared for journalists, policy-makers, and the public; to raise awareness of the health co-benefits from climate action; and to encourage support for a better understanding of the potential benefits for Australians.

Energy sources matter to health

Fossil fuels play a dominant role in Australia's energy supply, which is currently one of the most emissions-intensive and inefficient in the world.[18] In particular, a heavy reliance on coal, which supplies almost 80 per cent of Australia's electricity, has direct and immediate consequences for human health.[19]

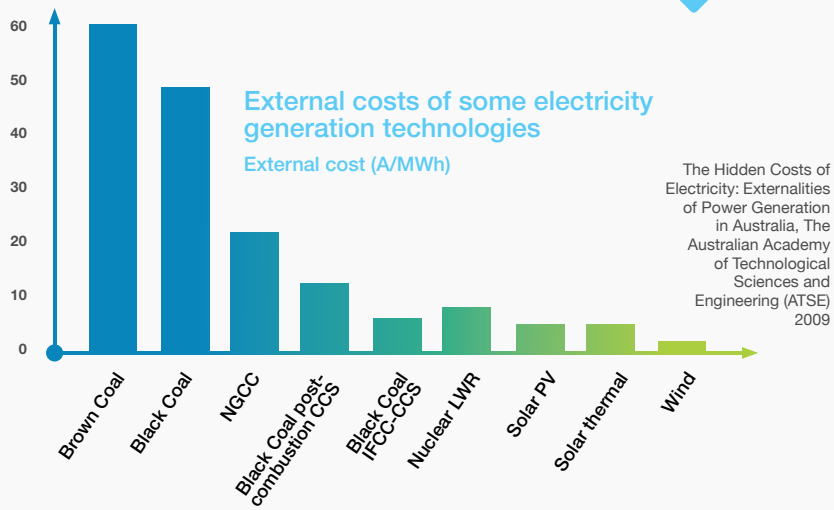
The mining and combustion of coal carries serious and well understood risks for human health, including diseases such as asthma, lung cancer, heart disease, and stroke.[20,21]

Pollution from coal power also affects lung development, increases the risk of heart attacks, and can impair intellectual development.[22] Coal mining is associated with cardiovascular, lung and kidney diseases,[23] including pneumoconiosis ('black lung') which causes permanent scarring of lungs in coal miners.[24]

Researchers estimate that coal-fired power generation in Australia carries a human health cost—from associated respiratory, cardiovascular, and nervous system diseases—of A$2.6 billion annually.[25,26]

Coal mining comes with some significant occupational hazards: coal miners die in greater numbers and suffer more lost time from injuries than all other miners.[27] In comparison, renewable energy systems have fewer and lower occupational health risks than coal and nuclear.[28]

The hidden costs of electricity



External costs of some electricity generation technologies

External cost (A/MWh)

The Hidden Costs of Electricity: Externalities of Power Generation in Australia, The Australian Academy of Technological Sciences and Engineering (ATSE) 2009

$2.6 billion

Researchers estimate that coal-fired power generation in Australia carries a human health cost—from associated respiratory, cardiovascular, and nervous system diseases—of A$2.6 billion annually.

HEALTH BENEFITS OF CLEAN RENEWABLE ENERGY

Research published in the *The Lancet* in 2009 found thousands of lives could be saved from shifting to cleaner energy generation.[29] The burning of fossil fuels—coal, petrol, diesel—releases tiny particles into the air which, when inhaled, increase the risk of cardiopulmonary (i.e. heart and lung disease), including lung cancer. Switching to cleaner power sources reduces this risk substantially.[30]

Modelling of potential changes in the energy mix in Europe shows that a two-thirds reduction in greenhouse gas emissions could save almost 50,000 lives each year; lives that would otherwise be lost owing to air pollution.[31]

The Acting Now for Better Health report from Health Care Without Harm and the Health and Environment Alliance evaluated the local health co-benefits of implementing strategies in Europe in 2010 to achieve 30 per cent by 2020 emissions reduction target. This report found implementing strategies to achieve this target would save the EU more than €82 billion (A$100 billion) each year by 2020 from avoided ill-health and productivity gains.[32] The same study shows that early action yields bigger gains, with benefits 250 per cent higher if action is taken immediately.

BLACK CARBON

The health benefits of cutting emissions by shifting to cleaner energy sources are even greater for people in developing nations. For example, almost three billion people in developing nations currently rely on the burning of biomass (mostly wood) and coal for heating and cooking.[33] The pollution this creates is a significant contributor to climate change and is also responsible for more than one-third of the annual deaths worldwide from chronic lung disease, causing the deaths of two million people annually from chronic obstructive pulmonary disease, lung cancer and pneumonia.[34]

The 'soot' produced from burning biofuels indoors such as wood, dung and crop residue is known as 'black carbon'. Black carbon is also produced from burning fossil fuels (such as coal and diesel) and biomass burning (associated with deforestation and burning of crop residues). Emissions of black carbon are the second strongest contribution to current global warming, after carbon dioxide emissions).[35]

Reducing the reliance of people in developing nations on wood and coal through the provision of clean renewable energy technologies has the potential to substantially improve health and dramatically reduce global greenhouse gas emissions,[36] and other global warming pollutants such as black carbon.[37]

Clearing the air

Cutting emissions in the energy and transport sectors not only has the potential to reduce greenhouse gas emissions, but can also deliver improvements in public health from improved air quality.[38]

Globally, air pollution kills 1.34 million people each year.[40] In Australia, it is estimated that more people are killed by air pollution every year than the road toll.[41] The 2012 OECD Environmental Outlook report suggests that without policy action, air pollution will become the biggest cause of environmentally-related deaths worldwide by 2050.[42]

COAL AND HEALTH

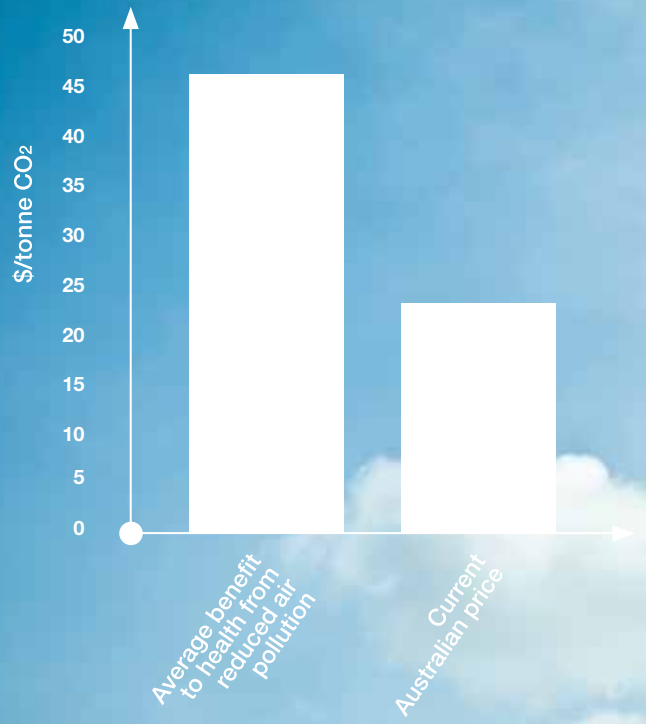
History provides a guide to the links between air pollution and health: the sudden reduction in air pollution following a ban on burning coal in Ireland in the 1990s was associated with marked and dramatic improvements in respiratory health.[39]

TRAFFIC AND AIR POLLUTION

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.[45]

Reducing air pollution through strategies to cut greenhouse gas emissions has the potential to significantly reduce the associated incidence of cardiovascular and respiratory disease, bronchitis, and asthma. This would prevent hospital admissions and visits to doctors, as well as reducing time lost from school and work.[43,44]

Benefits of reducing CO^2



There are considerable savings for Europe from emissions reductions, largely from reduced air pollution, that are outlined in the report *Acting Now for Better Health.* This report estimates the European Union could save more than €80 billion each year by 2020 from implementing emissions reductions of 30 per cent by 2020.[46] These benefits resulted from reduced particulate matter (PM), sulphur dixoide (SO_2), and nitrogen oxides (NO_x) associated with reductions in CO_2 emissions from energy and transport.[47]

A more recent American review of the economic value of the health co-benefits accrued through improved air quality suggests an average benefit of US$49 (A$46) per tonne of CO_2 avoided.[48]

Studies reveal that even a modest reduction in CO_2 emissions of (10–20 per cent) would lead to air quality improvements that would avoid thousands of deaths in developed nations like Australia, as well as tens of thousands of avoided deaths in developing countries.[49]

The Netherlands Environment Agency estimated in 2009 that reducing emissions of greenhouse gases to half of 2005 levels would reduce the number of premature deaths in 2050 from air pollution by 20–40 per cent.[50]

These health gains are likely to increase substantially with larger emissions reductions, with bigger cuts in emissions associated with delivering greater improvements in health.[51]

In addition to emitting carbon dioxide, energy and transport systems are responsible for the production of other, shorter-lived, greenhouse pollutants such as black carbon and ground-level ozone. All are associated with poor respiratory health and also contribute to global warming.[53]

Rising temperatures from global warming are contributing to increasing levels of ground-level ozone pollution, formed when sunlight and the chemicals (found in motor vehicle exhaust) react with one another.[54] Ozone damages the airways and lungs, causing inflammation and reduced function. Exposure to increased levels of ozone is associated with increased hospital admissions for pneumonia, chronic obstructive pulmonary disease, asthma, and other respiratory diseases—all with reduced life expectancy and fulfilment.[55]

Simply shifting to stricter emissions standards for non-road diesel engines being used in the construction and industrial sectors in Australia could reduce particle emissions by more than 10,000 tonnes each year and deliver associated health benefits (from reduced PM10 and NO_x emissions),

saving taxpayers up to $5 billion annually.[52]

In Australian cities like Melbourne and Sydney, ozone levels exceed the national standard several times a year.[56] While the health and economic costs of ozone pollution in Australia have not been evaluated, a 2011 study by the Union of Concerned Scientists (UCS) suggested that ozone will cost the United States US$5.4 billion ($A5.5 billion) each year by 2020, causing almost three million additional acute respiratory attacks.[57]

Reducing emissions from transport can have a powerful effect on health: a road transport reduction strategy implemented for the summer Olympics in Atlanta in 1996 led to a 22.5 per cent reduction in weekday peak traffic, and a corresponding decline in concentrations of carbon monoxide, particulates and nitrogen dioxide, as well as a drop of almost 30 per cent in ozone levels.[58] There was also a lower rate of acute childhood athsma attacks during the period.[59]

Changing the way we move

In Australia, annual health costs from pollution from fossil-fuelled transport are estimated to be around $3.3 billion.[62] Emissions from transport are the country's third largest source of emissions and second fastest growing source, with emissions expected to rise 64 per cent between 1990 and 2020.[63]

Globally, 3.2 million deaths each year can be attributed to physical inactivity.[64] It is estimated that the UK National Health Service (NHS) spends $US5,000 per minute treating diseases that could be prevented by regular physical activity.[65] Longtitudinal studies reveal cycling for transport is associated with 30-40% lower mortality rates,[66] and cycling and walking projects provide high value for money, with the health gains returning a benefit:cost ratio of 5:1.[67]

The likelihood of becoming obese increases by 6 per cent for each hour spent in a car each day.[68] Conversely, it is possible to reduce these odds by 5 per cent simply by walking an additional kilometre each day.[69] Relatively simple, cheap inititatives like this can yield profound improvements in health, cutting emissions at the same time.

Investing in active forms of transport such as walking and cycling as well as public transport also offers economic benefits by reducing the need to invest in costly road infrastructure and protecting against future shocks from price rises and interruptions to fuel supplies.[75] Communities that are designed to facilitate active and public transport can reduce household costs,[76] reduce social isolation and improve social capital by improving community connectedness as well as improve health and wellbeing.[77]

THE COSTS OF OBESITY

Obesity has now overtaken smoking as the leading cause of premature death and illness in Australia.[70] More than 60 per cent of Australian adults are overweight or obese.[71] Obesity leads to higher rates of diabetes and heart disease, and can lead to reproductive disorders, some cancers and osteoarthritis.[72] The health problems created by excess weight cause a burden for individuals, families and communities. The direct health costs of obesity to the Australian community are estimated to be more than $8 billion a year.[73] The overall cost to Australian society and governments of lost wellbeing associated of obesity is estimated at more than $58 billion a year.[74]

Direct and immediate health gains are possible from changes to our approach to land transport. Reducing our reliance on private vehicles through investment in improved public transport and increasing the proportion of trips taken by active transport such as walking and cycling offer substantial opportunities to improve health.

These include:

- reduced incidence of chronic diseases, in particular respiratory and cardiovascular diseases;
- obesity, from increased physical activity
- reduced illnesses and deaths as a result of declining air pollution; and
- reduced road injuries and deaths.[60,61]

Switching to active transport to achieve emissions reductions can provide considerable health benefits, with reductions in risk of ischaemic heart disease; cerebrovascular disease/stroke; breast cancer; dementia; and depression.

10-19%
Reduction of ischaemic heart disease

10-18%
Reduction of cerebrovascular disease/stroke

12-13%
Reduction of breast cancer

4-6%
Reduction of depression

Reduction of dementia
7-8%[78]

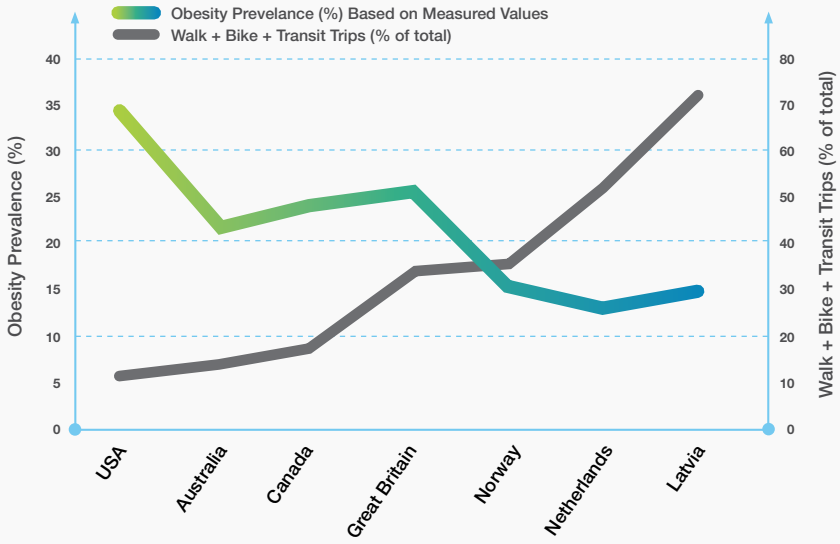
These strategies can bring further improvements in health and emissions reductions if an integrated policy approach is adopted, in which transport reform is accompanied by changes to planning and land use, making it possible for people to live and work more closely.[79]

Planning laws that make cities more accessible by providing walking, cycling and public transport infrastructure improve both health and equity as this can improve access to services and enhance safety for people without other forms of transport such as women, older adults and children.[80] There are demonstrable mental health benefits associated with the increased community connectedness and reduced social isolation from improved access to active transport.[81] While there is potential for increases in injuries associated with increased walking and cycling, concurrent improvements in active transport infrastructure and practices can reduce these risks and enhance safety for everyone.[82]

THE BENEFITS OF WALKING & CYCLING

Getting out of your car can improve health from increased physical activity and reduced obesity;[83,84] lead to less deaths and injuries from road trauma;[85] reduce social isolation;[86] decrease pollution (and respiratory and heart disease);[87] and reduce greenhouse gas emissions.[88]

Obesity prevalence and rates of active transport



The Journal of Physical Activity and Health 2008

Healthier homes and buildings

Improving the energy efficiency of houses and buildings, together with improvements in indoor air quality, can offer important health gains as well as financial savings in addition to emissions reductions.[89,90,91]

Residential and commercial buildings account for around 20 per cent of Australia's greenhouse gas emissions.[92] Reducing energy demand and improving energy efficiency could substantially reduce the sector's greenhouse gas emissions,[93] reduce energy infrastructure costs, and deliver a net economic benefit.[94] There are clear benefits for public health from improvements to household energy use through the introduction of measures to conserve (use less) energy, improve energy efficiency, and by switching to cleaner energy sources.[95]

Energy efficiency offers the cheapest emissions abatement opportunities, and reductions can be achieved quickly using existing technology.[96] Changes to building and urban design can reduce health risks by mitigating against the urban heat island effect (i.e. higher relative temperatures in metropolitan areas due to heat absorption by building materials), and help accrue financial savings over time.[97]

Many emissions reduction strategies in homes and buildings that also provide good household ventilation can improve health and wellbeing[98,99] and reduce health risks, particularly among elderly people and very young children.[100] Through minimising fluctuations in temperature, improving the energy efficiency of buildings can lead to reductions in premature deaths as well as reduce the incidence of heart disease, asthma, respiratory diseases and strokes.[101,102]

The enhanced housing comfort that comes from being consistently warmer or cooler due to energy efficiency measures such as insulation is also associated with better mental health.[103,104]

Introducing or expanding parks, gardens, and other green spaces around homes and buildings can reduce energy use (cutting emissions as well as costs) and air pollution, as well as provide important physical and mental health benefits.[105]

Research shows people living in urban areas have a more positive outlook on life and higher life satisfaction when they have access to natural environments.[106] Exposure to nature is also associated with an ability to cope with and recover from stress, and recover from illness and injury.[107] By creating shade and providing local protection from weather, plants and trees in urban green spaces can also help moderate extremes of heat and cold.[108]

MAKING HEALTH CARE HEALTHIER

The health sector is big energy user and source of greenhouse gas emissions.[109] In NSW for example, health facilities account for 53 per cent of the total NSW Government buildings energy usage.[110] Health care buildings such as hospitals, nursing homes and clinics can realise significant economic and health benefits from the implementation of sustainability strategies to reduce energy use. Other benefits to health can be realised through improving ventilation in health care settings as this can reduce can reduce cross-infection of airborne diseases.[111] Improved procurement practices can reduce emissions and save on resources.

Improved management of waste offers health benefits as well as emissions reductions through composting, recycling, better purchasing and minimising transport of waste, large quantities of waste can be avoided, and disposal of toxic waste reduced. [112] The use of information and communications technology to provide services can reduce emissions as well as also improve health outcomes: through targetted and individualised consultations, 'telehealth' has been demonstrated to be associated with effective management of mental health issues, heart and lung conditions, diabetes and high risk pregnancies.[113]

There are important potential benefits for public health in Australia from improvements to built environment and health sector energy use through the introduction of measures to conserve (use less) energy; improve energy efficiency and by switching to cleaner energy sources.[114]

Protecting our ecosystems

Human health and survival depends on a healthy natural environment for clean air, soil and water, as well as many naturally derived medicines.[115] Biodiversity—the diversity of plants and animals, and the ecosystems of which they are a part—is the foundation of agriculture and human health. Healthy landscapes and waterways provide society with vital ecosystem services, such as in waste recycling and our supply of nutrients.[116] Ecosystems can help prevent the spread of disease[117] and provide important psychological benefits.[118,119] The health and wellbeing of human beings and the natural environment are tightly linked.[120,121,122]

Strategies to protect and restore biodiversity can reduce greenhouse gas emissions and remove carbon from the air.[123] Australia's natural ecosystems are the country's biggest natural store of carbon.[124] Australia has the potential to achieve significant emissions reductions by its biophysical capacity to draw down carbon dioxide through biodiversity, according to the CSIRO.[125] Australia's native forests have enormous sequestation potential. For example, it is estimated that ending the logging of native forests in southeastern Australia could draw down around 140Mt of CO_2 each year.[126]

Exposure to natural environments is demonstrated to have important physical and mental human health benefits.[127] Contact with nature can reduce the risk of disease, improve general wellbeing (including mental health and emotional resilience), and increase longevity.[128]

Studies from the US and UK suggest that urban forests can help draw down greenhouse gas emissions, and reduce air pollution, and reduce energy demand by helping to alleviate the disproportionate temperature increases in metropolitan areas known as the 'urban heat island'[1] effect.[129,130]

Vegetation can also assist in the absorption of pollutants, such as ground-level ozone and nitrous dioxide, and through the cooling and protection from weather it provides, can reduce emissions from power generation by reducing energy consumption. Air quality can be improved as plants and trees intercept dust, ash, dirt, pollen, and smoke which can reduce respiratory disease, including asthma.[131] Heat-related deaths and illnesses can be minimised by utlising the localised cooling plants provide through shade and evapotranspiration (the release of water vapour from plants to the surrounding air.[132]

Eating our way to better health (and a safer climate)

The food and agriculture sectors offer important pathways for the reduction of greenhouse gas emissions and improvements in public health.[133] Globally and in Australia, emissions from agriculture make a substantial contribution to climate change. Australia's per capita agricultural emissions are among the highest in the world—and very high for a developed country.

Around 20 per cent of Australia's net annual emissions stem from food and fibre production and deforestation.[134] Ruminant livestock (i.e. cattle and sheep) are currently the largest single source of methane—a potent greenhouse gas.[135] Nitrous oxide is another potent greenhouse gas associated with some fertilisers and livestock, though produced in lower quantities.[136] At present, livestock contribute around 70 per cent of Australia's methane emissions,[137] and about 12 per cent of the country's carbon pollution overall.[138]

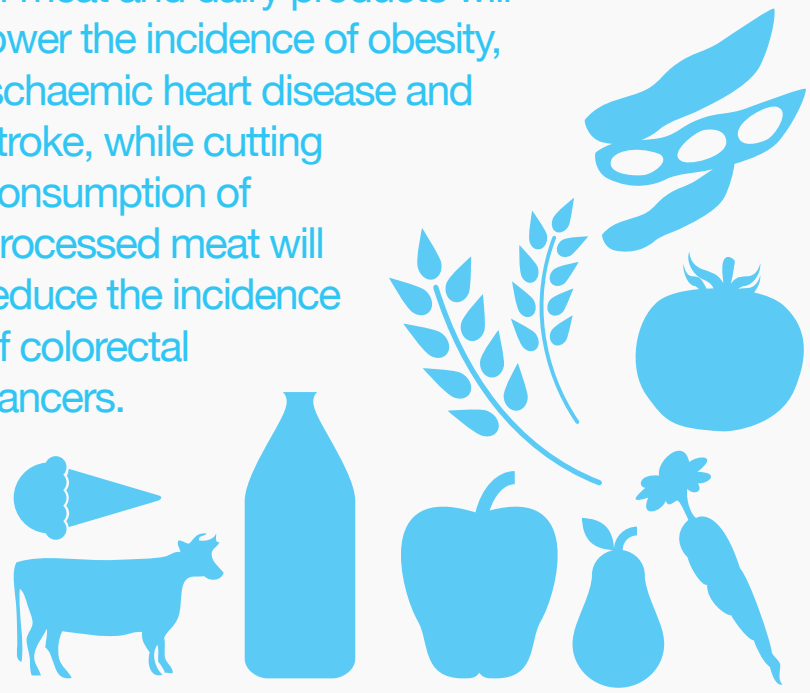
A rapid worldwide growth in meat consumption is driving emissions growth and contributing to diseases such as ischaemic heart disease, obesity, and colorectal cancers,[139] highlighting the common drivers between high emissions lifestyles and the global epidemic of chronic diseases.[140]

A 2009 study in *The Lancet* found that reducing animal product consumption by 30 per cent would lead to a 15 per cent reduction in the burden of ischaemic heart disease.[141] Combined with technological improvements in agricultural production, this could deliver greenhouse gas emissions reductions of 50 per cent in the farm sector by 2030 in countries such as the UK.[142]

Reductions in red meat consumption in Australia from the (current) average of 100g to 50g per person per day have been predicted to reduce annual emissions from livestock by 13.3 MtCO2-e (about 22 per cent) as well as cutting the incidence of colorectal cancer by 11 per cent.[143]

Progressively changing the diets of people in affluent societies like Australia is an important climate change mitigation strategy, and one that could also result in significant public health benefits.

Moderating our consumption of meat and dairy products will lower the incidence of obesity, ischaemic heart disease and stroke, while cutting consumption of processed meat will reduce the incidence of colorectal cancers.



Changes to Australia's food systems have the potential to make a sizeable contribution to climate change mitigation through the sequestration of carbon and moving to lower emissions production.

But production changes alone are unlikely to be sufficient in the long run; changes to food supply chains and consumption will also be important. In turn, these will improve public health and reduce demand on the healthcare system.[144]

Improvements in farming practices have the potential to reduce cardon dioxide, methane and nitrous oxide emissions as well as improve environmental conservation, which itself has public health benefits (see above).

One major pathway to improving population health and reducing emissions is through changes in the Australian diet.[145] Moderating our consumption of meat and dairy products will lower the incidence of obesity, ischaemic heart disease and stroke, while cutting consumption of processed meat will reduce the incidence of colorectal cancers.[146,147]

Conclusion

This paper demonstrates why it is important to evaluate health costs and benefits in developing policy solutions to climate change.

It is clear, from numerous studies and real-world examples, that substantial benefits are available to health from strategies to cut emissions, including cleaner transport and energy systems.[148] Many of these strategies come at a relatively modest cost but the health benefits can start to be realised immediately, while climate benefits accumulate over the long term.[149]

These shorter term and localised health benefits of emissions reductions can help reduce or offset the costs of climate action as well as provide greater incentives to act right now. Many people see climate change as something in the distant future and not an immediate threat. Quantifying and communicating the real, tangible, and immediate health benefits possible from cutting emissions can help build public support for climate action.

Coal-fired power, for instance, comes with a significant human health cost in terms of respiratory, cardiovascular, and nervous system diseases.[150,151] Conservative estimates put the total health costs to the Australian community from burning fossil fuels at around $6 billion annually. Economic modelling from other countries, however, suggests the savings for health from cutting emissions in the energy sector in particular are likely to be much greater. Avoiding the public costs of ill-health associated with greenhouse gas emissions will free up the investment dollars and productivity needed for Australia's transition to a low-carbon economy.

Better information is needed about the health benefits of climate strategies here in Australia. An understanding of the economic savings associated with the health co-benefits from cutting emissions across a range of sectors will help build political and public support for action. This requires researchers to evaluate potential health gains as well as existing health costs. But the task goes beyond the health sector. Collaboration across portfolios—health, climate, energy, transport, agriculture, and environment—is needed to get the best results. And, as a champion for better health, the health sector needs to be supported to reduce its own ecological footprint so it delivers the broadest benefits possible.

Finally, given both the tremendous health risks of a more hostile Australian climate and the potential benefits of action, a national health and climate change plan is needed. Such a plan could help communities, businesses and government better prepare for climate change, take advantage of the opportunities provided by low-carbon initiatives, and take actions that cut emissions and promote better human health.

Photograph: Michael Hall

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