

Australian healthcare services and the climate change debate

**Prue Power
CEO
Australian Healthcare and Hospitals Association**

26th July 2012

CONTENTS

1. Policy issue	1
2. Background and context	1
a. Carbon pricing and the carbon debate in Australia	1
b. Impact of carbon pricing on hospitals and healthcare providers .	2
c. Health impacts of climate change	3
3. Policy options, directions or initiatives	6
a. Reducing the health sector’s carbon footprint	6
b. Health sector preparedness for climate change	8
4. Conclusions	9
Appendix 1: Energy costs as a proportion of total recurrent costs in selected metropolitan hospitals	10
5. References.....	11

1. Policy issue

After years of highly charged political and public debate on tackling climate change, Australia started taxing carbon emissions on 1 July 2012. Under the carbon tax, Australia's biggest carbon emitting companies will pay a fixed-price levy on their carbon emissions for three years. At the end of this period, the carbon tax will transition to an emissions trading scheme, from 1 July 2015.

Healthcare services and hospitals are not directly affected by the carbon tax, as they are not among the biggest polluting companies in Australia. However, they may experience some indirect flow-on costs, in the form of higher energy prices. Though as this Policy Brief will explain, any overall increases in costs for public hospitals are likely to be minimal at most once the compensatory effects of new hospital funding arrangements are taken into account. Nonetheless, with the health sector responsible for 7 per cent of total carbon emissions from buildings in Australia,¹ there is significant scope for the sector to reduce its carbon footprint through greater energy efficiency measures.

Of course, the health sector also has a much broader interest in the climate change debate: the impacts of climate change on human health. Climate experts now agree that the health impacts of climate change, such as the spread of infectious diseases, and illness and fatalities related to severe weather events, are significant, and pose a significant threat for the future.²

This Policy Brief will explore each of these issues and outline policy options and other initiatives currently in place to address them.

2. Background and context

a. Carbon pricing and the carbon debate in Australia

From 1 July 2012, the carbon emissions of Australia's biggest polluting companies were subject to a levy on the carbon emissions they produce. Carbon pricing is the centrepiece of the Government's strategy to reduce carbon pollution, promote innovation and investment in renewable energy, and encourage greater energy efficiency.³ In introducing these measures, the Government aims to reduce carbon pollution in Australia from 2000 levels by at least 5 per cent by 2020, and to 80 per cent below 2000 levels by 2050.⁴

The carbon pricing mechanism will commence with the carbon tax (of \$23 per tonne of carbon emitted, increasing by 2.5 per cent each year in real terms), transitioning to an emissions trading scheme after three years, where the market will determine the price. The carbon tax will be levied on approximately 500 of Australia's biggest

carbon emitting companies – mostly power stations, mines and heavy industry plants.⁵

b. Impact of carbon pricing on hospitals and healthcare providers

Hospitals and healthcare providers will not have to pay the carbon tax, and thus will not be directly affected by the introduction of the new carbon pricing arrangements. However, they may experience indirect flow-on effects in the form of increased energy costs, as energy companies seek to pass on the increased cost of supplying energy under the carbon tax.

It is difficult to say precisely what the impact of higher energy costs on hospital budgets will be: first, because it is not clear exactly by how much hospital and healthcare providers' energy bills are likely to increase, though Commonwealth Treasury modeling predicts an increase in *household* electricity prices of up to 10 per cent.⁶ Second, because not all hospitals' annual reports disaggregate energy costs from other operating expenses in the same way, it is not possible to work out exactly what their current costs are. Third, because hospitals' energy costs may change as they adopt more energy efficiency measures – as many hospitals and healthcare providers around the country are doing (further on this below).

However, while it is not possible to be completely definitive, it *is* possible to say that energy costs make up only a very small component of hospital budgets. In a very small sample of selected major metropolitan hospitals in Victoria and Queensland, energy costs made up approximately 0.79 per cent of total recurrent/operating costs. While this sample is by no means meant to be representative, it does demonstrate that in the hospitals sampled, because they make up such a small proportion of overall operating costs, any increase in energy costs will only have a marginal impact on overall operating costs. Even on a 10 per cent increase in energy costs scenario, the average increase in total operating costs in the four hospitals sampled would be 0.08 per cent (See Appendix 1).

Nonetheless, in multi-billion dollar state public hospital budgets, a 0.08 per cent increase can mean several million dollars. The Victorian Government released figures in July 2011 suggesting that the carbon tax will lead to additional energy costs for Victorian hospitals of approximately \$13.6 million per annum from mid-2012.⁷ The NSW Government recently released figures indicating that NSW Health would face \$27 million in additional costs each year as a result of higher energy prices under the carbon tax, and the flow-on impact of the carbon tax on the economy. According to the NSW Government figures, this equates to around \$120,200 per year for the average NSW public hospital.⁸

However, the Commonwealth argues that, even if there are increased costs in the order of magnitude predicted by the Victorian and NSW governments, both current

and future hospital financing arrangements effectively have in-built compensatory arrangements which should negate any marginal impact:

- current funding for public hospital services provided by the Commonwealth to the States and Territories is indexed using the Australian Institute of Health and Welfare's (AIHW's) total health price index – which measures changes in health prices (incorporating operating costs) year on year;⁹
- from 2014-15, the Commonwealth will begin to increase its funding contribution to 50 per cent of the efficient growth in hospital costs, which will also incorporate increases in hospitals' operating costs.¹⁰

c. Health impacts of climate change

While much of the policy debate on climate change in Australia and elsewhere has focused on the environmental impacts of climate change and the economic impacts of policies designed to reduce climate change impacts caused by carbon emissions (as demonstrated by the Victorian and NSW governments' claims regarding the impact of the carbon tax on hospitals, outlined above), there has been relatively little discussion about the consequences of climate change on human health.

Yet the consequences are significant: according to the Australian Climate Commission, "climate change is harming our health in Australia, and poses a significant threat for the future".¹¹ In 2009, a commission established by *The Lancet* and University College London said climate change is "the biggest global health threat of the 21st century".¹² A recently published article in the Public Library of Science *Medicine* journal suggests that in the medium and long term, climate change could constitute a health crisis at least as wide-ranging as that currently caused by tobacco.¹³

The following table summarizes the potential health consequences of climate change for Australia, as described by the Climate Commission.¹⁴

Effects of climate change on human health¹⁵

Heat waves and other severe weather events	<ul style="list-style-type: none"> - By the end of the century the number of days over 35°C is expected to increase in all Australian capital cities, exponentially in some cases. - For instance, in 2008 there were 9 days over 35°C in Darwin in 2008 – by the year 2100, this is expected to increase to 312 – more than 10 months of the year. - Heat is the leading cause of weather-related death in Australia: very hot days and heatwaves can lead to illnesses such as heatstroke, kidney failure, and heart attacks. - Other severe weather events associated with climate change, such as heavy rainfall, floods, hailstorms and bushfires, can also cause injuries and illness, and lead to water and food contamination.
---	--

Spread of infectious diseases	<ul style="list-style-type: none"> - Rising temperature, changes in rainfall patterns and more severe weather events are expected to lead to higher rates of some infectious diseases. - For example, dengue fever is currently confined to northern Queensland, but as other parts of the country become hotter and wetter, the type of mosquito that spreads dengue fever is expected to move south. - This could put 5-8 million Australians at risk of this disease (10-16 times the population that is currently exposed).
Air pollution	<ul style="list-style-type: none"> - Air pollution and increased allergens in the air can exacerbate existing respiratory diseases, such as asthma, hay fever, and even lung cancer and heart disease.
Mental health	<ul style="list-style-type: none"> - Fires, floods, droughts and other extreme weather events can lead to mental health problems such as post-traumatic stress, depression and anxiety. - The physical and emotional impacts of climate change more generally, such as potential population dislocation if some regions become uninhabitable, can also lead to mental health problems.
Pressure on health services	<ul style="list-style-type: none"> - Each of the issues described above can put substantial demand on health services, in particular ambulances and emergency departments in the case of extreme weather events.

While some communities in colder climates will experience health benefits from warmer temperatures (in the form of reduced cold weather-related illness), experts agree that the detrimental impacts of warmer temperatures far outweigh the beneficial ones.¹⁶

The most vulnerable members of the community will be most at risk: in Australia, this means the very old, the very young, people with chronic disease, people in communities with low socioeconomic status, and Indigenous communities. Rural and remote communities, outdoor workers and tourists will also be affected.¹⁷ Around the world, malnutrition (as a result of reduced agricultural yields), diarrhoea and extreme climate events will have the most impact in poor regions of the world;¹⁸ and unmitigated climate change risks entrenching global health inequalities between rich and poor countries.¹⁹

Given the significant health impacts of climate change, it follows that, in addition to the environmental and economic policy reasons for introducing a carbon price, reducing carbon emissions will also have health benefits for the population by reducing health impacts of carbon pollution.²⁰ Accordingly, over recent years many public health experts have come together to argue stridently for strong action by governments on reducing carbon emissions.²¹

For example, according to a report from the European Health and Environment Alliance and Health Care Without Harm Europe, European Union countries could reap additional health and productivity benefits of up to €30.5 billion per year by increasing its greenhouse emissions reduction target from 20 per cent (from 1990 levels) to a 30 per cent reduction in domestic or internal emissions by the year 2020. This is in addition to the very significant benefits which will accrue from moving to the current 20 per cent target by 2020.

The €30.5 billion per year in benefits is equivalent to between €21 and €60 worth of health savings per capita in the 27 EU countries in 2020.²² The health benefits taken into account in the report's modeling include:

- improvements in life expectancy, respiratory and cardiac health as a result of cleaner air;
- fewer hospital admissions, and reduced rates of chronic respiratory disease, asthma attacks and various other respiratory and cardiac conditions; and
- fewer days of restricted activity because of respiratory health problems.²³

According to this report, the potential productivity benefits are significant: for example, the report estimates 3 million working days could be gained through increasing the EU's emissions reductions target – equivalent to having approximately 13,000 additional full-time employees in the workforce in EU countries in the year 2020.²⁴

Academics at the University of Western Sydney and the Australian National University's (ANU's) Centre for Epidemiology and Population Health modeled the impact of temperature-related deaths and hospitalisations, gastroenteritis caused by Salmonella and other bacteria, and dengue fever against a number of different carbon emission mitigation scenarios for the Garnaut Climate Change Review in June 2008.²⁵ They concluded:

- temperature-related deaths and hospitalisations will vary considerably between States and Territories, with Queensland, the NT and WA being most affected;
- depending on the extent to which carbon pollution is mitigated, climate change will cause up to 870,000 cases of gastroenteritis by the year 2100 at a cost to the health system of \$174.2 million, and a cost to the economy of 1.8 million work days lost; and
- up to 36,000 workdays lost as a result of higher incidence of dengue fever can be saved, depending on the extent to which carbon pollution is reduced.²⁶

The authors of this review estimate that the projected population health outcomes included in their study (temperature-related deaths and hospitalisations, gastroenteritis, and dengue fever) represent only around one-third of the total definable health burden from climate change.²⁷

While more extensive economic modeling on the health impacts of climate change has not been done in Australia, it is reasonable to assume that the general findings of the European study discussed above will apply: that is, there are considerable health and productivity gains to be made from reducing carbon emissions and the health impacts of carbon pollution – and that these are likely to run into the billions of dollars, particularly when projected over the next 50 and 100 years.

And while the precise gains can be difficult to measure, it is worth noting also that some policies aimed at reducing carbon emissions can have other health benefits (and potentially vice versa): for instance, encouraging (and providing the infrastructure to enable) people using their cars less to reduce carbon pollution by walking or cycling will also have health benefits, through greater physical activity and improved fitness.²⁸

3. Policy options, directions or initiatives

As noted at the outset of this paper, Australia is moving to reduce carbon emissions primarily through the introduction of a levy on carbon emissions which commenced on 1 July 2012, and which will transition to a carbon emissions trading scheme from 1 July 2015. However, there is some uncertainty over the future of this scheme, as the Coalition Opposition has pledged to abolish the carbon tax should they be elected to government at the federal election due in 2013.

The political context aside, the major climate change policy questions or issues for the Australian health care sector are twofold:

- i. How can hospitals and healthcare providers contribute to reducing carbon pollution by reducing their own carbon footprints?
- ii. How adequately prepared is the health sector overall for dealing with climate change?

This section of this paper explores these two issues.

a. Reducing the health sector's carbon footprint

While the health and hospitals sector in Australia is not a major emitter of carbon pollution compared to other industries such as the mining, agriculture and power industries, there is considerable scope for the sector to reduce its carbon 'footprint' (and its operating costs) through greater energy efficiency, in particular in hospital buildings.

According to the British Medical Journal, the National Health Service in England emits 3.2 per cent of the country's total footprint, equivalent to a quarter of all public sector emissions.²⁹ In Australia, energy used by buildings (both residential and

commercial) accounts for around 20 per cent of our greenhouse gas emissions.³⁰ The health sector accounts for 7 per cent of total carbon emissions from buildings in Australia.³¹

Hospitals are high energy intensity buildings – a factor of both the energy-intensive equipment that hospitals use (such as diagnostic imaging and operating theatre equipment), and the fact that they operate 24 hours a day, 365 days per year.³² According to one estimate, on average a hospital requires at least twice as much energy per square metre as an office building.³³ In Victoria, public hospitals consume around 60 per cent of public sector energy, and around 45 per cent in Western Australia.³⁴

Greater energy efficiency in existing hospital buildings is achievable through a range of small measures such as installing energy efficient lighting, switching off lights and equipment when not required, and relatively minor adjustments to existing control systems (for example, replacing old, inefficient timing systems for air conditioning).³⁵ Many Australian hospitals have been implementing these kinds of energy efficiency initiatives for years.

There is also significant scope to build greater energy efficiency into new hospital buildings and infrastructure – this is particularly the case given the large number of major hospital and health service infrastructure projects funded by the Australian Government over the last few years which are now underway around the country.

There are several examples of flagship hospital infrastructure projects incorporating energy efficiency and sustainability measures into their design. The recently completed Royal Children’s Hospital in Melbourne, for example, aims to be Australia’s ‘greenest’ hospital including through measures such as:

- reducing its greenhouse gas emissions by 45 per cent, through energy efficient lighting, heating and cooling systems, and the inclusion of a tri-generation plant and solar panels; and
- installation of a black water treatment system, rainwater collection, water-efficient fittings and water-conscious landscaping to reduce water use.³⁶

Existing policy initiatives provide some support for hospitals and health care providers to improve their energy efficiency. For instance:

- some health service organisations are eligible to apply for energy efficiency grants available under the Australian Government’s Clean Energy Future package;³⁷
- public hospitals may be eligible for assistance from Low Carbon Australia to become more energy efficient – Low Carbon Australia is an independent company established by the Australian Government in 2010 which provides

advice and finance to eligible businesses and public sector organisations for the retrofit of non-residential buildings; and³⁸

- state governments may also provide assistance to hospitals and community health facilities seeking to improve their energy efficiency.³⁹

b. Health sector preparedness for climate change

While many hospitals and health services are moving to improve their carbon footprints, opinions differ as to how prepared the health system is for the broader challenges that the changing climate and warmer temperatures will present.

In a recent submission to the Productivity Commission's inquiry into barriers to effective climate change adaptation, the Climate and Health Alliance (CAHA) argues the sector is ill prepared for the risks posed to health by climate change, and that health protection has been overlooked in Australia's climate adaptation approach.⁴⁰

In order to ensure Australia is adequately prepared for the health impacts of climate change, the CAHA and other groups such as the Australian Medical Association (AMA) has called for the development of a National Strategy for Health and Climate Change to protect the community from further health risks from climate change, incorporating issues such as:

- communication links between hospitals, major medical centres, GPs and emergency response agencies;
- localised disaster management plans for specific geographical regions that model potential adverse health outcomes in those areas;
- national surveillance measures to prevent exotic disease vectors from becoming established in Australia;
- development of effective interventions to address mental health issues arising from extreme events; and
- a register of retired competent medical practitioners who are willing to assist in providing medical services during a national emergency.⁴¹

The CAHA argues that there is also a need to improve climate 'literacy' among health professionals – to assist in developing more effective adaptation responses, and improve coordination with the public about risks to health from climate change, as well as effective strategies for health protection.⁴² Members of the group Doctors for the Environment argue that this should be undertaken by incorporating climate change and health into medical school curricula, as well as ongoing education for general practitioners and other specialists and health professionals. This is especially important for the *future* medical workforce who will be working when the effects of climate change are increasingly being felt.⁴³

To better prepare the health system for the impact of climate change, the CAHA has also called for evaluation of the economic impact of the health benefits of emissions

reductions,⁴⁴ the health risks of climate change to be reflected in national health priorities, and more research to support the health sector to respond to the risks posed by climate change, and for greater assistance to the sector to transition to becoming a low emissions industry.⁴⁵

The AHHA has joined the Global Green and Healthy Hospitals Network as an initial measure aimed at linking Australian health facilities with this international Network in order to raise awareness of the issue and to provide advice on how to lower their carbon footprint.

4. Conclusions

Irrespective of the domestic political debate over the future of carbon abatement policies, the issue of climate change itself is not going to go away.

The links between climate change and health are now irrefutable. The health sector therefore has an important role to play in this debate – both through reducing its own carbon footprint, through promoting climate policies which will reduce the impacts of climate change on human health, and through ensuring the preparedness of the health system for the challenges to it that climate change and warmer temperatures will bring.

Appendix 1: Energy costs as a proportion of total recurrent costs in selected metropolitan hospitals

	Energy costs (\$000)	Total recurrent costs (\$000)	Energy costs as % of total recurrent	Energy bill if increased by 10% (\$000)	Difference in cost (\$000)	Total recurrent with 10% higher energy bill (\$000)	Increase in energy bill as % of total recurrent
Austin Hospital 2010-11	7,011	686,462	1.02%	7,712	701	687,163	0.10%
Alfred Hospital 2010-11	3,900	692,308	0.56%	4,290	390	692,698	0.06%
Melbourne Health 2010-11	6,150	837,453	0.73%	6,765	615	838,068	0.07%
Royal Brisbane and Women's Hospital 2010-11	6,253	758,272	0.82%	6,878	625	758,897	0.08%
Average			0.79%				0.08%

Notes to table:

1. Not all hospitals disaggregate energy costs in the same way: for instance, the energy bills for the Victorian hospitals include water, whereas water is disaggregated from electricity and fuel costs in the Royal Brisbane and Women's Hospital Annual Report.
2. For the reason explained in note 1, the figures in the table probably in fact exaggerate the impact of a 10 per cent increase in electricity costs for the Victorian hospitals.

Data sources:

1. [Austin Hospital Annual Report 2010-11](#), p.23 onwards + note 3
2. [Eastern Health Annual Report 2010-11](#), p.59 onwards + note 3a
3. [Melbourne Health Annual Report 2010-11](#), p.32 onwards + note 3
4. [Royal Brisbane and Women's Hospital Year in Review 2010-11](#), p.48

5. References

- ¹ Low Carbon Australia Limited, 2012, viewed 26 July 2012, <http://www.lowcarbonaustralia.com.au/>
- ² Climate Commission, *The Critical Decade: Climate Change and Health*, November 2011, viewed 26 July 2012, http://climatecommission.gov.au/wp-content/uploads/111129_FINAL-FOR-WEB.pdf
- ³ Australian Government, 2012, *Working together for a clean energy future*, 'Carbon pricing mechanism: who is liable', viewed 26 July 2012, <http://www.cleanenergyfuture.gov.au/500-companies/>
- ⁴ Ibid
- ⁵ Ibid
- ⁶ The Treasury, 'Strong Growth, Low Pollution – Modelling a Carbon Price', viewed 26 July 2012, http://archive.treasury.gov.au/carbonpricemodelling/content/update/Modelling_update.asp
- ⁷ State Government of Victoria - Premier of Victoria, 'Julia Gillard's carbon tax power price increases to hurt Victorian country hospitals', media release, 21 July 2011, viewed 26 July 2012, <http://www.premier.vic.gov.au/media-centre/media-releases/1510-julia-gillards-carbon-tax-power-price-increases-to-hurt-victorian-country-hospitals.html>; S Lewis and M Johnston, 'Hospitals face \$170m hit from sick carbon tax', *Herald Sun*, 9 March 2012, viewed 26 July 2012, <http://www.heraldsun.com.au/news/victoria/hospitals-face-170m-hit-from-sick-carbon-tax/story-fn7x8me2-1226292571883>; however, note the Victorian Government did not release the details or assumptions behind their modelling, so it is not clear which data or assumptions they used in coming to these figures.
- ⁸ The Hon Mike Baird MP, NSW Treasurer, 'Cost of Carbon Tax on NSW Schools and Hospitals', media release, 29 April 2012, viewed 26 July 2012, http://www.treasury.nsw.gov.au/_data/assets/pdf_file/0012/22044/Carbon_impact_29-4-2012.pdf
- ⁹ Australian Institute of Health and Welfare 2011, *Health expenditure Australia 2009-10*, Health and welfare expenditure series no. 46, Cat. no. HWE 55, Canberra: AIHW, pp.150-151.
- ¹⁰ G Combet, 'Hospitals face small cost increases as a result of carbon tax', *Herald Sun*, 8 March 2012, viewed 26 July 2012, <http://www.heraldsun.com.au/news/victoria/hospitals-face-small-cost-increases/story-fn7x8me2-1226294034807>; S Benson, 'Carbon tax costs covered by the federal government', *The Daily Telegraph*, 12 June 2012, viewed 26 July 2012, <http://www.dailytelegraph.com.au/archive/national-old/carbon-tax-costs-covered-by-the-federal-government/story-e6freuzr-1226391686993>
- ¹¹ Climate Commission, *The Critical Decade: Climate Change and Health*, November 2011, viewed 26 July 2012, http://climatecommission.gov.au/wp-content/uploads/111129_FINAL-FOR-WEB.pdf
- ¹² A Costello, M Abbas, A Allen, et al. Lancet and University College London Institute for Global Health Commission: managing the health effects of climate change. *Lancet* 2009; 373: 1693-1733.
- ¹³ M Nilsson, B Evengård, R Sauerborn and P Byass (2012) 'Connecting the Global Climate Change and Public Health Agendas', Public Library of Science *Medicine* 9(6): e1001227, doi:10.1371/journal.pmed.1001227 viewed 26 July 2012, <http://www.plosmedicine.org/article/info%3Adoi%2F10.1371%2Fjournal.pmed.1001227>; M Nilsson, R Beaglehole and R Sauerborn, 'Climate policy: lessons from tobacco control', *The Lancet*, Volume 374, Issue 9706, Pages 1955 - 1956, 12 December 2009. doi:10.1016/S0140-6736(09)61959-0, viewed 26 July 2012, <http://www.thelancet.com/journals/lancet/article/PIIS0140-6736%2809%2961959-0/fulltext>
- ¹⁴ Climate Commission, *The Critical Decade: Climate Change and Health*, November 2011, viewed 26 July 2012, http://climatecommission.gov.au/wp-content/uploads/111129_FINAL-FOR-WEB.pdf
- ¹⁵ Climate Commission, *The Critical Decade: Climate Change and Health*, November 2011, viewed 26 July 2012, http://climatecommission.gov.au/wp-content/uploads/111129_FINAL-FOR-WEB.pdf; Garnaut Review, Garnaut *Climate Change Review*, 'The impacts of climate change on three health outcomes: temperature-related mortality and hospitalisations, salmonellosis and other bacterial gastroenteritis, and population at risk from dengue' (prepared by Hilary Bambrick, Keith Dear, Rosalie Woodruff, Ivan Hanigan, Anthony McMichael), June 2008, viewed 26 July 2012, [http://garnautreview.org.au/CA25734E0016A131/WebObj/03-AThreehealthoutcomes/\\$File/03-A%20Three%20health%20outcomes.pdf](http://garnautreview.org.au/CA25734E0016A131/WebObj/03-AThreehealthoutcomes/$File/03-A%20Three%20health%20outcomes.pdf)

¹⁶ Climate Commission, *The Critical Decade: Climate Change and Health*, November 2011, p.7, viewed 26 July 2012, http://climatecommission.gov.au/wp-content/uploads/111129_FINAL-FOR-WEB.pdf

¹⁷ Climate Commission, *The Critical Decade: Climate Change and Health*, November 2011, p.4, viewed 26 July 2012, http://climatecommission.gov.au/wp-content/uploads/111129_FINAL-FOR-WEB.pdf; D Campbell, M Stafford Smith, J Davies, P Kuipers, J Wakerman and MJ McGregor, 'Responding to health impacts of climate change in the Australian desert', *Rural and Remote Health*, 8: 1008. (Online), 2008, viewed 26 July 2012, http://www.rrh.org.au/publishedarticles/article_print_1008.pdf; D Green, U King, Morrison, 'Disproportionate burdens: the multidimensional impacts of climate change on the health of Indigenous Australians', *Medical Journal of Australia*, 2009; 190 (1): 4-5, viewed 26 July 2012, <https://www.mja.com.au/journal/2009/190/1/disproportionate-burdens-multidimensional-impacts-climate-change-health>

¹⁸ Health Care Without Harm and Environment Alliance, *Acting Now for Better Health*, 2010, p.4, viewed 26 July 2012, http://www.env-health.org/IMG/pdf/HEAL_30_co-benefits_report_-_FULL.pdf

¹⁹ A Costello et al, 'Managing the health effects of climate change', *The Lancet*, Volume 373, Issue 9676, Pages 1693 - 1733, 16 May 2009. doi:10.1016/S0140-6736(09)60935-1., viewed 26 July 2012, <http://download.thelancet.com/pdfs/journals/lancet/PIIS0140673609609351.pdf?id=e16241398b8eb460:-657956d5:137ea8cce5e:7cfc1339676048306>; T McMichael, H Montgomery and A Costello, 'Health risks, present and future, from global climate change', *BMJ* 2012; 344: e1359, viewed 26 July 2012, <http://www.bmj.com/content/344/bmj.e1359>

²⁰ Doctors for the Environment Australia, 'MJA Media Release - Carbon Pricing is a Health Protection Policy', *Media Release*, September 2011, viewed 26 July 2012, http://dea.org.au/news/article/mja_media_release_carbon_pricing_is_a_health_protection_policy; R Horton, 'The Climate Dividend', *The Lancet*, Volume 374, Issue 9705, Pages 1869 - 1870, 5 December 2009. doi:10.1016/S0140-6736(09)61994-2, viewed 26 July 2012, [http://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(09\)61994-2/fulltext](http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(09)61994-2/fulltext)

²¹ For example: [The Climate and Health Alliance](#), [Global Green and Healthy Hospitals Network](#).

²² Health Care Without Harm and Environment Alliance, *Acting Now for Better Health*, 2010, p.4, viewed 26 July, 2012, http://www.env-health.org/IMG/pdf/HEAL_30_co-benefits_report_-_FULL.pdf

²³ Health Care Without Harm and Environment Alliance, *Acting Now for Better Health*, 2010, p.8, viewed 26 July 2012, http://www.env-health.org/IMG/pdf/HEAL_30_co-benefits_report_-_FULL.pdf

²⁴ Health Care Without Harm and Environment Alliance, *Acting Now for Better Health*, 2010, p.8, viewed 26 July 2012, http://www.env-health.org/IMG/pdf/HEAL_30_co-benefits_report_-_FULL.pdf

²⁵ Garnaut Review, *Garnaut Climate Change Review*, 'The impacts of climate change on three health outcomes: temperature-related mortality and hospitalisations, salmonellosis and other bacterial gastroenteritis, and population at risk from dengue' (prepared by Hilary Bambrick, Keith Dear, Rosalie Woodruff, Ivan Hanigan, Anthony McMichael), June 2008, viewed 26 July 2012, [http://garnautreview.org.au/CA25734E0016A131/WebObj/03-AThreehealthoutcomes/\\$File/03-A%20Three%20health%20outcomes.pdf](http://garnautreview.org.au/CA25734E0016A131/WebObj/03-AThreehealthoutcomes/$File/03-A%20Three%20health%20outcomes.pdf)

²⁶ Garnaut Review, *Garnaut Climate Change Review*, 'The impacts of climate change on three health outcomes: temperature-related mortality and hospitalisations, salmonellosis and other bacterial gastroenteritis, and population at risk from dengue' (prepared by Hilary Bambrick, Keith Dear, Rosalie Woodruff, Ivan Hanigan, Anthony McMichael), June 2008, p.41, viewed 26 July 2012, [http://garnautreview.org.au/CA25734E0016A131/WebObj/03-AThreehealthoutcomes/\\$File/03-A%20Three%20health%20outcomes.pdf](http://garnautreview.org.au/CA25734E0016A131/WebObj/03-AThreehealthoutcomes/$File/03-A%20Three%20health%20outcomes.pdf)

²⁷ Garnaut Review, *Garnaut Climate Change Review*, 'The impacts of climate change on three health outcomes: temperature-related mortality and hospitalisations, salmonellosis and other bacterial gastroenteritis, and population at risk from dengue' (prepared by Hilary Bambrick, Keith Dear, Rosalie Woodruff, Ivan Hanigan, Anthony McMichael), June 2008, p.41, viewed 26 July 2012, [http://garnautreview.org.au/CA25734E0016A131/WebObj/03-AThreehealthoutcomes/\\$File/03-A%20Three%20health%20outcomes.pdf](http://garnautreview.org.au/CA25734E0016A131/WebObj/03-AThreehealthoutcomes/$File/03-A%20Three%20health%20outcomes.pdf)

²⁸ Health Care Without Harm and Environment Alliance, *Acting Now for Better Health*, 2010, p.4, viewed 26 July, 2012, http://www.env-health.org/IMG/pdf/HEAL_30_co-benefits_report_-_FULL.pdf; A Haines,

P Wilkinson, C Tonne and I Roberts, '[Aligning climate change and public health policies](#)', *The Lancet*, Volume 374, Issue 9707, Pages 2035 - 2038, 19 December 2009. doi:10.1016/S0140-6736(09)61667-6., viewed 26 July 2012, http://www.thelancet.com/journals/lancet/article/PIIS0140-6736%2809%2961667-6/fulltext#article_upsell

²⁹ A Cole, 'Saving the planet as well as lives', *BMJ* 2009; 338: b933, date viewed 26 July 2012, <http://www.bmj.com/content/338/bmj.b933>

³⁰ Department of Climate Change and Energy Efficiency, *Buildings*, viewed 26 July 2012, <http://www.climatechange.gov.au/what-you-need-to-know/buildings.aspx>

³¹ Low Carbon Australia, *Home*, date viewed, 26 July 2012, <http://www.lowcarbonaustralia.com.au/>

³² Department of Climate Change and Energy Efficiency, 'The Pathway to 2020 for Low-Energy, Low-Carbon Buildings in Australia: Indicative Stringency Study' (prepared by Pitt Sherry), Ref: DCC 137/2010, July 2010, pp.16-17, date viewed 26 July 2012, <http://www.climatechange.gov.au/what-you-need-to-know/buildings/publications/~media/publications/buildings/pathway-to-2020.pdf>

³³ M Skelton, *The cost of green star hospitals – Research Report*, Davis Langdon Company, July 2009, viewed 26 July 2012, <http://www.slideshare.net/micskelton/the-cost-of-green-star-hospitals-davis-langdon-research-report>

³⁴ Figures cited in B Burger and P Newman, *Hospitals and Sustainability*, CRC Construction and Innovation, undated, viewed 26 July 2012, http://sustainability.curtin.edu.au/local/docs/Hospital_Final_lowres.pdf

³⁵ UK Carbon Trust, *Hospitals – Healthy Budgets through energy efficiency*, June 2010, viewed 26 July 2012, http://www.carbontrust.com/media/39216/ctv024_hospitals.pdf and B Burger and P Newman, *Hospitals and Sustainability*, CRC Construction and Innovation, undated, viewed 26 July 2012, http://sustainability.curtin.edu.au/local/docs/Hospital_Final_lowres.pdf.

³⁶ The Royal Children's Hospital Melbourne, [Your Guide – for patients, families and visitors](#), Edition 1 November 2011, p. 15.

³⁷ Department of Climate Change and Energy Efficiency, *Energy Efficiency Information Grants Program Guidelines*, February 2012, viewed 26 July 2012, <http://www.rch.org.au/info/print/Your%20Guide%20to%20RCH.pdf>

³⁸ Low Carbon Australia, *Home*, date viewed, 26 July 2012, <http://www.lowcarbonaustralia.com.au/> ; Low Carbon Australia, '[Financing the Energy Efficient Future](#)', *Facility Perspectives*, vol. 6 no. 1, viewed 26 July 2012, <http://www.lowcarbonaustralia.com.au/sites/default/files/upload/Retrofitting%20for%20Green%20Buildings.pdf> ; See also information about Low Carbon Australia's carbon neutral program, <http://www.lowcarbonaustralia.com.au/cnprogram>

³⁹ See NSW Health, *Annual Report 2010-11*, p. 208, re projects funded from the NSW Treasury Loan Fund for this purpose, viewed 26 July 2012, <http://www.health.nsw.gov.au/pubs/2011/pdf/annualreport11.pdf>

⁴⁰ CAHA sub to PC inquiry, viewed 26 July 2012, <http://ama.com.au/node/7368>

⁴¹ CAHA sub to PC inquiry, viewed 26 July 2012, <http://ama.com.au/node/7368>

⁴² Climate and Health Alliance, *Submission to the Productivity Commission Inquiry into Barriers to Effective Climate Change Adaptation*, June 2012.

⁴³ E Hamel Green, G Blashki and H.L Berry, '[Preparing Australian medical students for climate change](#)', *Australian Family Physician*, Vol. 38, No. 9, September 2009, viewed 26 July 2012,

<http://www.racgp.org.au/afp/200909/200909green.pdf> ; G Blashki, T McMichael and D.J Karoly, 'Climate change and primary health care', *Australian Family Physician*, Vol. 36, No. 12, December 2007, viewed 26 July 2012, <http://www.racgp.org.au/afp/200712/200712Blashki.pdf>

⁴⁴ CAHA, '[PC study into climate policy must also consider health costs](#)', media release, 22 November 2010, viewed 26 July 2012, http://caha.org.au/wp-content/uploads/2010/12/101122_PC-study-into-climate-policy-must-also-consider-health-costs_CAHA-media-release.pdf

⁴⁵ CAHA, *Submission to the Strategic Review of Health and Medical Research*, March 2011, viewed 26 July 2012, <http://caha.org.au/wp-content/uploads/2012/01/Submission-to-McKeon-Review-March-2012.pdf>