

**Issues for Future Melbourne:
University of Melbourne-City of Melbourne
Competition, April 2007**

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N/A

3. Details

3.1 Issue Name eg <i>Climate Change, Energy, New Technologies</i>	Energy (in response to Climate Change)
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3.2 Explanation: Description of the issue and the likely outlook over the next ten years	<p>Global warming is a term used to refer to the increase in the average temperature of the Earth's oceans and atmosphere, observed in recent decades. Scientific consensus currently believes that global warming is real and that it is primarily caused by anthropogenic green house gas (GHG) emissions. An increase in global temperatures has been predicted to raise sea levels (from thermal expansion and melting land ice), change precipitation patterns, increase the frequency of extreme weather events (such as floods and droughts) and affect agricultural yields¹. Growing public concern about the predicted consequences of global warming is beginning to drive changes in many high GHG emission industries, with specific focus on carbon dioxide (CO₂), the primary GHG.</p> <p>As the largest direct emitter of carbon dioxide (an estimated 49%²) the energy industry is anticipated to undergo major structural changes over the next 10 years and beyond, to reduce these carbon emissions. The overwhelming majority of energy generated within Victoria currently comes from high carbon dioxide emission fossil fuels (primarily brown coal and natural gas). About 220 Peta Joules per annum of electricity are generated in Victoria by fossil fuels which represent about 92% of the state's total annual electricity generation¹². Transforming this industry to reduce carbon emissions will be a major challenge for Victoria but there are a variety of energy generation technologies that offer a means to reduce carbon dioxide emissions.</p> <p>One of the recommendations of the Switkowski Report⁹ released in December of 2006 was for Australia to consider nuclear power in a future strategy to cut carbon emissions. Nuclear power generation is not currently used in Australia but is an established technology; having existed for over 50 years it currently provides 7% of world power demand³. Broad public resistance to nuclear power in Victoria primarily stems from concerns over plant safety, long term storage of waste and a perceived link with weapons proliferation. Nuclear power generation within Australia is currently opposed by the federal opposition and many state governments⁴.</p> <p>Renewable energy sources (such as hydroelectricity, wind power, photovoltaic solar energy and geothermal energy) may also be considered in Victoria's future energy mix. Compared to the rest of Australia, Victoria has large community support for renewable energy. Currently 130,000 Victorian</p>
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	<p>households choose to buy more expensive renewable energy which represents almost half of the renewable energy households in Australia⁵. In spite of Victoria's example, the high cost of renewable energy means that it accounts for less than 5% of total energy production in Australia with the majority of this capacity (90%) coming from hydroelectricity¹³. By world standards, Australia currently has a low rate of renewable energy generation (for example, the European Union currently generates about 14% of power from renewable sources and has set a directive to increase this to 22.1% by 2010⁶). Although hydroelectricity, wind and solar energy all emit negligible carbon dioxide, all 3 technologies cause significant land pollution by occupying large areas per joule of electricity generated. Wind and solar energy also present the problem of intermittent power generation, which must be supplemented with complementary, reliable energy sources.</p> <p>A third option to reduce GHG emissions involves keeping current fossil fuel technologies but with an additional carbon capture and storage step called geo-sequestration. Technology for capturing carbon dioxide is well established but large scale CO₂ storage (in expended oil wells or saline aquifers) remains largely unproven. There are also safety concerns with subterranean carbon dioxide storage, related to a sudden CO₂ release. For example in 1986 volcanic action caused the release of large amounts of CO₂ swamp gas near Lake Nyos in the Cameroons. As carbon dioxide is heavier than air, it sank into neighbouring valleys up to 30km away and resulted in the asphyxiation of nearly 1700 people. Apart from safety concerns, the limited capacity for geo-sequestration represents a constraint for the technology. The largest point source emitters of CO₂ are on the eastern seaboard of Australia but the largest storage potential for geo-sequestration is in Western Australia. Consequently Australia is anticipated to have storage for about 27-31% (100-115 M tonnes per year) of current annual CO₂ emissions⁷. As a result, geo-sequestration of carbon dioxide currently represents only a partial solution to the problem of GHG emissions.</p> <p>Over the next 10 years, fossil fuels will remain as the dominant energy source within Victoria. Without refurbishment, coal and natural gas power stations can be expected to run for 30-35 years so significant changes to the technological division of energy generation can be expected to take several decades. What can be expected over the next 10 years is a shift in government policy to favour GHG reduction schemes and growth in the renewable energy sector. Given the diversity of promising energy generation technologies, it is difficult to make precise predictions about the long term energy generation mix. However it is clear is that no single energy technology offers a solution to the future energy generation needs of Victoria. An efficient and flexible electricity supply system should be based on a portfolio of generating technologies. The electricity market should be allowed to help the portfolio evolve to its most efficient form.</p>
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<p>3.3 Fundamental Assumptions: What current assumptions regarding this issue need to change?</p>	<p>Despite overwhelming scientific consensus that global warming is real and its consequences are serious¹ the current federal government has traditionally been slow to accept concerns about climate change and implement legislation to cut green house gas emissions⁸. Endorsement of the Switkowski Report⁹ by the Prime Minister and the commission of a working group into carbon emissions trading¹⁰ both herald a change in the federal government's position on global warming. These are encouraging signs because the traditional assumptions that the consequences of global warming have been overstated are incongruent with current expert opinion. Similarly, the notion that Australia should not contribute to carbon emission reduction at the expense of commercial advantages (principally low cost electricity) is increasingly becoming morally unacceptable to the Australian community. The assumption that high carbon dioxide emission industries can continue over the next decade with a 'business as usual' mentality is probably incorrect.</p>
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3.4 Key impacts on Melbourne in general and the "City of Melbourne" specifically

Impact		Risk*
1	Global failure to address climate change may have direct impacts on Melbourne in the form of raised sea levels, extreme weather events, species extinction and lower agricultural yields ¹ . As a developed country, Australia may be able to deal with these consequences better than many other nations but the indirect consequences of climate change may have more significant repercussions for	Low Risk High Impact

	Melbourne. For example large fractions of the world's population migrating as economic refugees is likely to instigate pandemics and wars.	
2	A long standing criticism of carbon emission reform and the Kyoto Protocol by the current federal government has been that many developing countries (such as China and India) have low emission reduction targets which gives them an unfair commercial advantage. This may cause a manufacturing shift overseas and result in job loss within Melbourne.	Medium Risk Medium Impact

*Summarise risk as High, Medium or Low in terms of their significance, their impacts and the likelihood of occurrence.

3.5 Cross Issue Influences

Supporting or countervailing effects other key issues listed could have on this issue:

Impact	Risk*
A critical commercial advantage for manufacturing within Victoria has traditionally been access to low cost electricity. Abundant sources of coal and natural gas have given Australia the 3 rd lowest average industrial electricity price of all OECD countries ¹¹ . It is estimated that nuclear power in Victoria would cost 20-50% more than current coal-fired power ³ . Renewable energy costs are higher again. Shifts away from high carbon emission power generation (like brown coal and natural gas) will raise Victorian electricity prices and concede this competitive advantage. Not only will this directly affect residential electricity prices but it will also constrict Victorian manufacturing and industrial sectors.	Medium Risk Medium Impact
Restructuring within any industry inevitably results in movement in the employment sector with accompanying job loss. As one of Victoria's largest industries, there are currently 8000-9000 Victorians directly employed in the energy industry ¹² , whose jobs may be placed at risk in any restructuring. Job loss may be offset by growth in the renewable energy sector.	Medium Risk Low Impact
Victoria's economy may be weakened by shifts within its energy sector. Victoria currently holds approximately \$A 25 Billion in energy industry assets and nationally the energy industry contributes about 1.5% to Australia's gross domestic product ¹³ .	Low Risk Low Impact

* Summarise risk as High, Medium or Low in terms of their significance, their impacts and the likelihood of occurrence.

3.6 Potential impacts on specific aspects of the City of Melbourne

Aspect and Impact	Risk*
Environmentally sustainability- Failure to implement energy industry reform may bring about climate change.	Low
Transport – ability to move people and freight- Higher electricity prices may indirectly raise transportation costs.	Low
Global positioning and linkages – Energy Industry reform will raise Victorian electricity prices and concede one of the regions major competitive advantages.	High
Melbourne's liveability – Failure to well manage the restructure of the energy industry may result in unreliable energy delivery and higher cost electricity to residential consumers.	Medium
Businesses and doing business – The energy industry best practice will be directly affected by energy reform. Down stream consumers may need to reform their business practice to accommodate their energy supplier's environmental restrictions.	Low

* Summarise risk as High, Medium or Low in terms of their significance, their impacts and the likelihood of occurrence.

3.7 Opportunities What opportunities arise as a consequence of any of the above?	<p>Most of the world is already trying to address climate change by reducing carbon dioxide emissions. Currently 166 countries have signed and ratified the Kyoto Protocol on climate change¹⁴. Those countries whose governments manage their energy sector transition consistently and monotonically will incur the minimal detriment in their economies. This provides Australia with an opportunity to secure a competitive over other nations by ensuring that changes to our energy sector are not disjointed.</p> <p>If government incentives are provided to reduce carbon dioxide emissions (in the form of carbon taxation or a carbon credits trading</p>
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	scheme ¹⁰) growth in the renewable energy sector may be expected.
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3.8 Key Sources and References

¹ Intergovernmental Panel on Climate Change Climate Change 2001: Working Group 1: The Scientific Basis, Part 7.

² Australian Greenhouse Office, 'National Greenhouse Gas Inventory' (2003)

³ Shihab-Eldin, A., 2002 'New Energy Technologies; Trends in Development of Clean and Efficient Energy Technologies', 8th International Energy Forum, Osaka

⁴ AAP 'Nuclear economics do not add up: Labor', The Age 30/12/06

⁵ Weekes, P. 'Clean and green Victoria leads way', The Sunday Age 17/12/06

⁶ Renewable Energy Generators of Australia (REGA), 2004 'International Trends in Renewable Energy'

⁷ Bradshaw et al 'The Potential for Geological Sequestration of CO₂ in Australia: Preliminary Findings and Implications for New Gas Field Development', APPEA Journal (2002) 25

⁸ The Age 'On a green wicket, Howard plays, and misses. He plays again . . .' 03/11/2006

⁹ Uranium Mining, Processing and Nuclear Energy Review, 'Uranium Mining, Processing and Nuclear Energy —Opportunities for Australia?'(2006)

¹⁰ The Financial Review 'PM pushes global climate pact' 14/11/2006

¹¹ Renewable Energy Generators of Australia (REGA), 2004 'Australia's Competitiveness and Electricity Prices'

¹² Calculated from statistics from Australian Bureau of Agricultural and Resource Economics (ABARE) (2005) Energy In Australia Commonwealth of Australia and Uranium Mining, Processing and Nuclear Energy Review, 'Uranium Mining, Processing and Nuclear Energy —Opportunities for Australia?'(2006)

¹³ Australian Bureau of Agricultural and Resource Economics (ABARE) (2005) 'Energy In Australia' Commonwealth of Australia

¹⁴ Status of Ratification. UNFCCC's Kyoto Protocol Background. Retrieved on December 13, 2006..