This online textbook provides free access to a comprehensive education and training package that brings together the knowledge of how countries, specifically Australia, can achieve at least 60 percent cuts to greenhouse gas emissions by 2050. This resource has been developed in line with the activities of the CSIRO Energy Transformed Flagship research program, which is focused on research that will assist Australia to achieve this target. This training package provides industry, governments, business and households with the knowledge they need to realise at least 30 percent energy efficiency savings in the short term while providing a strong basis for further improvement. It also provides an updated overview of advances in low carbon technologies, renewable energy and sustainable transport to help achieve a sustainable energy future. While this education and training package has an Australian focus, it outlines sustainable energy strategies and provides links to numerous online reports which will assist climate change mitigation efforts globally.

Chapter 1: Climate Change Mitigation in Australia’s Energy Sector

Lecture 1.2: Carbon Down, Profits Up – Multiple Benefits for Australia of Energy Efficiency
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The International Energy Agency forecasts that if policies remain unchanged, world energy demand is set to increase by over 50 percent between now and 2030.¹ In Australia, CSIRO has projected that demand for electricity will double by 2020.² At the same time, The Intergovernmental Panel on Climate Change (IPCC) has warned since 1988 that nations need to stabilise their concentrations of CO₂ equivalent emissions, requiring significant reductions in the order of 60 percent or more by 2050³. This portfolio has been developed in line with the activities of the CSIRO Energy Transformed Flagship research program; ‘the goal of Energy Transformed is to facilitate the development and implementation of stationary and transport technologies so as to halve greenhouse gas emissions, double the efficiency of the nation’s new energy generation, supply and end use, and to position Australia for a future hydrogen economy’.⁴ There is now unprecedented global interest in energy efficiency and low carbon technology approaches to achieve rapid reductions to greenhouse gas emissions while providing better energy services to meet industry and society’s needs. More and more companies and governments around the world are seeing the need to play their part in reducing greenhouse gas emissions and are now committing to progressive targets to reduce greenhouse gas emissions. This portfolio, The Sustainable Energy Solutions Portfolio, provides a base capacity-building training program that is supported by various findings from a number of leading publications and reports to prepare engineers/designers/technicians/facilities managers/architects to assist industry and society rapidly mitigate climate change.

The Portfolio is developed in three modules;

**Module A: Understanding, Identifying and Implementing Energy Efficiency Opportunities for Industrial/Commercial Users – By Technology**

Chapter 1: Climate Change Mitigation in Australia’s Energy Sector

Lecture 1.1: Achieving a 60 percent Reduction in Greenhouse Gas Emissions by 2050
Lecture 1.2: Carbon Down, Profits Up – Multiple Benefits for Australia of Energy Efficiency
Lecture 1.3: Integrated Approaches to Energy Efficiency and Low Carbon Technologies
Lecture 1.4: A Whole Systems Approach to Energy Efficiency in New and Existing Systems

Chapter 2: Energy Efficiency Opportunities for Commercial Users

Lecture 2.1: The Importance and Benefits of a Front-Loaded Design Process
Lecture 2.2: Opportunities for Energy Efficiency in Commercial Buildings
Lecture 2.3: Opportunities for Improving the Efficiency of HVAC Systems

Chapter 3: Energy Efficiency Opportunities for Industrial Users

Lecture 3.1: Opportunities for Improving the Efficiency of Motor Systems
Lecture 3.2: Opportunities for Improving the Efficiency of Boiler and Steam Distribution Systems
Lecture 3.3: Energy Efficiency Improvements available through Co-Generation

Module B: Understanding, Identifying and Implementing Energy Efficiency Opportunities for Industrial/Commercial Users – By Sector

Chapter 4: Responding to Increasing Demand for Electricity
Lecture 4.1: What Factors are Causing Rising Peak and Base Load Electricity Demand in Australia?
Lecture 4.2: Demand Management Approaches to Reduce Rising ‘Peak Load’ Electricity Demand
Lecture 4.3: Demand Management Approaches to Reduce Rising ‘Base Load’ Electricity Demand
Lecture 4.4: Making Energy Efficiency Opportunities a Win-Win for Customers and the Utility: Decoupling Energy Utility Profits from Electricity Sales

Chapter 5: Energy Efficiency Opportunities in Large Energy Using Industry Sectors
Lecture 5.1: Opportunities for Energy Efficiency in the Aluminium, Steel and Cement Sectors
Lecture 5.2: Opportunities for Energy Efficiency in Manufacturing Industries
Lecture 5.3: Opportunities for Energy Efficiency in the IT Industry and Services Sector

Chapter 6: Energy Efficiency Opportunities in Light Industry/Commercial Sectors
Lecture 6.1: Opportunities for Energy Efficiency in the Tourism and Hospitality Sectors
Lecture 6.2: Opportunities for Energy Efficiency in the Food Processing and Retail Sector
Lecture 6.3: Opportunities for Energy Efficiency in the Fast Food Industry

Module C: Integrated Approaches to Energy Efficiency and Low Emissions Electricity, Transport and Distributed Energy

Chapter 7: Integrated Approaches to Energy Efficiency and Low Emissions Electricity
Lecture 7.1: Opportunities and Technologies to Produce Low Emission Electricity from Fossil Fuels
Lecture 7.2: Can Renewable Energy Supply Peak Electricity Demand?
Lecture 7.3: Can Renewable Energy Supply Base Electricity Demand?
Lecture 7.4: Hidden Benefits of Distributed Generation to Supply Base Electricity Demand

Chapter 8: Integrated Approaches to Energy Efficiency and Transport
Lecture 8.1: Designing a Sustainable Transport Future
Lecture 8.2: Integrated Approaches to Energy Efficiency and Alternative Transport Fuels – Passenger Vehicles
Lecture 8.3: Integrated Approaches to Energy Efficiency and Alternative Transport Fuels - Trucking

Chapter 9: Integrated Approaches to Energy Efficiency and Distributed Energy
Lecture 9.3: Beyond Energy Efficiency and Distributed Energy: Options to Offset Emissions
Climate Change Mitigation in Australia’s Energy Sector

Lecture 1.2: Carbon Down, Profits Up – Multiple Benefits for Australia of Energy Efficiency

Educational Aim

The aim of this lecture is to demonstrate the business and economic case for action on climate change. Engineers and designers often need to convince business managers of the cost benefits of developing and implementing strategies to reduce energy demand and greenhouse gas emissions. It is important to be aware of the competitive advantage benefits to their organisation of taking a proactive stance on climate change. Business, government and other organisations are now committing to achieve significant greenhouse gas reductions like never before. This lecture will show that through energy efficiency, low carbon technology strategies, and carbon offsets, many companies and governments have achieved significant greenhouse gas reductions and cost savings. This lecture provides a contextual overview of the benefits of pursuing the strategies to be outlined in this portfolio - namely energy efficiency (Module A and B), low carbon technologies (Module C) and carbon offsets (Lecture 9.3). To highlight the critical relevance of this material to current practicing engineers this lecture highlights the wide range of business, government and civil society organisations now committing to becoming climate neutral. This lecture asks whether or not becoming climate neutral is now the new best practice standard, and overviews key economic studies which show that action on climate change will cost significantly less than inaction.

Essential Reading

Reference Page

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5 Peer review by Adjunct Professor Alan Pears – RMIT, and Molly Olsen and Phillip Toyne – EcoFutures Pty Ltd.
Learning Points

As many companies have already learned, acting on this issue is simply good business. Reducing our use of energy reduces costs... Inviting our employees to be active on this issue helps us recruit and retain the world's best. For us, as a media company - this is a chance to deepen our relationships with our viewers, readers, and web users. The debate is shifting from whether climate change is really happening to how to solve it. And when so many of the solutions make sense for us as a business, it is clear that we should take action not only as a matter of public responsibility, but because we stand to benefit.

Rupert Murdoch, Founder of News Corporation, 2007

1. There is growing demand for engineers, designers and other technicians with skills in helping companies, governments, schools, universities and other organisations to dramatically reduce the emissions of greenhouse gases in Australia and around the world. This training program provides the understanding required for organisations to become a climate leader in your sector. If organisations do not rapidly commit to developing and implementing a strategy to significantly reduce greenhouse gas emissions they will not only be left behind, but will eventually be forced to follow.

2. Numerous corporations have now committed to the goal of becoming 'Climate Neutral', meaning that overall their operations do not contribute greenhouse gases into the atmosphere resulting in climate change. High profile corporations which have committed to becoming climate neutral include News Limited, Australian Football League (AFL), Price Waterhouse Coopers, Westpac, Insurance Australia Group, Swiss Re, Bunnings Warehouse, KPMG Australia, ANZ Bank Group, and Channel Seven's Sunrise Breakfast TV Program.

3. In government, the climate leaders in Australia are Newcastle City Council - which has already reduced emissions by over 50 percent throughout its operations since the mid 1990s, and the City of Melbourne - which is working hard to achieve its goal of being climate neutral by 2020. Other local governments who have committed to becoming climate neutral include: Moreland City Council, Maribyrnong City Council, and the Yarra Ranges Shire Council. Councils such as Townsville City Council are focused on practical programs such as the national Solar Cities program to assist constituents to reduce energy demand and shift to renewable options.

4. There is a strong business case for a shift towards renewable options. Westpac's journey provides a good summary of why so many businesses are now making the commitment to become climate neutral. Westpac has already achieved a 45 percent reduction in greenhouse gas emissions on 1996 levels.

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In 2007, The Climate Group, reporting on Westpac, stated that.\textsuperscript{11} Since 1996 reductions in travel, paper and electricity use have cut the company’s GHG emissions by 45% on 1996 levels. In 2005-06, Westpac realized a 12% reduction by purchasing green power and integrating energy, water and emission performance indicators into facility managers’ contracts. Westpac is striving towards an ultimate goal of zero net emissions. Since 1993, Westpac has saved over US$7 million in energy costs and recently invested in a new headquarters designed to achieve optimal energy efficiency and minimal GHG emissions. As well as reducing its own carbon footprint, Westpac helps its customers reduce theirs – for example, through its green mortgage scheme. Its environmental credentials are also attracting new business and employees – 50% of graduates chose Westpac over other Australian banks explicitly because of its CSR approach.

5. This shift is not just occurring in Australia, it is global. Numerous corporations overseas are taking their contributions to global atmospheric pollution very seriously.\textsuperscript{12} Globally, companies that proactively commit to reducing greenhouse gas emissions find that not only does this cut their costs, but it can also increase the productivity of the business and create new sources of cost savings, as well as helping these businesses improve their competitive advantage and reduce risk.

6. This has been shown in The Climate Group’s 2006 report \textit{Carbon Down, Profits Up}.\textsuperscript{13} This report showed that 43 companies had significantly reduced their greenhouse gas emissions and saved a total of AUD$15 billion.\textsuperscript{14} The Climate Group also published a report on the leading cities around the world that are making similar savings to both costs and greenhouse gas emissions.\textsuperscript{15}

7. Many corporations are committing to achieving deep cuts in greenhouse gas emissions as part of their corporate strategy. There is now evidence that those companies that ignore these business opportunities risk losing significant market share. In 2005, Standards and Poors downgraded GM and Ford in the US market to junk-bond status while Toyota’s profits reached over US$14 billion more than GM or Ford due to a focus on energy efficient cars like the Hybrid Prius and the Toyota Corolla.\textsuperscript{16} GM\textsuperscript{17} and Ford\textsuperscript{18} ignored the hybrid car market in the 1990s and banked on people wanting to continue buying SUVs. GM and Ford now have hybrid cars available.

8. There are also significant government programs in most OECD countries working with hundreds to thousands of companies to assist them to meet their greenhouse gas reduction targets ahead of schedule and make money. Around the world there are practical government energy efficiency programs working with small to medium sized businesses and large energy users to help them achieve significant reductions in energy usage, such as the Queensland EPA Sustainable Industries Division EcoBiz Program.

\textsuperscript{14} Ibid.
9. “Such government programs are valuable because fields like energy efficiency are moving so fast that if firms have not checked what is best practice within six months they will probably be out of date. Most small businesses do not have the time or resources to source the best information, let alone the funds. It makes sense then for governments to address these information and market failures to help them implement resource productivity programmes wisely.”

10. The Australian Business Roundtable on Climate Change have published reports which further outline additional benefits for early action on climate change. These reports, published in April 2006, found that early action on climate change - to achieve a 60 percent reduction in greenhouse gas emissions by 2050 - can still achieve strong economic growth. Formed in 2005, the Business Roundtable is made up of CEOs from BP, Insurance Australia Group, Origin Energy, Swiss Re, Visy Industries, and Westpac, with The Australian Conservation Foundation. They found that early action on climate change is far better for business than delaying it.

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20 Ibid
Brief Background Information

There is rapidly growing demand from business and government for expertise across a number of fields in methods and practices to reduce greenhouse gas emissions. Numerous corporations have committed to becoming climate neutral, including high profile organisations like News Limited, Australian Football League (AFL), Price Waterhouse Coopers, Westpac, Insurance Australia Group, Swiss Re, Bunnings Warehouse, KPMG Australia, ANZ Bank Group, and Channel Seven’s Sunrise Breakfast TV Program. Virgin Airlines in Australia has launched a carbon offset option through which customers can choose to offset their emissions.21 Europcar Australia has partnered with Greenfleet to offset the carbon emissions of every new vehicle that is added to its fleet. Companies like BP, ACTEW/AGL, Origin Energy, and Virgin Airlines have already got low carbon/climate neutral products accredited with the Australian Greenhouse Office’s (AGO) ‘Greenhouse Friendly’ accreditation scheme.22 Fuji Xerox Australia recently announced that it will soon run its company sites on 100 percent green power from renewable energy sources, and over the next four years the company will be increasing its use of renewable energy-based power by 25 percent annually, aiming to purchase 100 percent green electricity by the year 2010.

With the increased severity of drought, likely due to climate change, organisations across the water services sector are also examining climate neutrality. Melbourne’s water authorities are leading the way by working towards becoming climate neutral such as City West Water through a public commitment in March, 2007 that it will become carbon-neutral. Other water authorities such as Melbourne Water, Yarra Valley Water and South East Water are also working towards carbon-neutrality, but are yet to set a target. A recent survey by Yarra Valley Water showed 74 percent of its customers supported efforts to go carbon neutral, even if it meant water bills would cost more.

In government, the Climate Leaders are Newcastle City Council - which has already reduced emissions by over 50 percent throughout its operations since the mid 1990s, and the City of Melbourne - which is working hard to achieve its goal of being climate neutral by 2020.23 Other local governments to commit to becoming climate neutral include Moreland City Council,24 Maribyrnong City Council25 and the Yarra Ranges Shire Council.26 Councils such as Townsville City Council are also focused on practical programs such as the national Solar Cities program to assist constituents to reduce energy demand and shift to renewable options. This level of will for action on climate change has only grown further since Al Gore led a global concert, ‘Live Earth’, lasting 24 hours, with some of the biggest stars in the entertainment industry on seven continents on the 7th of July 2007 (07.07.07).

The demand for engineers, planners, designers and other technicians with skills in helping companies, governments, schools, universities and other organisations rapidly reduce greenhouse gas emissions and seek to become climate neutral in Australia and around the world is likely to grow rapidly in the near future. Companies that adopt such goals find that not only does a commitment to behave in more sustainable ways cut their costs, but it can also increase the productivity of the business and create new sources of cost savings. This has been shown in The Climate Group’s


Prepared by The Natural Edge Project 2007 (Hosted by GU and ANU)
This report showed that 43 companies had significantly reduced their greenhouse gas emissions and saved a total of AUD$15 billion.\footnote{See The Climate Group’s 2004 and 2005 Carbon Down Profits Up reports at www.theclimategroup.org/index.php?pid=732. Accessed 14 April 2007.} The Climate Group also published a report on the leading cities around the world that are making similar savings to both costs and greenhouse gas emissions.\footnote{Ibid.} Using energy more efficiently offers an economic bonanza because saving fossil fuel is a lot cheaper than buying it. Since the early 1990s, The Climate Group’s reports\footnote{The Climate Group (2007) Low Carbon Leader: Cities, The Climate Group. Available at http://theclimategroup.org/assets/resources/low_carbon_leader_cities.pdf. Accessed 14 April 2007.} have shown that six major firms – Dupont, IBM, British Telecom, Alcan, NorskeCanada and Bayer – have collectively saved over US$4 billion while reducing their carbon emissions by more than 60 percent. DuPont was able to achieve such significant overall reductions in GHG emissions largely by a focus on reducing and replacing the non CO\textsubscript{2} GHGs, such as HFCs, PFCs, CH\textsubscript{4} (shown in Figure 1.2.1 as the middle line) and NO\textsubscript{2} (the top line in Figure 1.2.1).

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure1_2_1.png}
\caption{Global GHG emissions for DuPont (1990 – 2004)}
\end{figure}

\textit{Source:} DuPont Inc.

The Climate Group’s report also showed that STMicroelectronics (ST) have pledged to zero net CO\textsubscript{2} emissions with a 40-fold increase in production over its 1990 levels, and set a 2010 goal of 50 percent reductions in greenhouse gas emissions. This includes a mix of 15 percent from renewable energy, 55 percent from co-generation and 30 percent from conventional sources. By the time ST is climate neutral, it will have saved US$900 million. Perhaps more important, ST’s commitment to this goal has driven the company’s innovation, taking the company from being the number twelve chipmaker in the world to the number six. In 2007 ST have stated on their website that they believe that a focus on what they are calling “Sustainable excellence’ reflects the, ‘belief we have in our ability to evolve, to improve and to respond to the expectations of our stakeholders, which will make our company ‘sustainable’ and enable us to contribute to sustainable development at a global level’.\footnote{See The Climate Group’s 2004 and 2005 Carbon Down Profits Up reports at www.theclimategroup.org/index.php?pid=732. Accessed 14 April 2007.}
Barclays Bank, Marks & Spencer and BSkyB are all a part of forty top British companies who, in early April 2007, launched an unprecedented campaign to shrink Britain's carbon footprint, by cutting their own energy use and trying to turn 'green consumerism into a mass movement'. The initiative - launched by Tony Blair - aims to counter a widespread feeling of helplessness among people who want to act to combat climate change, but fear that any contribution they make will be too small to make any difference. It is being spearheaded by some of the country's best-known brands, including Tesco, Marks & Spencer, BSkyB, HSBC, the BBC, B&Q and 02, working with the Prime Minister's office, the National Consumer Council and the Church of England. Top businessmen - Sir Terry Leahy, chief executive of Tesco, and James Murdoch, chief executive of BSkyB - are intimately involved. The companies at the heart of the plans have all promised to clean up their own operations as a precondition of the campaign. 'Our philosophy is that we will not ask customers to do something that we have not done', said one. BSkyB, for example, has cut greenhouse-gas emissions from its sites by 47 percent, buys all its electricity from renewable sources and has announced its intention to go carbon neutral.32

**Improving Competitive Advantage**

As Philip Stephens wrote this year in the UK Financial Times,33

*Business is about to discover that the shift towards a low-carbon economy is irreversible. Going green is about staying competitive. The steady trickle of companies signing up to do their bit to reduce carbon emissions is turning into a sizeable river.*

Many leading companies are showing that action on climate change can help improve bottom line competitiveness while providing benefits to the company's brand and reputation. Leading companies, like Toyota and Westpac, are implementing sustainable business practices as part of their corporate strategy in the light of growing calls for corporate social responsibility, and are now basing a significant part of their marketing on their corporate sustainability performance. There is now evidence that those companies that ignore these business opportunities risk losing significant market share:

- In May 2005, General Electric, announced 'Ecomagination', a major new business driver expected to more than double revenues from cleaner technologies to US$20 billion by 2010 (from US$6.2 billion in 2004). In May 2006, the company has already reported revenues of US$10.1 billion from its energy efficient and environmentally advanced products and services.

- Wal-Mart announced in 2006 a US$500 million climate change commitment, including initiatives to increase truck fleet fuel efficiency by 25 percent in three years and double it in ten. They projected that such efficiency improvements will reap significant bottom line benefits for Wal-Mart, making it even tougher for their competitors to compete. In addition Wal-Mart has developed a strategy to influence its 60,000 suppliers to produce lower carbon products.36

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34Ibid.


UK Business and Government Leadership Improves Competitive Advantage

There are now significant government programs in most OECD countries working with hundreds to thousands of companies who are meeting their greenhouse gas reduction targets ahead of schedule and making money. The UK was one of the first countries to implement a national emissions trading scheme and a carbon tax, and they did it in such a way that it has helped business competitiveness overall rather than harming it. In the UK, heavy energy using companies can apply to sign a Climate Change Agreement (CCA) Program37 whereby a company agrees to commit to achieving a certain carbon reduction target or improving their energy efficiency, and in return receives exemption from 80 percent of the carbon tax. Over 12,000 large energy using UK companies have performed far better than expected in cutting emissions of carbon dioxide.38 In 2002, thousands of companies achieved cuts totalling nearly three times above the agreed targets, and the CCAs have been very successful in improving energy efficiency in the existing sectors. In aggregate the UK companies have beaten their targets by the equivalent of 1 million tons of carbon (MtC) a year in the first target period (to 2002) and by 1.4 MtC a year in the second target period (to 2004).39 Through this process these businesses are saving over US$650 million from reducing greenhouse gas emissions.40 Economic modelling by the UK Treasury department has found that the UK’s approach to addressing climate change, which has encouraged business to become more energy efficient, has helped economic growth rather than harmed it.

Similar results are being achieved in the USA. Nearly 100 case studies charted by the Center for Energy & Climate Solutions for the Cool Companies Project demonstrate how one business after another is earning the equivalent of 40 to 50 percent returns on energy saving investments.41 Savings bring not only lower costs, but also measurable, documented productivity gains through improved product quality and employee morale. The US Pew Center on Global Climate Change42 partner companies are also meeting targets ahead of schedule and making money, as are the companies involved in the US EPA’s Climate Leaders program.

In Australia companies in the Australian Greenhouse Office’s Greenhouse Challenge, and Department of Industry Tourism Resource’s Energy Efficiency Best Practice, and now the Energy Efficiency Opportunities program43 have exceeded expectations. This program builds on from work by the department with businesses between 1999-2004, which showed that 30-70 percent energy efficiency savings are possible in most industry sectors in Australia. There are now several government and private sector schemes around the world working with thousands of companies that are meeting their greenhouse gas reduction targets ahead of schedule, as well as reducing costs and increasing profits.

42 See Pew Center on Global Climate Centre at www.newclimate.org/companies_leading_the_way_belc/targets/, Accessed 20 April 2007.
It is time for a more sophisticated approach in Australia towards competitive advantage for business and climate change issues. Professor Michael Porter from the Harvard Business School, and author of many books on business competitiveness, has written that,\(^{44}\)

*Our central message is that the environment-competitiveness debate has been framed incorrectly. The notion of inevitable struggle between ecology and the economy grows out of a static view of environment regulation, in which technology, products, processes, and customer needs are all fixed. In this static world, where firms have already made their cost-minimizing choices, environmental regulation inevitably raises costs and will tend to reduce the market share of domestic companies on global markets. Managers must start to recognize environmental improvement as an economic and competitive opportunity, not as an annoying cost or an inevitable threat. Environmental progress demands that companies innovate to raise resource productivity - precisely the new challenge of global competition. It is time to build on the underlying economic logic that links the environment, resource productivity, innovation, and competitiveness.*

**Managing Risk and Liability**

Most leading corporations around the world are taking action on climate change and positioning themselves for the booming markets in greenhouse friendly products. Companies that do not act now will be left behind and eventually forced to follow in one way or another. Hence, more than ever, competent greenhouse gas management is becoming a proxy for competent corporate governance. By taking a leadership position in dealing responsibly with climate change businesses will be positioning themselves for new emerging markets and also ahead of likely changes to regulations and government incentives. Post the UK *Stern Review*\(^{45}\) it is clear that significant action on climate change from governments nationally and globally is warranted to correct what Stern described as, ‘the biggest market failure ever – climate change’.

A pro-active position on climate change also assists to address other risks for business. In a world that overwhelmingly recognises climate change as a serious threat, behaviour that ignores it is coming to be seen as irresponsible. In 2003 the *Columbia Journal of Environmental Law* published an article\(^{46}\) demonstrating the legal feasibility of lawsuits holding companies accountable for climate change. The effects of such have already started, with Friends of the Earth (FoE), in conjunction with Greenpeace and several western cities, filing one of the first climate change lawsuits in 2006. The suit charges two US government agencies with failing to comply with the National Environmental Policy Act (NEPA) requirements to assess the environmental impact of projects they financed over the past decade. The states of Connecticut, Massachusetts, and Maine have also filed a climate change lawsuit against another US government bureau, the Environmental Protection Agency, for failing to regulate carbon dioxide emissions under the Clean Air Act.

In 2003, the *Wall Street Journal* reported that, ‘with all the talk of potential shareholder lawsuits against industrial emitters of greenhouse gases, the second largest re-insurance firm, Swiss Re, has announced that it is considering denying coverage, starting with director’s and officer’s liability


policies, to companies it decides aren’t doing enough to reduce their output of greenhouse gases.”

In the United States, the new Sarbanes-Oxley Act makes it a criminal offence for a company board of directors to fail to disclose environmental liabilities (including greenhouse gas emissions) that could alter a reasonable investor’s view of the organisation. In France, The Netherlands, Germany and Norway, companies are required by law to publicly report their greenhouse gas emissions.

In an era of instant global communication, corporations and organisations can have their activities broadcast to an audience of millions, and risk swiftly losing their reputation. A 2004 survey of some of the world’s leading CEOs, undertaken by the World Economic Forum at Davos, found that the responding leaders felt that corporate reputation is now a more important measure of success than stock market performance, profitability, and return on investment. Only the quality of products and services edged out reputation as the leading measure of corporate success. Fifty-nine percent of the respondents estimated that corporate brand or reputation represents more than 40 percent of a company’s market capitalisation.

**The Business Case for Early Action on Climate Change**

The Australian Business Roundtable on Climate Change have published reports which further outline additional benefits for business or early action on climate change. These reports, published in April 2006, found that early action on climate change, to achieve a 60 percent reduction in greenhouse gas emissions by 2050, can still achieve strong economic growth. Formed in 2005, the Business Roundtable is made up of CEOs from BP, Insurance Australia Group, Origin Energy, Swiss Re, Visy Industries and Westpac with The Australian Conservation Foundation. They found that early action on climate change is far better for business than delaying it. Specifically, the economic modelling they commissioned found that:

- GDP still continues to grow 2.1 percent pa and by 2050 will increase from AUD$0.8 trillion in 2005 to AUD$2 trillion in 2050. This occurs while Australia reduces emissions by 60 percent. Australian Bureau of Agriculture and Resource Economics’ (ABARE) modelling shows GDP continuing to grow by around 2.1-2.2 percent pa with a 15-40 percent reduction in emissions.
- Real income per person is more than AUD$15,000 higher than it was in 2005. Put another way, in 1984 Australian GDP per person was AUD$22,000 and it is now AUD$44,000. Even if we reduce emissions by nearly two thirds this would double again to AUD$88,000 by 2050.
- Employment would grow by 38.7 percent over the period of 2050, leading to the creation of 3.5 million jobs by 2050.
- Electricity costs would be lower as business invests earlier in low and zero emission technologies, when compared to taking delayed action. Future electricity price rises would be three times higher in the delayed action scenario in comparison with the early action scenario.

Conversely if action on climate change is delayed in Australia then the costs of adoption will be far greater to business and governments at all levels, leading to a major disruptive shock to the

49 In Germany, only ‘heavy’ industry is required to report greenhouse gas emissions.
52 Ibid
Australian economy. The Australian Business Roundtable found that GDP growth would be limited to an average of 1.9 percent pa to 2050, or AUD$1.84 trillion, and employment growth would only be 36.2 percent (250,000 fewer jobs created) in the delayed action scenario.

The UK Stern Review’s conclusions on the effect of climate change on economic growth align well with the findings of the Australian Business Roundtable on Climate Change. The key message from the UK Stern Review, as with the Roundtable, is that climate change poses a significant risk to the world economy and it will be cheaper to proactively address the problem than to deal with the consequences of inaction. Specifically the Stern Review concludes that 1 percent of global gross domestic product (GDP) per annum is required to be invested in order to avoid the worst effects of climate change, and that if we do not act, this could risk global GDP being up to twenty percent lower than it otherwise might be.53

The Australian Business Roundtable on Climate Change found that delayed action on climate change would also put significant sectors of the Australian economy at risk, wreaking havoc with major tourist destinations, and hitting agriculture and forestry sectors hard with increasing risks of regular bush fires, and a decrease in water flows. This result has been corroborated by the IPCC’s recent national assessment of Australia.54

The work of the Australian Business Roundtable on Climate Change has not only received significant support from business leaders but also from over 200 University economists who signed a statement in May 2007 supporting the Roundtables’ economic claims. The University Economists on Climate Change stated that,55

Global climate change carries with it serious environmental, economic and social risks and preventive steps are urgently needed. Policy measures are available that would greatly reduce emissions of carbon dioxide and other greenhouse gases at modest economic cost. Credible estimates suggest that a 50% emissions reduction is achievable for less than one year’s economic growth. A major change in our emissions-related activities can be achieved over an extended period of transition. Australia has shown over the last two decades that it can manage significant change without major negative consequences for

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incomes or employment and, in fact, with change being a stimulus to improving innovation in the longer term.

This provides further evidence that the goal of the CSIRO Energy Transformed Flagship of reaching 60 percent greenhouse gas reductions by 2050 is not only technically achievable, but also economically achievable.
Optional Reading


