CASE STUDY OF A SUCCESSFUL AUSTRALIAN NATIONAL ENERGY PROGRAMME/STRATEGY

LOW EMISSION TECHNOLOGY

1. The problem or issue addressed:

Australia is committed to pursuing an effective global response to climate change. Energy production and use is the major source of greenhouse emissions globally and in Australia. Energy accounts for 68 per cent of Australia's emissions profile and this percentage is rising. Energy sector emissions must be reduced as part of any effective global climate change response.

The Australian Government is also committed to maintaining and growing Australia's strong and internationally competitive economy in a sustainable manner. The achievement of these two commitments will require the Australian Government to address future emissions from energy generation as a priority.

Whatever the future shape of international action on climate change, it is prudent for Australia to take practical action now to prepare our economy and society for the future. The Australian Government views the development and deployment of a suite of practical low emissions technologies (such as clean coal technologies and renewable energy) as an important step towards meeting the challenge of reducing Australia's emissions while meeting future energy demands and maintaining living standards. In order to develop these new technologies, the Australian Government has identified the reduction and capture of emissions from energy generation as a priority goal of Australia's National Research Priorities.

2. Name of the programme:

The activities outlined in this case study encompass a broad range of policy initiatives concerning low emission technologies

3. Timeframe:	years	Year started:
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4. Status: X Ongoing Completed in year _____

5. Main objectives:

In 2004, the Australian Government issued an energy policy statement, entitled *Securing Australia's Energy Future*. To achieve energy prosperity, security and sustainability, the Australian Government has put in place policies to:

- a. attract investment in the efficient discovery and development of our energy resources for the benefit of all Australians
- b. deliver a prosperous economy while protecting the environment and playing an active role in global efforts to reduce greenhouse emissions
- c. encourage development of cleaner, more efficient technologies to underpin Australia's energy future

- d. develop effective and efficient energy markets that deliver competitively priced energy, where and when it is needed into the future
- e. minimise disruptions to energy supplies and respond quickly and effectively when disruptions occur
- f. establish an efficient energy tax base, restricting fuel excise to end use and applying resource rent taxes to offshore projects
- g. ensure Australia uses its energy wisely.

The following case study is an example of how Australia is giving effect to its energy policy goals, particularly in relation to elements (b) and (c).

6. Lead institution:

Australian Government Department of Industry, Tourism and Resources

7. Other implementation arrangements and stakeholders involved:

8. The results achieved

Specific Initiatives

Since 1997, the Australian Government has allocated over AU\$1.8 billion towards a comprehensive approach to greenhouse abatement including a range of programmes to promote energy efficiency; the development and uptake of low emissions technologies; reductions in transport emissions; and non-energy abatement measures.

Domestic and global advances in low emissions energy technologies are reducing the costs of producing and using energy with reduced greenhouse gas emissions. The Australian Government provides substantial support for innovation across all sectors of the economy, including the energy sector. Through *Backing Australia's Ability: Building our future through science and innovation*, a further AU\$5.3 billion will be provided for science and innovation over the period 2004-2011.

In 2001–2002, the Australian Government spent AU\$223 million on energy innovation—which was nearly five per cent of the research and development budget for that year. The National Research Priority Goal was established in 2002 to 'reduce and capture emissions in transport and energy generation'. The Australian Government's major research organisation – the Commonwealth Scientific and Industrial Research Organisation (CSIRO) - established *Energy Transformed* as one of its seven flagship programmes and received significant additional funding. Research centres, funded through the Australian Research Council include the Key Centre for Photovoltaic Engineering at the University of New South Wales. Cooperative Research Centres, which involve partnerships between industry, government research organisations and universities are currently funded for the development into energy technologies for brown coal, black coal and also for the geological storage of CO₂.

In Securing Australia's Energy Future the Australian Government announced several new measures to promote low emissions technology. These include:

- AU\$500 million over 15 years through the Low Emissions Technology Development Fund which will provide support for demonstrating new low emissions technologies with significant long-term abatement potential. The fund is technology neutral which means that a range of technologies, including fossil fuel, renewable energy, transport sector and energy efficiency are potentially eligible for support. The Fund is designed to encourage at least AU\$1 billion in additional private sector investment.
- AU\$100 million over seven years will be allocated to the Renewable Energy Development Initiative to promote the commercialisation of renewable energy technologies, systems and processes.
- AU\$20 million will be provided to support development of advanced electricity storage technologies, including batteries, electro-mechanical and chemical storage. Important renewable energy technologies, including wind and solar, produce electricity intermittently, which can reduce their commercial attractiveness and ability to contribute to the electricity system. Breakthroughs in storage could accelerate renewable energy use.

Australian industry has been a major partner in many of the low emission technology initiatives. A major collaboration is COAL21 which is a partnership between the coal and electricity industries, Australian Federal and State Governments and the research community. It commenced in 2003 when the Australian Coal Association issued invitations to participate in a process aimed at first identifying and then realising the potential for reducing or eliminating greenhouse gas emissions that arise from the use of coal in electricity generation in Australia. While a number of priority technologies have been identified in the COAL21 Action Plan, primary focus is on further development and deployment of breakthrough technologies capable of delivering major reductions or even near zero emissions. The range of technologies associated with carbon dioxide (CO₂) capture and geological storage (also known as geosequestration) are identified as the key to achieving deep cuts or even near zero emissions in coal-based electricity generation.

Progress to date

Technical progress has been in a number of areas as a consequence of initiatives by Australian Government and industry over the past decade.

A study into the potential for geological storage of CO_2 in Australia has identified 65 sites which are considered to be environmentally sustainable for CO_2 injection and have the capacity to meet the volume requirements of neighbouring CO_2 sources. Recent developments have included:

- Formation of an international partnership to conduct a detailed feasibility study for demonstration of oxy-fuel combustion;
- Commencement of a detailed feasibility study for Australia's first black coal Integrated Gasification Combined Cycle (IGCC) power plant with carbon capture and storage (CCS);
- Progress with the Victorian brown coal Integrated Drying Gasification Combined Cycle (IDGCC) power project;
- A feasibility study for a brown coal advanced gasification power station;
- Progress towards a scaled-up Mechanical Thermal Expression (MTE) pilot plant ;

- Advanced planning for Australia's first CO₂ injection and storage pilot scale project; and
- Development of a set of regulatory principles to establish the basis for a nationally consistent framework for CO₂ capture and geological storage.

Australia is also undertaking research into a range of renewable energy technologies and is at the forefront of the international research in the fields of photovoltaic technology and hot rock geothermal energy.

The Centre for Photovoltaic Engineering at the University of New South Wales is undertaking research into improved crystalline and thin film silicon cell efficiencies. In conjunction with industry licensees, the Centre is working on improved manufacturing processes for its laser grooved cell technology. With industry support, the Centre for Sustainable Energy Systems at the Australian National University is developing a new thin film photovoltaic technology which uses just one tenth of the costly silicon used in conventional photovoltaic panels.

Until recently, Australia has not been considered a particularly prospective site for geothermal energy as it is situated in the middle of a geological plate with no recent volcanism. However recent research by industry and government organisations supported by an Australian Government R&D grant has demonstrated that the prospects for recovering energy from hot rock geothermal resources located up to five kilometres underground are far better than had originally been assumed. One important development has been the discovery that it is possible to recover a relatively large amount of heat from each drill hole as the rocks have not been subjected to folding as typically occurs in volcanic areas. Heat extraction of up to 15 MW (thermal) is presently being obtained from two interconnected wells under a reservoir testing programme. This programme is scheduled to be followed by the establishment of a 13 MW (electric) demonstration plant in 2006.

9. The relationship of the programme to internationally agreed goals and targets:

With major reserves of coal and natural gas, and as a major exporter of coal and LNG, it is appropriate that Australia be investigating ways of capturing and storing CO_2 . However, given that carbon dioxide capture and storage is yet to be successfully demonstrated in Australia, it is also important for Australia to examine a range of other low emission technologies.

At the Energy and Environment Ministerial Roundtable in London in March 2005, there was common ground on the need to diversify energy sources recognizing that there is no one silver bullet solution, and that each country needs to find the mix of technologies and energy systems appropriate to its national circumstances. In doing so, Ministers were giving effect to paragraph 20 of the Johannesburg Plan of Implementation, and more specifically paragraph 20 (e), which calls on governments to diversify energy supply by developing advanced, cleaner, more efficient, affordable and cost-effective energy technologies.

Australia's relatively small economy means that international engagement and collaboration provides an important means for accessing new technology, promoting Australian innovation,

and influencing the development and acceptance of new technologies to meet Australian priorities. Key international technology collaborations include:

- Participation in international energy technology and policy through the International Energy Agency (IEA) As an IEA member, Australia has access to technology developments and the outcomes of international collaboration in energy technology. The IEA also promotes the development and deployment of energy technologies through a framework of over 40 implementing agreements (IAs). These enable experts from different countries to work collectively and share results, which are usually published. Through participation in IAs, Australia is able to share the cost of research, pool scientific and technical results, access the expertise and training of foreign participants in projects, and demonstrate Australian expertise and skills. Australia is currently a member of 15 IAs, covering renewable energy, fossil fuels, energy end-use and fusion power.
- Member of the APEC Energy Working Group which includes as one of its seven key objectives 'facilitating energy technology development, exchange, application and deployment'.

Australia has also entered into bilateral climate change partnerships with several countries including the US, China, Japan, EU and New Zealand which include collaboration on low emission technologies.

In addition, Australia is also involved in several multilateral partnerships which are focussed on specific low emission technologies.

- Australia is one of 18 members participating in the Carbon Sequestration Leadership Forum (CSLF) which is an international climate change initiative that is focusing on development of CCS technologies as a means to accomplishing long-term stabilisation of greenhouse gas levels in the atmosphere. The purpose of the CSLF is to make these technologies broadly available internationally; and to identify and address wider issues relating to carbon capture and storage. This initiative is designed to improve CCS technologies through coordinated research and development with international partners and private industry. This could include promoting the appropriate technical, political, and regulatory environments for the development of such technology.
- Australia is also a participant in the Methane to Markets Partnership, which is an international initiative that focuses on advancing cost-effective, near-term methane recovery and use as a clean energy source. The Partnership is designed to promote collaboration between developed and developing country partners with strong participation from the private sector to enhance economic growth, improve energy security and reduce greenhouse gas emissions. It aims to promote the adoption of existing technologies focussing on methane emissions from coal mines, landfills and the oil and gas sector.
- Another multilateral collaborative organisation in which Australia participates is the Renewable Energy and Energy Efficiency Partnership. The Partnership includes governments, businesses and other organisations and aims to accelerate the development of renewable and energy efficiency systems. It seeks to facilitate the development of supportive policies and regulations amongst partner countries by promoting information sharing and raising awareness of the economic benefits of renewable energy sources. The Partnership also works with financial institutions to promote more innovative financing mechanisms for renewable energy technologies.

• Australia is also a member of the International Partnership for the Hydrogen Economy which aims to serve as a mechanism to organise and implement effective, efficient, and focused international research, development, demonstration and commercial utilisation activities related to hydrogen and fuel cell technologies. It also provides a forum for advancing policies, and common codes and standards that can accelerate the cost-effective transition to a global hydrogen economy to enhance energy security and environmental protection.

Further information

Commonwealth of Australia (2004). Securing Australia's Energy Future http://www.pmc.gov.au/publications/energy_future/index.htm

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Australian Coal Association, Coal 21 – Reducing greenhouse gas emissions from coal-based electricity generation http://www.coal21.com.au/index.php

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Australian Greenhouse Office. International Climate Change Partnerships <u>http://www.greenhouse.gov.au/international/partnerships/index.html</u>

International Energy Agency. http://www.iea.org/

APEC Energy Working Group http://www.apecenergy.org.au/index.cfm?event=object.showHome