

GARNAUT CLIMATE CHANGE REVIEW ISSUES PAPER 4
Research and Development: Low Emissions Energy Technologies

NSW GOVERNMENT SUBMISSION

BACKGROUND

This submission responds to some of the questions raised in Issues Paper 4, drawing on the NSW Government's experience with innovation and research, development and deployment (RD&D) in the energy industry.

As noted in the *Final Framework Report* of the National Emissions Trading Taskforce ("NETT Report", 2007), new low-emissions technologies are likely to be needed to achieve significant emissions reductions in all major emitting sectors. An emissions trading scheme will set a price for carbon, but this may not be sufficient to ensure the development and deployment of technology to support ongoing emissions reductions for some time. That is, the 'technology pull' established by a long-term price path will need to be supplemented by an active 'technology push'. RD&D of new low-emissions and zero emission technologies will be an essential complement to emissions trading in both the covered and non-covered sectors.

KEY POINTS ADDRESSING QUESTIONS RAISED IN THE ISSUES PAPER

Item 3. How Innovation Happens

What is the role of an emissions trading scheme in driving innovation?

How large are the market failures in innovation?

Are there alternative frameworks that may be useful in the processes of policy analysis and development?

Australia's relatively small size in the global economy means that it cannot be a leader in all technologies and it must carefully consider its unique needs and capacities. The NSW Government uses a framework for assessing whether to assist potential new energy projects from a strategic point of view:

- (a) active projects in Australia;*
- (b) fast follower approach participating in international efforts; or*
- (c) watching brief¹*

This framework takes a strategic view as to the likely economic and environmental benefits to Australia and whether technologies and research are worth investing in. Australia should generally focus on RD&D support in areas in which Australia has a strategic interest and cannot rely on international activity

¹ See for example Wyld Group (2007), *Discussion Paper - High Temperature Solar Thermal (HTST) Technologies, Market Potential and Innovation Opportunities*, Prepared for the New South Wales Department of Environment and Climate Change and Victorian Department of Primary Industries, www.greenhouse.nsw.gov.au/_data/assets/pdf_file/0005/9455/HTST_Discussion_Paper_FINAL_07-10-03.pdf

(e.g. because the technology is geographically or resource dependent) and/or has a sustainable technological edge. For technologies in which Australia has a strategic interest but which can be developed elsewhere, Australia may wish to adopt those technologies when available and focus on supplementing international developments.

As noted in the NETT Report, the emphasis on ‘push’ or ‘pull’ mechanisms varies depending on the stage of development of the particular technology. An emissions trading scheme will assist with the commercialisation and diffusion of new technologies, whilst complementary measures, such as funding and support, are likely to be needed in the earlier phases of development. Early research undertaken for the NSW Innovation Council, consistent with the Review of the National Innovation System, has also highlighted opportunities for targeted policy measures in the later stages of the innovation chain.

The scale and speed of change required to address the economic challenges of climate change are also likely to require more targeted intervention by governments in the initial stages of an emissions trading scheme. The actual need for RD&D support in particular sectors will need to have regard to, amongst other things, existing and prospective local and overseas RD&D activity, and the availability of venture capital to support such activity.²

There is significant potential for innovation in the energy sector. The prospect of a carbon price is already driving new directions in the Australian resources and power industry, such as industry investment in the development of clean coal technologies (including the COAL 21 fund). Significant industry funding is also being provided to accelerate the diffusion and uptake of innovations from other jurisdictions. The Commonwealth and state and territory governments are already providing significant RD&D support for the stationary energy sector, including in the areas of clean coal and renewable generation technologies.

Item 4.1 Policy clarity, continuity and coherence

How can Australian governments improve policy clarity, continuity and coherence for businesses looking to invest in new energy technologies, or in other sectors with the potential to contribute to mitigation or adaptation?

How will this be improved with the implementation of an Australian emissions trading scheme? What areas of uncertainty might remain?

Australian governments have recognised that an effective national response to climate change encompasses, amongst other things, a nationally-consistent set of climate change measures to support the emissions trading scheme. They have agreed through COAG to review their existing complementary measures, including RD&D, to achieve this end and to base new measures on agreed principles, which will assist to ensure a streamlined policy approach across Australia. Governments’ reviews will look at the areas in which it makes sense to have a single national policy, or consistent policies across jurisdictions, so as to minimise costs to the economy. Governments have already agreed that there should be one renewable energy policy – the Commonwealth’s expanded MRET.

² See for example the article in the Economist, 28th February 2008, “From Geeks to Greens”, which reports that “Executives are switching in droves from the computer industry to clean-technology firms.”

Co-ordination and joint initiatives between the Commonwealth and State governments will contribute to setting consistent policy signals and would leverage efforts from both jurisdictions. For example the Commonwealth Government previously successfully operated a targeted energy research and development function through the Energy R&D Corporation (ERDC), with which the NSW Government SERDF collaborated on some projects (see examples below in 5.1).

Item 5.1 National public good research

What criteria, processes and institutional structures are most desirable for allocating funding to public good research?

What types of reforms are needed to ensure that public funding is allocated to the most appropriate and highest-value uses?

The Issues Paper notes that basic research often leads to outcomes with no immediate commercial return, but that is widely applicable and easily transferable. Experience from some energy R&D funding programs in Australia has been that although the research and development phase occurs in Australia, the commercialisation stage is often undertaken overseas. Some examples include:

- BP Solar established its high efficiency photovoltaic solar cell manufacturing plant in Spain, near to markets to its own R&D headquarters. This commercialised R&D undertaken at the University of NSW funded by the NSW and Commonwealth Governments.
- Pacific Solar is commercialising its thin film photovoltaic cell technology in Germany, supported by a substantial industry development grant from the German Government. The technology was originally piloted at a plant in Sydney, after R&D undertaken at the University of NSW, supported by funding from the NSW and Commonwealth Governments.
- The solar thermal electricity generation technology developed at the University of Sydney and funded by NSW and Commonwealth Governments, was being commercialised by a local company, Solar Heat and Power Pty Ltd, but has subsequently moved to California as Ausra Inc., after a significant equity injection.

Consistent with the proposition that Australia should focus on RD&D support in areas in which Australia has a strategic interest and cannot rely on international activity, there is a need for these clear objectives in defining funding criteria.

Overall, there need to be clear governance arrangements over the selection, review and exit arrangements for public RD&D grants. The criteria for 'success' for a particular project should be as clearly defined as possible.

The climate change related technological challenge is not typical of most R&D challenges, it is very well defined, and fundamentally important for the economy and society. These characteristics change the risk-return calculus for private R&D effort compared with most technological R&D activity. The potential returns from break-through low emissions technologies are substantial. This may well dilute the force of market failures which, in the standard analysis, might be expected to lead to a significant shortfall in the level of R&D undertaken. The weight to be placed on the various theoretical problems requires much greater consideration,

including an assessment of existing and prospective local and overseas R&D activity, and the availability of venture capital to support such activity.

If significant R&D funding is available, some businesses may try to access such funding before investing themselves, even though they would be prepared to undertake their own investment in the absence of government funding. Business will favour arrangements under which they retain the upside risk from spending on R&D and take the credit, while the downside risk is shifted to the taxpayer. Governance arrangements should be designed to try and ensure an appropriate share of benefits that are realised, and a fair allocation of downside risk. Governance arrangements should also carefully scrutinise claims of economic benefits as justification for jurisdiction-specific research.

The emissions trading scheme will be the central emissions mitigation tool and will drive RD&D. Other government complementary policy measures, particularly market-based instruments such as the MRET, will also drive technology change. In this policy environment, public RD&D should ideally be undertaken to accelerate the development and diffusion of innovation to reduce the cost of abatement.

5.3 Coordination failures

Does coordination improve research outcomes and thereby outcomes for society?

How large are the coordination failures in Australia?

How can government create more cohesive research environments and promote genuine cooperation between rival firms or organisations? Is this a role for government?

Coordination between jurisdictions can prevent duplication of effort and the pooling of scarce resources toward agreed priorities.

5.4 International public good research and coordination

In what areas would coordinated international public good research be warranted?

What are the appropriate institutional arrangements for shared public good research that will ensure the best outcomes at minimal administrative costs?

How can governments encourage the diffusion of technology internationally without diluting the incentives for innovation?

International collaboration in RD&D may be warranted where Australia lacks the market potential or the investment capital to commercialise a strong technology. Collaborating with overseas governments or business may provide the investment and the markets required to get the project off the ground.

However, common barriers to international collaboration, both public and private, include sensitivities over intellectual property, geographic restrictions on where public research funding can be spent and, in some cases, the availability of sufficient resources to support the collaboration. National governments can play a major role by developing international agreements (either bilateral or multilateral)

to facilitate information and resource sharing, and collaborative projects. The US-Australia Climate Action Partnership is an example of this approach. Support for international collaboration between research institutions should also be fostered.

The examples cited above at 5.1 shows that it is important to seek opportunities to share the returns of innovation through collaborative funding of RD&D – this is one strategy that could reduce the costs and improve the returns to Australia from public good research. It is important to ensure that collaboration also brings the fruits of the research to Australia.