PRIME MINISTER'S SCIENCE, ENGINEERING AND INNOVATION COUNCIL

FIRST MEETING, 29 May 1998

Canberra

REPORT OF THE PRIORITIES WORKING GROUP

The Working Group's Origins and Tasks

The Priorities Working Group was formed at the December 1997 meeting of the former Prime Minister's Science and Engineering Council. Its membership is:

Professor John Stocker, Chief Scientist (Chair)
Dr John Keniry, Chairman, Ridley Corporation Ltd
Professor Peter Cullen, President, Federation of Australian Scientific and Technological Societies
President of the Academy of Science
Dr Bob Frater, CSIRO (co-opted member)
Professor Max Brennan (co-opted member)
Professor Ron Johnston (co-opted member)

It has the task of identifying key, or high-priority issues in science, engineering and innovation which should be brought to the attention of PMSEIC.

The Working Group adopted as the basis of its work, the concept of 'structural' priorities developed in the 1997 report by the Chief Scientist, *Priority Matters*. Structural priorities, which deal essentially with the goals or objectives of our science, engineering and innovation system, are considered to be the level of priorities most appropriate to consideration by the Council. They also bring a new perspective to analysing and understanding the workings of the Australian system.

Structural Objectives for the Science, Engineering and Innovation System

As a starting point, the Working Group developed a statement of structural objectives for the Australian science, engineering and innovation system. This statement can be used to describe where our system should be heading, and as a basis against which individual activities or initiatives can be evaluated. The statement of structural objectives as so far developed is:

Structural Priorities for the Australian Science, Engineering and Innovation System

To Develop and Maintain a Science Base Appropriate to Australia's Needs:

- provide a supply of scientific, research, engineering and innovative skills appropriate for Australia's needs and circumstances;
- add to basic knowledge, particularly of conditions, issues and problems unique or important to Australia;
- selectively encourage excellent research and researchers;
- ensure that Australia has access to, and can benefit from, the international stock of basic scientific and engineering knowledge.

To Develop Applicable Knowledge:

- undertake strategic and applied research in response to Australia's needs and circumstances;
- ensure that Australia has access to, and can benefit from, the international stock of applicable and strategic research and its outcomes.

To Promote Interaction Among Providers and Users of Research:

- commercialise public-sector research;
- undertake cooperative research across sectoral boundaries;
- increase the influence of users of public sector research on the funding of, and setting of agendas for, that research.

To Stimulate Innovation in Industry:

- promote the conduct of research, development and innovation in industry;
- improve access to venture capital to facilitate innovation in small firms;
- ensure that research, development and innovation contribute to achieving an improved industry structure, and the development of products and services which meet the demands of international market places.

To Improve Awareness of Science and Technology:

- improve science, technology and engineering teaching in schools, and promote the value of innovation;
- improve scientific, technological and engineering literacy in the community;
- demonstrate to decision makers in industry the value of science and technology in industrial and economic growth.

Applying Structural Objectives

The working group has undertaken a number of activities aimed at translating this broad statement of structural objectives into issues and initiatives of interest to the Council.

A study is being undertaken of the activities of the Commonwealth's major science and innovation funding programs and performing agencies against the structural objectives. The results of this study will provide a valuable new perspective on the performance of programs and agencies, as this sort of information is not currently collected. While we have substantial information on how resources flow to programs and agencies, and on the performance of R&D against socio-economic objectives, we do not have a consolidated picture of how the Commonwealth's major mechanisms contribute to the science, engineering and innovation system's objectives

An issue of major national significance which is worthy of consideration under the structural priorities framework is *Salinity, and its Impacts on Rural Industries and the Australian Landscape*.

Salinity - A National Issue

Salinity is a growing problem in Australia's inland regions. Comprehensive national data is not available, but salinity is clearly a serious long-term natural resource management issue for Australia. Impacts of salinity include current and future agricultural yield losses, and off-site effects on water quality, environmental values, damage to public and private infrastructure and added costs to business. The area affected by dryland salinity alone is estimated to be 2,746,000 hectares, or about 5% of the land sown to crops or pastures. It is estimated that salinisation contributes 12% of the total cost of yield loss due to all forms of land degradation. It is the fastest-growing of all threats to Australia's agriculture and landscape (the area affected grows by 3 to 5% per year), and is expected to grow until an equilibrium is established (in anything from 10 to over 100 years) at about 11,783,000 hectares.

The matter of how to address the salinity problem poses dilemmas for Australia. Despite the lack of a consistent national picture of the situation, it is clear that a problem exists. The basic cause of the problem is now generally well known. Changes to vegetation cover arising from a variety of land uses have led to changes in the hydrologic equilibrium in many parts of the country. Consequential changes to ground water levels have led to a major mobilisation of extensively distributed soil-embedded salts in the landscape with water being the mobility agent.

Other than the simple construction of drains to move saline water to the nearest wetland or stream, no simple or cheap solutions to manage the salt problem at the landscape level have as yet emerged. Also, scientific knowledge is now emerging to indicate that it would require replanting of some 30% of the landscape with native vegetation in many areas to start to halt the salinisation process and some 50% to start to reverse it. To move to these revegetation targets would clearly poses structural adjustment costs to society which are likely to be difficult to justify given the range of pressures on the public purse.

The operating environment in which land managers function also needs to be considered. Land managers currently lack the incentives to change practices, and successful management of salinity will require changes to the environment in which decisions are made. Those changes will need to flow from actions by governments, and will need to be informed by better information about the benefits to society flowing from reducing salinity, compared with the costs of not doing so. Research in science and engineering has a major role to play in providing decision makers in government and elsewhere with this improved information.

If the above argument is accepted then it can be put that a return to the "original" hydrologic equilibrium is not going to be a feasible scenario in very large areas of Australia. This in turn would point to the need to adopt a broad focus on research, investigation and innovation activity built around the following suggested themes:

- assessment of what any likely new hydrologic equilibrium will mean for the people and activities in local areas (probably best assessed catchment by catchment). This assessment will likely need to contemplate the concept of "sacrifice" areas where the hydrologic data leads to pessimistic conclusions.
- assessment and development of new cost-effective measures to significantly change hydrologic equilibrium situations at landscape and local scale (with both "engineering" and non-engineering options needing to be considered).
- "living with salinity" options including examination of scope for investments in water treatment technologies and such activities as saltland agronomy and implementation of dilution flows in significant river systems.
- what innovations are necessary in our approaches to communication to prevent the need for lessons learnt in parts of Australia where problems have emerged from having to be relearnt elsewhere.

The lessons of history are such that it is clear that salinity is an international issue of the past as well as of the present. In this context, quite apart from the direct costs to Australian rural industry and the landscape (and hence the benefits of activity to prevent or ameliorate salinity), there are other, less direct benefits, to be obtained from successful research or innovation to address salinity. These include:

- the potential for the development of an internationally-competitive industry in this area, which could sell technology to other countries suffering similar problems;
- linking activities to address salinity to other objectives, such as tree planting to ameliorate the greenhouse effect;
- success in attacking the salinity problem would add to Australia's 'clean green' reputation,
- potentially boosting rural exports and reinforcing ecotourism; and
- salinity is receiving attention from international development and financing agencies, and there is an opportunity to demonstrate Australia's capabilities and determination to address the problem in this context.

In the overall context described above, it is considered that salinity provides a strong specific example of an Australian issue where science, engineering and innovation can play major roles. Further, the structural objectives for science and technology can be used as a way of assessing and organising Australia's effort on this issue, as shown overpage.

Objective	Salinity Issue
The Science Base	Do we have the necessary basic knowledge about the causes, physical effects and socio-economic impacts of salinity? Are we producing sufficient skills to conduct research on salinity and its impacts, and to apply that research?
Applicable Research	Do we understand the extent and impacts of the problem? What is the level of our effort on scientific and socio-economic research directly addressed at salinity? Is it appropriate? Are our efforts in the field of encouraging innovation adequate? Are we accessing useful knowledge from elsewhere?
Promoting Interaction	Do the users of research on salinity have an appropriate level of influence over the priorities and directions of that research? Is a cooperative approach being taken - are physical and social science researchers, engineers, local innovators and policy advisers working together? What mechanisms are used to translate research and innovation into practice?
Stimulating Uptake	What are the incentives and disincentives to rural industry and environmental interests taking up the results of pure and applied research? What are the costs/benefits of research and its uptake? How can the flow of information to rural industry and environmental interests on salinity and its prevention or treatment be improved? What are the potential spin-offs into other areas of successful research into, and treatment of, salinity?
Improving Awareness	Is there sufficient knowledge, in industry and government, of the extent and costs of salinity? How can we improve public awareness and appreciation of the issue?

Addressing each of these questions within the framework provided by the structural objectives would, it is believed, help identify a comprehensive program or initiative for addressing salinity in rural Australia. Any such initiative would, of course, need to recognise current activity to address the problem.

The Commonwealth Government, for example, is providing Natural Heritage Trust funding to support salinity mitigation activities. It is also supporting work undertaken by CSIRO, the Australian Geological Survey Organisation and the Land and Water Resources Research and

Development Corporation (LWRRDC). LWRRDC is currently developing Stage 2 of its National Dryland Salinity Program. Work is also being undertaken by the Murray-Darling Basin Commission towards developing an overall Salinity Management Strategy for the Basin.

Conclusions

1. The 'structural objectives' approach to describing and evaluating our science, engineering and innovation system is a valuable one, and the Working Group will continue to develop this approach and present results to PMSEIC.

2. An initial result of this work is the identification of salinity as an issue of national importance, where the science, engineering and innovation system can make a valuable contribution. This contribution includes both helping address the problem, and seizing wider opportunities arising from successes achieved.

3. An initial evaluation against structural objectives of the S,T&I system's potential contribution to addressing salinity suggests that there is scope for a major initiative which would integrate science, engineering and innovation with rural industries and environmental interests.

Recommendations

1. That a PMSEIC Working Group be formed to advise the Council on an initiative for an integrated, large-scale attack on the problem of salinity in rural Australia. This Working Group will report out of session using the structural priorities approach and context described above as the framework for the advice.

2. Recognising that salinity is part of wider issues of natural resource management, a future meeting of PMSEIC should include a major presentation on these wider issues, addressing the directions to be taken beyond the Decade of Landcare and the current Natural Heritage Trust Initiative.