FASTS' 2004 Election Statement

Real Priorities

Science and technology for Australia's social, economic and environmental benefit

The Federation of Australian Scientific and Technological Societies (FASTS) is the peak representative organisation for Australia's 60,000 scientists and technologists

http://www.fasts.org

Science And Technology For Australia's Benefit

Science and technology lie at the heart of Australia's national development. They help:

* deepen our knowledge of ourselves, our environment, our world;
* establish new industries;
* enable existing industries to develop new and improved products and processes;
* meet future opportunities and challenges; and
* provide a sustainable and healthy environment.

In the 2004 election campaign Australia's scientists and technologists will be carefully evaluating the commitments of our political parties and candidates.

Since 2001 there has been some progress in reversing the decline in national investment in R&D and more recognition that R&D requires long-term investment. However, we still lack a coherent vision of where Australian science and research are heading.

Long-term vision and long-term commitments are required if Australia is to fully capture the benefits of Australian innovations and inventiveness and meet the social, environmental and economic challenges and opportunities that lie ahead.

Economic growth in the global economy is increasingly dependent on the quality and capacity of the science and technology knowledge base. But Australia's investment is not internationally competitive and the gap is widening. The shortfall between Australia's investment (1.59% of GDP) and the OECD average (2.33%) is about $5.5 billion.

R&D spend as a % of GDP is an important indicator. It tells us a lot about how much of today's economic activity we are prepared to invest for our future and our children's future.

There is an important correlation between future economic growth as measured by GDP and current R&D intensity. Productivity is fundamental to economic growth. R&D, along with education, is a key driver of increased productivity.

It is well established that the rates of return on R&D are high, and produce a whole range of social, environmental and economic benefits.

The FASTS 2004 election statement maps out the real priorities needed to take Australian science and R&D forward. Some priorities require significant investment and policy changes, others can be readily implemented including, for example, fair HECS rates for science teachers and 100 new post-docs to encourage industry culture change.

Commonwealth investment in R&D: How much to maintain 2003-04 share of GDP?

	2003-04	2004-05	2005-06	2006-07	2007-08	Total
Total GDP ($b)	809.56	858.6	907.2	955.85	1009.5	
Total Commonwealth R&D spend ($b)	5.214	5.342				
Projected Total Commonwealth R&D spend (CPI adjusted 2.25%)		5.344	5.478	5.615	5.755	
% GDP	0.644	0.62				
Total C'wealth R&D spend needed to maintain 2003-04 share of GDP		5.529	5.842	6.156	6.501	
Additional investment above CPI adjusted 2003-04 to maintain % of GDP from 2004/5 – 2007/8($m)		185	364	541	746	**1836**

Source: Treasury, *Budget Overview 2004-05,* Appendix A, DEST, *Science and Innovation Budget Tables 2004-05*, Table 1

Checklist of Real Priorities

The election priorities FASTS puts forward are the collective view of 60,000 working scientists and technologists. We believe credible science and technology policies must address the following real priorities.

The National R&D Commitment

- Making Australia competitive with global R&D investment
- Lifting Australia's total investment in R&D to 2.3% of GDP by 2010
- Maintaining Government investment as a % of GDP
- FASTS recommend detailed analysis of the flow on benefits of our national R&D commitment
- Ensure the Australian community gain the benefits that flow from Australian ideas and innovations generated by publicly-funded R&D.

Environmental Sustainability

- Ensure a pluralistic approach to understanding and managing environmental issues
- Change selection criteria for Cooperative Research Centres (CRCs) to re-instate 'public good' strategic research aligned with the National Research Priorities.
- PMSEIC to take on more strategic role evaluating opportunities and deficiencies in the national research profile
- Overcome the inefficient gaps and overlaps in Commonwealth and States responsibilities on the big environmental issues facing Australia.

Science Education in our schools

- Recognise access to expert science, mathematics and technology teaching is a fundamental equity issue for our students and for the nation's future.
- commit to ensuring science, mathematics and technology teachers do not suffer higher levels of student debt due to differential HECS.
- Ensure HECS places are available for all science and mathematics DipEd students

Industry R&D

- a sliding scale of R&D tax deductions that increase with R&D intensity
- a sliding scale for capital gains tax that rewards the longer periods of investment needed for high technology, R&D intensive industries
- providing jointly funded postdoctoral positions in industry to inject scientists into the corporate structure of business

Public sector R&D

- Appropriate levels of indexation of Commonwealth funding of our universities and public sector research agencies.
- FASTS recommends that research funding agencies should aim to fund the full cost of research and research infrastructure.
- Growth funding for CSIRO to ensure a strong foundation for 'flagships'.

The National R&D Commitment

The new Australian Government must ensure Australia is competitive with global R&D investment.

Australia's has a low level of Gross Expenditure on R&D (GERD). The latest figure of 1.59% of GDP in 2003 represents a fall from the peak of 1.65% in 1996. Australia is well below the latest OECD average of 2.33% in 2001, compared to our 1.53% in the same year. Since then our international competitors have ramped up their R&D investment, with the EU and Canada committed to spending 3% of GDP by 2010 to compete with similar current levels in Sweden, the United States and Japan.

Australia needs to increase its R&D spending at least to the current OECD average of 2.3% by 2010.

It is likely that the OECD average will increase during this period, in which case this goal represents a minimum staging post on the way to ensuring Australia is internationally competitive in the long term.

While Australia has a relatively strong record of Government R&D expenditure (just over half of GERD), the national average is dragged down by the Business Expenditure on R&D (BERD). Australia needs a cultural change in its business sector to turn this poor performance around and increase Australian productivity and its global market share.

This will also enhance our ability to attract international R&D investment in Australia.

Government investment in public sector R&D must at least maintain the existing % of R&D over all programs.

The 2004-5 Budget saw a modest increase in Government investment in R&D in real terms, but a decrease as a percentage of GDP to 0.62%. This is lower than the 2002-03 figure of 0.66%. While the lower figure reflects the relatively strong growth of private sector GDP we cannot afford for this decline to become entrenched.

FASTS believes that maintaining Government investment in R&D as a percentage of GDP is the minimum commitment needed by the incoming Australian Government, and would represent an *additional* investment of $1.8 billion dollars over 2003/04 levels for the period 2004-8 (see table 1).

FASTS recommend detailed analysis of the flow on benefits of our national R&D commitment

The Australian economy is structurally different to other countries. Therefore, we need better understanding of local constraints, impacts and opportunities of R&D.

We must also ensure the Australian community capture the benefits that flow from Australian ideas and innovations generated by publicly-funded R&D.

The next Government must examine the terms and conditions of commercialisation of publicly funded R&D to ensure our most promising companies are not cherry-picked and jobs, know-how, R&D capability and export opportunities simply taken offshore.

Sustainability

An *environmentally sustainable Australia* has been identified as a national research priority, and with good reason. We face huge challenges in respect of sustainability and survival on planet Earth. On a per capita basis Australia uses energy, water and other natural resources to a far greater degree than most other countries. It is time for action.

Issues such as; land degradation, water resources, biodiversity loss, energy supplies, climate change, pollution, urbanisation, pest control and natural hazards, affect not just Australia but the whole Earth. All these matters require urgent action from the incoming Government based on the best scientific and technological advice that is available.

We must ensure a pluralistic approach to understanding and managing environmental issues.

Complex problems need a diversity of approaches including different timeframes and types of R&D. There are no 'one-size–fits-all' solutions. In particular, we need to invest more in long-term, public-good strategic research because short-term commercial outcomes are not often achievable.

FASTS recommends the criteria for selecting CRCs be changed, to re-instate 'public good' strategic research aligned with the National Research Priorities.

At present the guidelines for CRCs and the emphasis in CSIRO for commercialisation and cost recovery (projected to rise to 40% in 2006/7) undervalue the significance of 'public good' research with strong social and environmental outcomes.

PMSEIC to take on more strategic role evaluating opportunities and deficiencies in the national research profile

FASTS are concerned there are emerging gaps in where Australia's research is heading as a result of narrower focus and emphasis on shorter time frames.

FASTS recommends that the Commonwealth Government take the lead to improve the working relationships between the Commonwealth and the States on the big environmental issues facing Australia.

Unfortunately, Australia's federal system is not suited to tackling these major issues which all involve at least two layers of government. The situations with greenhouse gases, coastal waters, invasive and threatened species, the Murray Darling Basin and indoor air quality are cases in point.

Poor environmental management will cost a great deal more to rectify in the future if we do not get this right now.

A sustainability agenda cannot be delivered by one department and one Minister alone. A whole of government approach is essential, with leadership from the Prime Minister and key senior Ministers.

Based on these policies, the government needs to develop ***action plans with teeth*** that provide carrot and stick incentives to industry, state and local governments and all other sectors of the community. It is time for strong leadership and action for the benefit of all Australians.

Science Education in our schools

Government reports estimate that by 2008 Australia may have a shortage of 30,000 teachers, primarily in science, mathematics and technology.

Access to expert science, mathematics and technology teachers is a real equity issue for our students.

To participate successfully in society is increasingly dependent on good understanding of science, mathematics and technology. Young Australians may be disadvantaged for life if they do not have access to well-trained science and mathematics teachers in their formative years.

Teaching is a vital vocation and FASTS laments that good teachers and good teaching is not adequately rewarded, appreciated or respected.

One step the Commonwealth Government must take is to remove disincentives for prospective science teachers.

Ensure science, mathematics and technology teachers do not suffer higher levels of student debt due to differential HECS.

It is inequitable that science teachers start their careers with more debt than their humanities colleagues.

In 2004, mathematics, computing, science and engineering students pay HECS fees of $5367 pa compared to $3768pa for arts, humanities and social studies students.

From 2005, mathematics, computing, science and engineering students will pay fees up to $6,837pa compared to $3840 pa for arts, humanities and social studies students.

This means our next generation of science teachers may start their working life with about $9,000 more debt than their arts and humanities trained colleagues.

HECS places must be available for science and mathematics DipEd students.

FASTS believes it is preferable that science teachers undergo a 3 year science degree followed by a one year Diploma of Education (as distinct from a Bachelor of Education that includes science subjects).

Accordingly, FASTS believes it is regressive that DipEd students may no longer access a HECS place after 2005 but will pay full fees for their postgraduate qualification with access to an interest-bearing loan.

FASTS believes HECS places must be provided for science, mathematics and technology Dip Ed students at least until the shortage of expert science teachers is overcome.

Industry R&D

Australia's Business Expenditure on R&D (BERD) as a share of GDP is less than half of the OECD average.

There is a view that the low spend on BERD is a structural feature reflecting a high proportion of small, medium enterprises (SMEs), the large service sector within Australia, and relatively small R&D intensive sectors such as advanced manufacturing and few global firms based in Australia – the branch economy.

FASTS believes it would be a mistake, though, to think low BERD is simply an artefact of structure. There are clearly cultural factors in Australian business that contribute to low R&D spend. For example, the percentage of researchers employed by Australian business as a percentage of total employees is low and lags behind all other advanced economies in this important indicator.

Introduce a sliding scale of R&D tax deductions that increase with R&D intensity

FASTS believes we need new industry R&D policies that encourage change in the R&D investment-shy nature of Australian industry through measures that reward an *increasing* level of R&D performance, rather than setting a flat bar.

Introduce a sliding scale for capital gains tax that rewards the longer periods of investment needed for high technology, R&D intensive industries

To allow Australian R&D intensive firms the time and capital to develop the manufacturing and marketing capacity to take their inventions into global markets we must address the chronic shortage of venture capital and reward long-term, patient investment.

Provide jointly funded 100 postdoctoral positions in industry to inject scientists into the corporate structure

One constructive measure the new Government can do to bring about cultural change is to assist firms inject science and technology PhD holders into business. Not only to deepen the R&D capability but, over time, to generalise their knowledge and skills throughout corporate culture.

Table 2: Selected R&D statistics 2001 (*Source: OECD*)

	Australia	Canada	EU	OECD	UK	US
R&D as % of GDP	1.53	1.94	1.93	2.33	1.90	2.82
% R&D funds from Govt	46	31	35	29	30	27
% R&D funds from business	46	42	56	64	46	68
% R&D done by Higher Ed	27	30	21	17	21	14
% R&D done by business	47	57	64	70	67	74
Business researchers by 10,000 workers	1.7	3.3	2.9	4.1	3.2	6.9
Growth of business researchers 1991 - 2001	2.09	6.41	2.91	3.62	1.54	3.27
% of BERD financed by Govt	3	4	8	8	10	11

Public Sector R&D

The underlying poor financial position of universities has arisen because of inadequate indexation of higher education funding, which has failed to keep up with real costs.

Adequate indexation of the funding for Higher Education.

A study by Burke and Curran estimated that universities would have received an additional $500m in 2001 if the indexation of university grants had incorporated changes in average weekly earnings.[1] This has decreased universities' ability to attract and retain high quality staff, and undermined the capacity to achieve excellence in teaching and research – which have had negative impacts on science, mathematics and technology.

Research funding agencies should be able to fund the full cost of research and research infrastructure.

The research opportunities for universities have also increased through access to competitive funding schemes. However, many of these schemes require matching funds from the universities, whose financial resources have been stretched and in some cases distorted by overleveraging of research funding.

In 2003-4 it is estimated that universities will pay $450m to participate in competitive schemes. This leveraging undermines universities' capacity to set its own priorities that best serve their local regions and research strengths.

Increased investment in Postgraduate Research and early career researchers

Postgraduates and early career researchers are the future face of Australian research in industry, universities, medical institutes, CSIRO and other Commonwealth and State research agencies. The effective freeze on funding the Research Training Scheme undermines universities' capacity to ensure a quality research education experience. We need to identify impediments to early career researchers and strengthen career pathways into industry.

Growth funding to strengthen CSIRO's breadth

The second tranche of Backing Australia's Ability announced in May 2004 provides $310m over 7 years for CSIRO's flagships. There is a logic to identifying and supporting priorities. However, priorities can only work in the long run if they are surrounded and supplemented by a plurality of research and research interests.

FASTS are concerned with the lack of growth funding for CSIRO programs that are not part of the flagships. Stripping the divisions of the flexibility to maintain research in other areas, notably in basic and 'strategic public good' research diminishes CSIRO's ability to rejuvenate the flagships or respond to major international R&D developments.

[1] Cited in Phillips Curran, *Independent Study of the Higher Education Review, Stage 1 Report for MCEETYA*, Dec 2002, p. 30

One Hundred PhD Science Graduates To Invigorate Industry

Current and previous initiatives to address the R&D-shy culture of Australian businesses have met with limited success. SPIRT grants and ARC linkage project grants were designed to support collaborative research projects between higher education researchers and industry. The Australian Postdoctoral Fellowships Awards establish linkages between higher education researchers and CSIRO. Neither of these options fully offer industry the benefits that flow from having competent and well trained scientists engaged in an enterprise's strategy and operational activities.

The Government should fund to employ new PhD graduates in industry for two years, to bring fresh ideas for new methods, new products and to forge science-based industry career paths. Employment of postdoctoral scientists would not be restricted to R&D but would be available throughout the organisation in commercialisation activities, marketing and management.

The advantages of this program would be:

* an injection of talent into industry of young scientists and technologists, all with new approaches, project management expertise and strong links to the research sector;
* a bridge across the cultural divide between research and industry in Australia with attendant benefits on both sides;
* useful exposure to industry for a significant group of the brightest young scientists and technologists creating a new awareness of industry priorities;
* to encourage industry to employ people with the qualifications most likely to contribute to the development of new and improved products and processes;
* to create a new source of demand for recent science and technology post-graduates.

The program would be competitive, and could be run along similar lines to R&D START Graduate. However, unlike R&D START Graduate, the proposed postdoctoral program would provide a cohort of experienced researchers trained in program management who could immediately establish and pursue new research programs in the company. There would therefore be no requirement for a matching university partner, although this could be encouraged to retain strong research linkages.

FASTS suggests that government support for the program be limited to half the cost of employing a new postdoctoral fellow over two years (salary, training, travel, superannuation, plus the costs of administration). For example we estimate the total cost at about $90,000 per postdoctoral fellow over two years. On this assumption the cost, to government, of the program would be as follows:

Cost @ $45,000 per postdoctoral fellow pa		
Year	50 postdocs	100 postdocs
1	$2.25M	$4.5M
2 (second tranche)	$4.5M	$9.0M
3	$6.25M	$13.5M
subsequent years	$6.25M	$13.5M