

Australia's R&D challenges

To help inform the policy debate, the Group of Eight offers the following analysis of Australia's R&D challenges.

Despite solid growth in Australian R&D over the last five years there is no room for complacency about the future because:

- competitor countries are increasing their investment in R&D out of recognition of its importance to the future of their economies and societies;
- much of the growth in public support for Australian R&D is a result of the Federal Government's *Backing Australia's Ability* Science Innovation package announced in 2001 and renewed in 2004. There is no growth in funding under BAA from 2005 for important schemes such as the Australian Research Council, its Centres of Excellence program, National Collaborative Research Infrastructure Strategy (NCRIS) and Research Infrastructure Block Grants (RIBG);
- while there has been a near doubling of funding for national competitive grants schemes since 2001, success rates for many programs remain low and grants typically cover only 70% of a project's cost;
- institutions continue to receive direct infrastructure funding support of around 21 cents for every dollar of national competitive grant income won. This compares to international benchmarks of 50 cents in the dollar;
- organisations successful in winning national competitive grants are effectively penalised by having to supplement research project costs with funds for teaching and other purposes; and
- with the pool of national competitive grants now approaching \$1 billion annually, current arrangements are unsustainable in the long term. Serious consideration needs to be given to funding the full cost of sponsored research – as is the policy in the UK.

Table 1: Gross expenditure on R&D (GERD) ratios of selected OECD countries, 2000–01 to 2004–05 as a percentage of GDP

	2000–01 %	2002–03 %	2004–05 %
Finland	3.38	3.43	3.51
Japan	2.99	3.12	3.13
Korea	2.39	2.53	2.85
United States of America	2.74	2.65	2.68
Germany	2.45	2.49	2.49
Denmark	na	2.51	2.48
Austria	1.91	2.12	2.24
France	2.15	2.23	2.16
Canada	1.94	2.06	1.99
Belgium	1.97	1.94	1.9
United Kingdom	1.86	1.89	na
Netherlands	1.82	1.72	1.78
Australia	1.51	1.69	1.76
Norway	na	1.67	1.61
Czech Republic	1.23	1.22	1.27
Ireland	1.13	1.1	1.2
OECD average	2.23	2.24	2.26

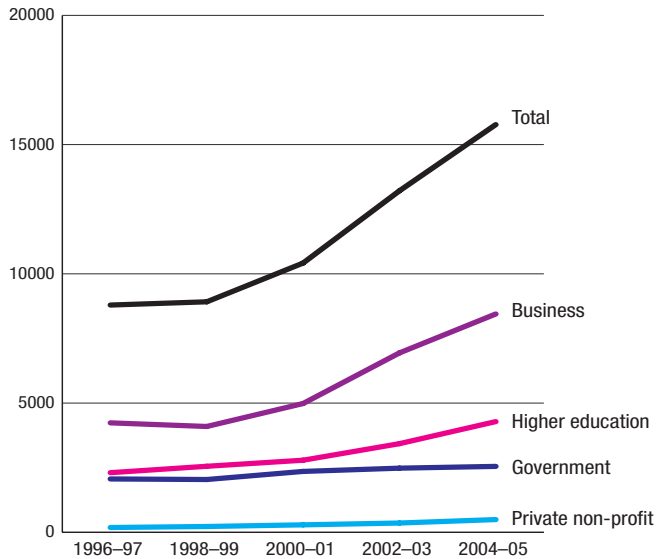
Source: ABS Catalogue 8112.0

Table 2: Business expenditure on R&D (BERD) ratios of selected OECD countries, 2000–01 to 2005–06, as a percentage of GDP

	01–02 %	02–03 %	03–04 %	04–05 %	05–06 %
Japan	2.3	2.36	2.4	2.38	2.54
Finland	2.35	2.34	2.42	2.42	2.47
Korea	1.97	1.9	2	2.18	2.3
United States of America	2	1.86	1.84	1.79	1.82
Germany	1.72	1.72	1.76	1.74	1.71
Denmark	1.64	1.73	1.78	1.7	1.67
Austria	na	1.42	na	1.51	1.64
Luxembourg	na	na	1.48	1.46	1.34
France	1.39	1.41	1.36	1.34	1.32
Belgium	1.51	1.37	1.31	1.29	1.24
United Kingdom	1.2	1.19	1.14	1.09	1.1
Canada	1.29	1.17	1.13	1.12	1.07
Australia	0.84	0.89	0.92	0.97	1.04
Netherlands	1.05	0.98	1.01	1.03	1.02
Czech Republic	0.72	0.73	0.76	0.8	0.92
Ireland	0.77	0.76	0.8	0.82	0.83
Total OECD	1.57	1.51	1.51	1.49	1.53

Source: ABS Catalogue 8104.0

Chart 1: Gross investment in Australian R&D, 1996–97 – 2004–05

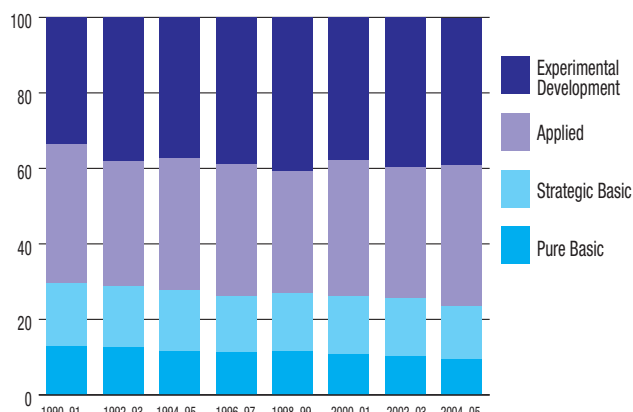


Source: ABS Catalogue 8112.0

Key points Tables 1 & 2 Chart 1:

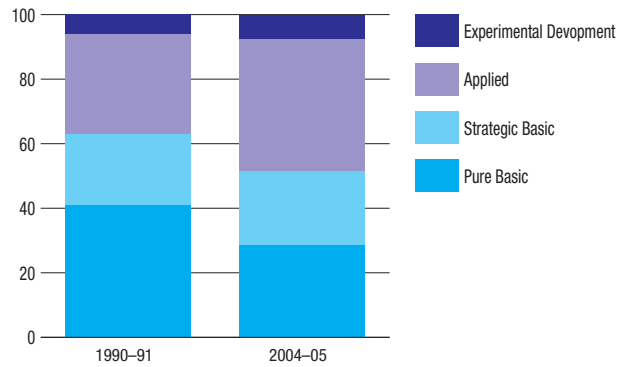
- Australia’s Gross Expenditure on R&D increased from \$10.4 billion in 2000–01 to \$15.7 billion in 2004–05.
- Australia’s GERD has increased from 1.51% of GDP in 2000–01 to 1.76% of GDP in 2004–05, alongside the strong GDP growth Australia has experienced over this period.
- The main contributor to Australia’s GERD growth has been business investment in R&D (BERD) which has risen from 0.84% of GDP in 2000–01 to 1.04% in 2004–05.
- Increased Government investment in R&D, particularly through the Higher Education system has also contributed to the improvement.
- Despite these strong gains, Australia’s GERD and BERD both still lag well behind the OECD averages of 2.26% and 1.53% of GDP respectively and many other OECD countries are investing heavily in R&D activities.
- If Australia were investing in R&D at the OECD average rate, a further \$5 billion would be going into the system annually.

Chart 2: Gross expenditure on Australian R&D by research type, 1990–01 – 2004–05



Source: ABS Catalogue 8112.0

Chart 3: Australian higher education expenditure on R&D by research type, 1990–91 & 2004–05

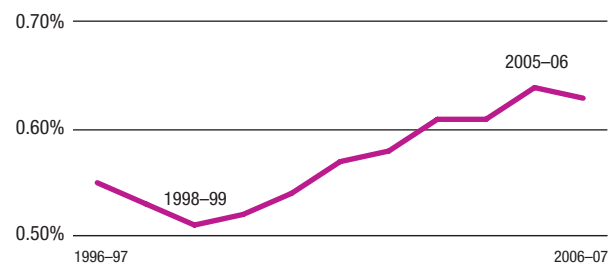


Source: ABS Catalogue 8112.0

Charts 2 & 3 key points:

- Between 1990 and 2005 the proportion of Australia’s GERD dedicated to basic research (pure and strategic) declined from 29.6% to 23.6%.
- The shift from basic to applied research has been more pronounced in Australia’s higher education system. In 1990–91, 63% of Australia’s Higher Education R&D (HERD) supported basic research. In 2004–05 basic research represented 51.5% of all HERD.
- Maintaining a strong capacity for basic research is important because it is the knowledge obtained from such research that makes practical applications possible.
- A nation’s strength in basic research is a determinant of its capacity to:
 - supply the skilled graduates and researchers that underpin knowledge industries;
 - respond to the social, environmental and economic challenges it faces;
 - understand and apply ideas and innovations generated in other countries;
 - develop new scientific instrumentation and methods; and
 - create new firms and industries.

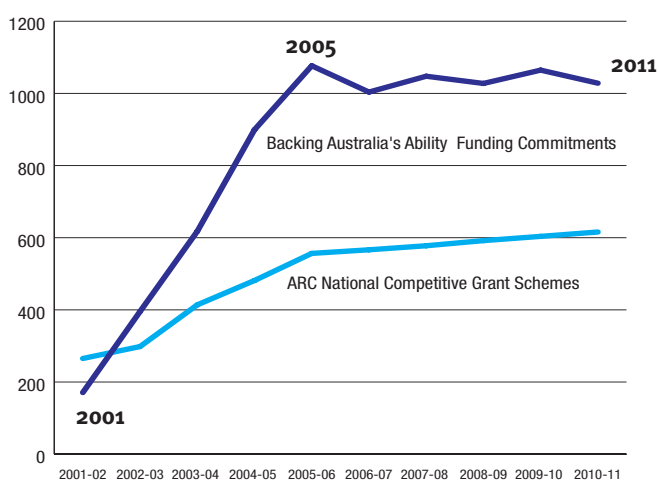
Chart 4: Commonwealth support for science and innovation as a percentage of GDP, 1996 – 2007



Sources, DEST, Australian Government’s Science and Innovation Budget Tables 2005–06 and 2006–07, Reserve Bank of Australia GDP figures 1996–2007, Bulletin G10.

Charts 4 key points:

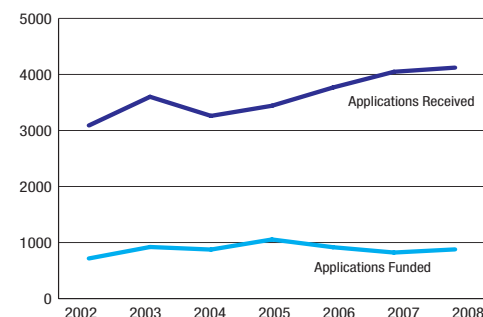
- Following a decline in the mid-1990s Commonwealth investment in science and innovation has increased from 0.52% of GDP in 1998–09 to 0.63% in 2006.
- In 2006–07 total Commonwealth support for science and innovation programs is estimated to be just under \$6 billion, up from \$4.2 billion in 2000–01.
- While this improvement has had a positive impact on Australia's science and innovation system, many competitor countries have been increasing their investment in these areas out of recognition of the importance of S&T to the future of their economies. For example:
 - China spent 1.3% of GDP on R&D in 2005 and is aiming for the OECD average of 2.3% by 2020;
 - the US will double the amount of funding for the National Science Foundation, the Department of Energy's Office of Science and the Department of Commerce's National Institutes of Standards and Technology over the next 10 years;
 - the Blair-Brown governments in Britain have also substantially increased investment in higher education and research. The most recent decision is to invest £1 billion over 2008–2010 in a new science and innovation strategy;
 - German federal and state governments have committed to increase annual research grants by at least 3 per cent per year through to 2010; and
 - Singapore has identified areas for selected R&D investment through a strategy of concentration of resources to develop peaks of excellence in areas with the greatest potential for scientific breakthroughs for industry growth and enterprise creation.

Chart 5: Backing Australia's Ability and Australian Research Council funding, 2001–2011

Source: DEST, *Backing Australia's Ability Funding Table, 2004*.

Chart 5 key points:

- In 2006–07 the Federal Government's *Backing Australia's Ability* (BAA) Science and Innovation package represented about 1/6th of total Commonwealth support for science and innovation. The remainder includes university block grants, funding for major federal research agencies (DSTO, CSIRO etc), the NHMRC and programs supporting business R&D.
- BAA funding grew rapidly from 2001, peaking in 2005 at \$1.076 billion. Since 2005 funding under various BAA programs has plateaued.
- There is no growth in BAA funding between now and 2011 and no commitment has been made about the future of the numerous essential schemes that it comprises. These include:
 - the ARC National Competitive Grants Program;
 - the Research Infrastructure Block Grants Scheme;
 - the National Collaborative Research Infrastructure Strategy; and
 - the CSIRO Flagships and International Science Linkages programs.
- Chart 5 shows rapid growth in funding for the Australian Research Council's National Competitive Grants Program between 2000 and 2005. Once again, funding for these programs plateaus from 2005.

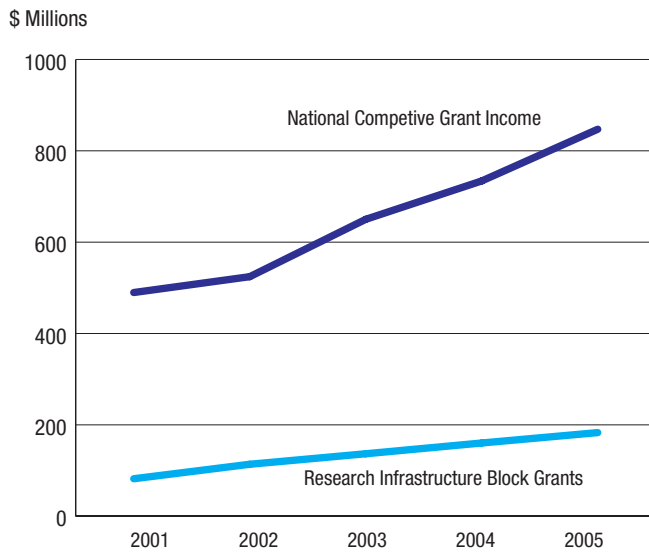
Chart 6: Australian Research Council, Discovery Grant Scheme, applications received and funded for projects commencing 2002 to 2008

Source: ARC Discovery Project Selection Reports 2001–2008.

Chart 6 key points:

- Chart 6 shows applications received and funded for the ARC's flagship Discovery Grants Scheme. Success rates peaked at 30.9% for projects commencing in 2005.
- In 2008, the success rate for this scheme was 21.4%.
- ARC grants typically cover 70% of the actual cost of selected projects – leaving successful institutions to pick up the shortfall from other sources.
- The ARC's current approach to the administration of competitive schemes such as Discovery appears focused on stabilising success rates rather than properly funding as many successful projects as possible.
- In the Go8's view, this approach is unsustainable in the long term because it places an ever-increasing funding burden on successful institutions.

Chart 7: Australian University National Competitive Grant Income and Research Infrastructure Block Grant Funding, 2001–05



Sources: Universities Australia, Higher Education Research Data Collections Time Series 1992–2005.
DEST Higher Education Triennium Reports 2001–03 – 2004–06 and Higher Education Report 2005.

Chart 7 key points:

- In 2004, for every dollar of national competitive grant scheme income available, the Commonwealth has committed to provide at least 20 cents in infrastructure funding through the Research Infrastructure Block Grants scheme (RIBG).*
- The primary purpose of the RIBG scheme is to provide the infrastructure needed to support Australian competitive grants.
- In 2005, national competitive grant income amounted to \$847.2 million and RIBG to \$182.9 million. This represented 21.6 cents in the dollar.
- The international benchmark for research infrastructure support linked to national competitive grants is at least double the Australian rate of 20 cents in the dollar. For example, the US's National Science Foundation and National Institute of Health both reimburse universities for the overhead cost of sponsored research at more than 50 cents in the dollar.
- Increasing RIBG for 2005 from 20 to 50 cents in the dollar would require funding to rise from the current \$183 million to \$424 million – an increase of \$240 million.

* National Competitive Grant Scheme Income is all income from schemes that appear on the Australian Competitive Grant Register (ACGR)

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