# AUSTRALIA

## **Hot STI issues**

- Transitioning to a low-carbon, globally connected and productive economy through advanced skills.
- Increasing R&D collaboration, commercialisation and internationalisation.
- Improving returns on science and research investments.
- Exploiting emerging/enabling frontier technologies, such as space and health.

General features of the STI system: Australia's economy has been one of the world's most resilient during the past five years and has benefited significantly from the global commodities boom. Primary and resource-based industries account for a much larger share of BERD than the OECD median (Panel 2) and are responsible for much of the recent increases in business funding of R&D. Manufacturing (particularly high-technology manufacturing) accounts for a smaller share of BERD. At 1.3% of GDP in 2009, the intensity of BERD was slightly above the OECD median. Triadic patents are below the OECD average (Panel 1<sup>(f)</sup>). Levels of public research funded by industry (1<sup>(0)</sup>) are slightly above average, an indication of sound academicindustry linkages. International linkages appear somewhat weaker, with 44% of scientific articles and 16% of PCT patent applications produced with international collaboration  $(1^{(q)(r)})$ . Australia's RTA shows robust growth over the past decade in bioand nano-technologies and a slight decline in environment-related technologies (Panel 3). The country has a strong skills base: 37% of the adult population have tertiary qualifications  $(1^{(s)})$  and 37% of the labour force are employed in S&T occupations (1<sup>(v)</sup>). PISA scores in science for 15-year-olds are the fourth highest in the OECD area. IT infrastructures compare well internationally, with wide wireless broadband coverage (1<sup>(l)</sup>), and the e-government readiness index accounts for 0.84  $(1^{(n)})$ .

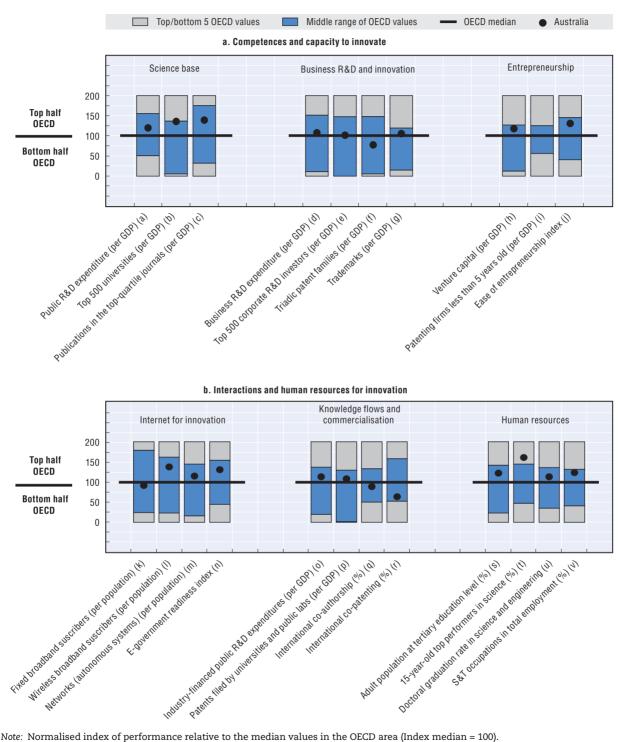
**Recent changes in STI expenditures:** Australia's R&D intensity is slightly below the OECD average, but

higher than that of the EU27. GERD grew by a strong 10% a year in real terms between 2004 and 2008 to 2.24% of GDP. The share funded by industry increased to 62% over the decade to 2008, while the share of government funding declined to 34%. Funding from abroad also decreased.

**Overall STI strategy:** The key STI strategy document is Powering Ideas: An Innovation Agenda for the 21st Century (2009-20). It commits to strengthen public research, improve science-industry collaboration and international linkages, strengthen human capital and improve governance. In 2011 a review of publicly funded research recommended the establishment of an Australian Research Committee to provide integrated and strategic advice on future research investments. The 2011 Strategic Roadmap for Australian Research Infrastructure also identified 19 research infrastructure capability areas critical to Australian research over the next five to ten years.

**STI policy governance:** The Department of Industry, Innovation, Science, Research and Tertiary Education (DIISRTE) is responsible for innovation, research, science and tertiary education policy and AusIndustry is one of its programme delivery divisions. The Commonwealth State and Territory Advisory Council on Innovation (CSTACI), the Coordinating Committee on Innovation (CCI) and the Prime Minister Science, Engineering and Innovation Council (PMSEIC) were established to improve governance and collaboration and provide policy advice. The Framework of Principles for Innovation Initiatives provides guidance to enhance consistency

Key figures			
Labour productivity, GDP per hour worked in USD, 2010	46.8	GERD, as % of GDP, 2008	2.24
(annual growth rate, 2005-10 )	(+0.7)	(annual growth rate, 2004-08)	(+10.0)
Environmental productivity, GDP per unit of $CO_2$ emitted in USD, 2009	2.24	GERD publicly financed, as % of GDP, 2008	0.78
(annual growth rate, 2005-09)	(+2.2)	(annual growth rate, 2004-08)	(+5.6)



### Figure 10.2. Science and innovation in Australia

Panel 1. Comparative performance of national science and innovation systems, 2011

Note: Normalised index of performance relative to the median values in the OECD area (Index median = 100).

across the ecosystem and to improve the accessibility and efficiency of innovation initiatives across Australia. The major national science agencies are included in the DIISRTE portfolio, as are the Australian Research Council (ARC) and Intellectual Property Australia.

**Science base:** Australia's science base is strong, as shown by its high public-sector expenditure on R&D, the high international ranking of its universities and publication rates in top scientific journals  $(1^{(a)(b)(c)})$ . HERD was 0.54% of GDP (2008) and 24% of GERD, high by OECD standards. While the academic research system is largely based on investigator-led research, there has been a shift towards funding directed to thematic priorities (Panel 4). The Industrial Transformation Research Programme (2011-14) will pursue industry-driven research in universities.

**Business R&D and innovation:** The government's goal is to achieve a 25% increase in the proportion of businesses engaging in innovation over the next decade. To that end, the government encourages business innovation through a combination of direct and indirect measures. Australia replaced its R&D tax concession in 2011 by a R&D tax incentive scheme based on a tax credit. This scheme also targets support to R&D by SMEs and is open to foreign-owned companies.

**Public-sector innovation:** The Australian Public Service Innovation Action Plan was drawn up to deal with increasingly complex issues in the public sector. It was endorsed by agency secretaries in 2011. The aim is to drive innovation in the public sector through initiatives such as the Public Sector Innovation Network, an innovation blog and an innovation toolkit. Since 2011, the Australian Public Service Innovation Indicators (APSII) project has been collecting detailed information about innovation in the Australian public service that will be comparable with European data.

**Entrepreneurship:** Australia has favourable conditions for entrepreneurship. Regulatory barriers are low, and attitudes towards the fear of failure and perceived opportunities are positive. There is relatively little venture capital for seed and start-up stages of investment and it has declined during the financial crisis. However, a range of investment funds are available to develop the VC industry. The Renewable Energy Venture Capital Fund (REVC) was announced in 2011. Broader business support to SMEs is provided by a network of twelve Enterprise Connect centres.

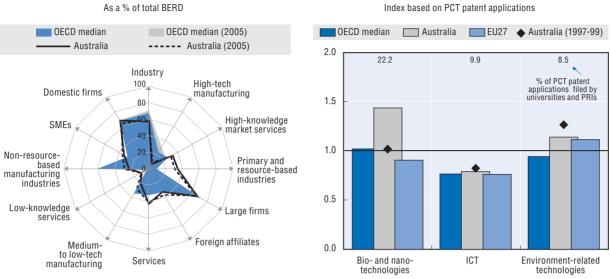
**ICT and scientific infrastructures:** Australia's strong ICT infrastructure is sub-optimal in certain areas. NBNCo was established in 2009 to provide a highspeed broadband network. The Digital Education Revolution has invested USD 1.5 billion to align ICT in schools with broader government initiatives. Important investments have been made through the National Collaborative Research Infrastructure Strategy (NCRIS), the Super Science Initiative (SSI) and the Education Investment Fund (EIF) to produce a collaborative network of research infrastructure.

**Knowledge flows and commercialisation:** International co-operation on publications and patenting are below the OECD median  $(1^{(q)(r)})$ . Initiatives to strengthen bilateral knowledge exchange include the Australia-China Science and Research Fund and Australia-India Strategic Research Fund.

**Human resources:** Australia has a strong skills base. Questacon, the National Science and Technology Centre, manages the Inspiring Australia Programme which focuses on engagement of the Australian community with the sciences. The Australian Curriculum and Building the Education Revolution programmes intend to strengthen overall education, especially maths and science skills.

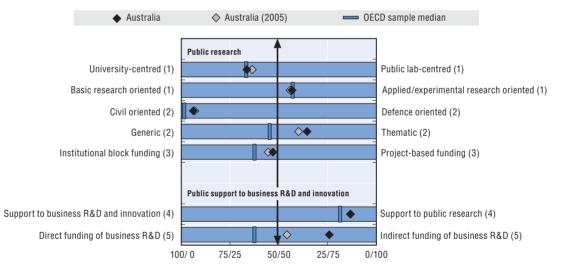
**Emerging technologies:** The Super Science Initiative, with funding of USD 705 million, has recently focused on space science and astronomy, marine and climate science, enabling technologies and future industries, such as bio- and nano-technology, ICT and clean energy. The Australian Space Research programme (ASRP) is developing niche space capabilities and the Stem Cells Australia does cutting-edge health research.

**Green innovation:** Australia passed legislation in 2011 to tax carbon emissions as of 2012. As part of the Clean Energy Futures Plan, the Clean Technology Innovation Programme supports the development of technology with reduced greenhouse gas emission. The Clean Energy Finance Corporation will invest USD 6.4 billion in renewable energy and low-emissions technologies, with the new Australian Renewable Energy Agency (ARENA) investing a further USD 2 billion.



#### Panel 3. Revealed technology advantage in selected fields, 2007-09 Index based on PCT patent applications

#### Panel 4. Overview of national innovation policy mix, 2010



1. Balance as a percentage of the sum of HERD and GOVERD.

2. Balance as a percentage of total GBAORD.

3. Balance as a percentage of total funding to national performers.

Panel 2. Structural composition of BERD. 2009

4. Balance as a percentage of the sum of HERD and GOVERD funded by government and higher education and components of (5).

5. Balance as a percentage of the sum of indirect funding of business R&D and innovation through R&D tax incentives and direct funding of BERD through grants, contracts and loans.

Source: See reader's guide and methodological annex.

### StatLink ans http://dx.doi.org/10.1787/888932690168