

Australia 2030

Navigating our uncertain future

Executive summary

May 2016

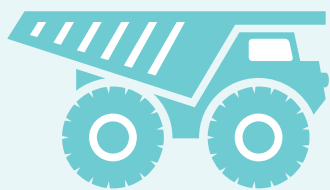
Australia's economy: an uncertain future

For the foreseeable future, the resources sector alone is unlikely to continue to drive income growth to the extent that it has.

Australia has enjoyed an enviable position over the last two decades, with demand for the nation's abundant resources leading to strong economic growth and rising standards of living.

However, we are entering a period of significant change across national and global markets.

In light of this rapid pace of change, how will Australia maintain competitiveness in existing industries and build comparative advantage in new and emerging industries?



Mining boom **boosted real per capita disposable income by 13 per cent** from 2000 to 2013 (45% of total growth)¹



Price of iron ore has dropped from US\$180 per tonne (2011) to below US\$65 per tonne (2016)²

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Australia risks being left behind if it fails to innovate

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Innovation will be key to driving future productivity growth in established industries as well as developing new companies and industries based on emerging science and technologies. In an increasingly interconnected and rapidly changing world, Australia risks being left behind if it fails to innovate.

This report will assist senior decision-makers in government and industry to plan today's innovation investments to meet future opportunities and

challenges. It uses a scenarios-based approach to account for future uncertainty by expand thinking about the future, understand trade-offs

between different actions, and guide strategic planning at both a national and corporate level.



In 2015, the Global Innovation Index **ranked Australia 17th overall in terms of innovation**, but 72nd for innovation efficiency³

\$145B

Advanced physical and mathematical sciences make a **direct contribution to the Australian economy of around \$145b a year** (11% of GDP)⁴



Technological innovation, driven by research and development (R&D) investment, **contributes around 50 percent of GDP growth in developed countries**⁵

Strategic planning framework

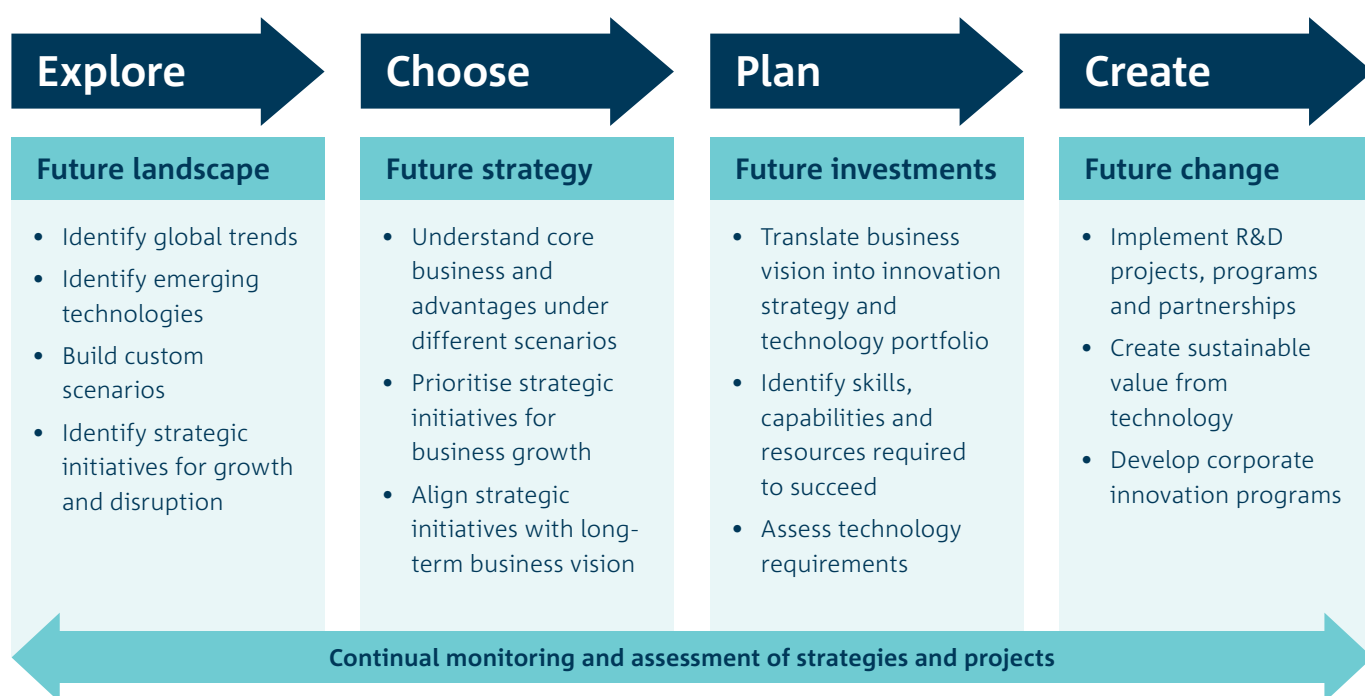
Future strategic decision making will need to take into consideration the rapid pace of change, market disruption, and future uncertainty and volatility.

Our framework applies scenarios and sector implications to strategic planning. The framework can be used in both top-down strategic planning and exploratory ‘bottom-up’ development to assist in developing or strengthening a comparative advantage in the market.

Following this framework and asking the right questions allows organisations to better understand the allocation of scarce resources (labour, capital), the underlying assumptions

that underpin existing business decisions, and the role that innovation can play in helping businesses strengthen their future.

The next 15 years are full of opportunities for Australia. With careful consideration, the framework presented in this report can help Australian companies identify new opportunities, build resilience for the future, and ensure sustainable growth for the years ahead.



Access the full report at www.csiro.au/futures

1 Downes, P. et al (2014), The Effect of the Mining Boom on the Australian Economy – Research Discussion Paper. Reserve Bank of Australia.
 2 Ng, J. and Stringer, D. (2015) Bloomberg Business, Iron Ore Plummets Below \$40 a Ton as Global Glut Hurts Outlook, 7 December 2015
 3 Cornell University, INSEAD, and WIPO (2015), The Global Innovation Index 2015: Effective Innovation Policies for Development, Fontainebleau, Ithaca, and Geneva.
 4 Australian Government Chief Scientist and Australian Academy of Science (2015), Joint Media Release: Science – A Major Contributor to the Economy, 25 March 2015.
 5 OECD (2015), OECD Innovation Strategy 2015 – An agenda for policy action. Meeting of the OECD Council at Ministerial Level Paris, 3-4 June 2015

Australia 2030 scenarios

Scenario planning is not intended to predict the future, but rather to communicate a wide range of possible outcomes and the consequences of each.

Through expanding thinking and identifying trade-offs, this approach provides guidance on where to invest innovation resources most effectively.

Four plausible and divergent scenarios for Australia in 2030 have been developed, each based on different combinations of social, economic,

environmental and technological drivers. Each is purposely extreme in an attempt to provide a sharp contrast between different potential futures and more clearly illustrate the trade-offs involved.



Digital DNA

Australia experiences a dramatic shift towards a digital services and knowledge-driven economy made possible by the exponential growth of computing power, an increasingly connected world, and the wide range of new technologies this enables.

Underlying global trends

- Increasing computing power
- Increasing resource efficiency
- Increasing productivity
- Increasing levels of international trade
- Disruptive business models

National impact

- Much **stronger** economic growth
- **Positive** social impact
- **Positive** environmental impact
- **Bold and new** industries



Mining and dining

Australia's economy benefits from a second wave of the resources boom driven by growth and urbanisation in developing economies. Minerals, energy and food represent the majority of Australian exports and are the underpinning wealth generators for the economy.

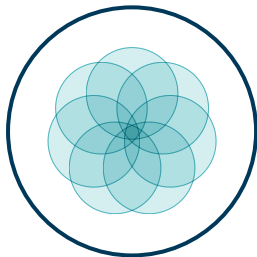
Underlying global trends

- Resource efficiency follows current trends
- Moderate carbon abatement efforts
- Increasing global energy demand and material consumption
- Increasing and changing food demand
- Asian economic growth and urbanisation

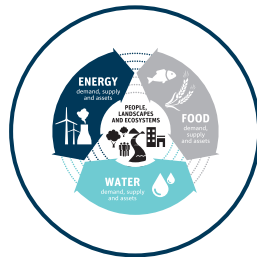
National impact

- **Stronger** economic growth
- **Neutral** social impact
- **Neutral to negative** environmental impact
- **Tried and tested** industries

Scenario inputs



CSIRO 2015
Megatrends



CSIRO Australian
National Outlook 2015



CSIRO sector-specific
forecasting reports



Consultation with
CSIRO researchers and
industry experts



Clean and lean

Decoupling of economic growth and environmental sustainability has led countries to simultaneously pursue both objectives. Consumers seek out healthier lifestyles and Australia works with other advanced economies to address carbon abatement, resource efficiency and sustainability.

Underlying global trends

- Declining material consumption
- Increased focus on health Increasing and changing food demand
- Strong carbon abatement efforts
- Increasing resource efficiency

National impact

- **Neutral** economic growth
- **Positive** social impact
- **Positive** environmental impact
- Both **new and traditional** industries



Weathering the storm

Global geopolitical instability increases, driven by climate change and regional conflicts over access to land, food and water. Tensions threaten to destabilise trade alliances and disrupt global supply chains, leading to prolonged global economic stagnation.

Underlying global trends

- Increasing water scarcity and limited natural resources
- Growing impacts of antimicrobial resistance
- Severe weather events
- Decline in available agricultural land
- Global trade disruption

National impact

- **Weaker** economic growth
- **Negative** social impact
- **Negative** environmental impact
- **Tried and tested** industries

Australian sector implications

Each of the four scenarios open the door to a number of opportunities for Australia.

We can now consider the impact scenarios could have on potential growth areas for different industry sectors and the role that innovation in science and technology (S&T) could play in capturing these opportunities.



Through this analysis, it becomes clear that investments made today will fare markedly differently under different scenarios. We can influence which

scenario we move towards but it will require vision and investment.



The tables below highlight the implications of two scenarios for five key Australian sectors.

For the full breakdown of scenario implications for each major Australian industry sector, see the full Australia 2030 report at www.csiro.au/futures.



Food and agriculture

SCENARIO	POTENTIAL GROWTH AREA	KEY CONSIDERATIONS	S&T ENABLER
	<ul style="list-style-type: none"> • Service exports: Build on agricultural legacy with technology and knowledge exports 	<ul style="list-style-type: none"> • Technology integration • Required skill sets 	<ul style="list-style-type: none"> • Sensors and data analytics
	<ul style="list-style-type: none"> • Speciality exports: Service the changing social preferences and specialised dietary needs 	<ul style="list-style-type: none"> • Cost of compliance • Shift from bulk-produced to tailored 	<ul style="list-style-type: none"> • Agronomics



Healthcare and pharmaceuticals

SCENARIO	POTENTIAL GROWTH AREA	KEY CONSIDERATIONS	S&T ENABLER
	<ul style="list-style-type: none"> • Integrated health services: End-to-end health services that provide cost efficiencies under increased funding pressures 	<ul style="list-style-type: none"> • Data management systems • Role of local niche SME providers 	<ul style="list-style-type: none"> • Remote diagnostics
	<ul style="list-style-type: none"> • Targeted drug design: Novel and personalised treatments to address risks of disease spread 	<ul style="list-style-type: none"> • New pharmaceutical business models • Antimicrobial resistance 	<ul style="list-style-type: none"> • Genomics and epidemiology



Manufacturing

SCENARIO	POTENTIAL GROWTH AREA	KEY CONSIDERATIONS	S&T ENABLER
	<ul style="list-style-type: none"> • Intelligent and connected products and solutions: Advanced materials, sensors and communication technologies turn widgets into smart products and solutions 	<ul style="list-style-type: none"> • Data management of personal information • Required skill sets 	<ul style="list-style-type: none"> • Sensors and data analytics
	<ul style="list-style-type: none"> • Premium high-value products: Increasing wealth across Asia and Australia's resource industries offers opportunities for products with superior properties and attributes 	<ul style="list-style-type: none"> • Shift in focus toward resource-based industries • Environmental impacts 	<ul style="list-style-type: none"> • Advanced materials

Mining and METS

SCENARIO	POTENTIAL GROWTH AREA	KEY CONSIDERATIONS	S&T ENABLER
	<ul style="list-style-type: none"> • Expand METS footprint: Capitalise on Australia's mining legacy to strengthen and rapidly expand the nation's mining equipment, technology and services exports 	<ul style="list-style-type: none"> • Testing and scaling on-site technologies • Technology barriers 	<ul style="list-style-type: none"> • Digitisation, modelling and integration
	<ul style="list-style-type: none"> • Sustainable production and exports: Greener processes and value-added exports that offer superior environmental performance across the value chain and in downstream manufacturing processes 	<ul style="list-style-type: none"> • Recycling and reuse • Waste streams 	<ul style="list-style-type: none"> • In-situ recovery

Oil, gas and energy

SCENARIO	POTENTIAL GROWTH AREA	KEY CONSIDERATIONS	S&T ENABLER
	<ul style="list-style-type: none"> • Renewable exports: Services and technologies related to renewable energy integration and storage 	<ul style="list-style-type: none"> • Reducing lead time for exportable renewable technologies and services • Infrastructure planning and energy integration service opportunities 	<ul style="list-style-type: none"> • Carbon Capture Storage
	<ul style="list-style-type: none"> • Coal exports: The world seeks out cheaper energy sources 	<ul style="list-style-type: none"> • Trade relationships and energy stockpiling • Maintaining production in face of climate related weather events 	<ul style="list-style-type: none"> • Fuel diversification technologies e.g. Direct Injection Carbon Engine

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WE INNOVATE.

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CSIRO Futures is the strategic advisory and foresight arm of Australia's national science agency. We build on CSIRO's deep research expertise to help clients create sustainable growth and competitive advantage by harnessing science, technology and innovation. We are a trusted advisor to some of Australia's largest companies and government, helping senior decision-makers develop evidence-based strategies to address major opportunities and challenges.

FOR FURTHER INFORMATION

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