



Australian Government  
Australian Trade Commission



# Investment opportunities in Australian resources and energy



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## **Disclaimer**

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Front cover image: LNG facility on Curtis Island, Queensland.

# Australia. Abundant. Innovative. Sustainable.

Australia's vast mineral and petroleum resources underpin its status as a global leader in the resources and energy sector.

Australia is home to an innovative mining equipment, technology and services sector and hosts some of the world's leading mining, oil and gas conglomerates, offering investors excellent collaboration prospects and access to global supply chains.

Significant exploration opportunities in oil, gas and minerals, and a healthy pipeline of committed projects have generated a high level of demand for operations and maintenance solutions. Rising power prices and a commitment to a less carbon-intensive economy mean there is also a demand for renewables and energy efficient technologies.

These factors, combined with Australia's proximity to the energy-hungry markets of Asia, the country's rich intellectual capital and a supportive government, make Australia attractive to investors and new market entrants seeking sustainable, long-term returns.



## 12TH LARGEST ECONOMY IN THE WORLD

IMD World Economic Outlook, October 2015  
Nominal 2015E



## 5TH LARGEST ECONOMY IN THE ASIAN REGION

IMD World Economic Outlook, October 2015  
Nominal 2015E



## GDP: US\$1.3 TRILLION

IMD World Economic Outlook, October 2015  
Nominal 2015E



## AAA CREDIT RATING

Standard & Poor's, Moody's and Fitch



## POPULATION: 23.7 MILLION

(March 2015) ABS Cat. No. 3101, 24 September 2015



Maptek engineer, Kanmantoo Copper Mine, South Australia.

# Why Australia

Australia offers investors access to a growing and resilient economy, close trade and cultural links to the Asia-Pacific region and a transparent regulatory environment.

## Strong economy

Australia is in its 24th consecutive year of economic growth, a track record unequalled by any other developed nation. This growth is expected to continue with the International Monetary Fund anticipating Australia will achieve an average annual real GDP growth of 2.8 per cent between 2013 and 2019 – the highest forecast among major advanced economies.<sup>1</sup>

The resources sector is Australia's largest single export earner, accounting for around 60 per cent of total goods and services exported.<sup>2</sup> Export earnings are projected to increase at an average annual rate of six per cent a year from 2014–15 to total A\$240 billion in 2019–20.<sup>3</sup>

## Abundant resources

Australia's rich mineral and petroleum deposits and comprehensive geoscience data provide investors with compelling exploration, operations and maintenance opportunities. A substantial pipeline of new and planned projects with 25- to 50-year life cycles offers sustainable investments in mining, oil, and conventional and unconventional gas production.

## Supportive government

The Australian Government is committed to supporting the resources and energy sector, developing a policy and regulatory framework that facilitates increased international investment and participation in mining, oil and gas projects. There are also exploration incentives and research and development (R&D) tax concessions for eligible companies.

## Global network

Many of the world's largest mining and oil and gas companies and their global suppliers have longstanding operations in Australia. Investors can seek collaborations with these organisations or link into substantial supply networks across a range of resources and energy sub-sectors. There is also strong demand for maintenance and operations firms that can improve productivity and cost competitiveness within the sector.

## World-class R&D

Australia is known for developing innovative products and services for the resources and energy sector. Investors can collaborate and share in research outcomes with world-class institutions, including the national science agency, the Commonwealth Scientific and Industrial Research Organisation (CSIRO), cooperative research centres, centres of excellence and universities.

## Strategic location

Australia's proximity to high-growth Asian markets makes it an excellent base from which to export commodities, services and technologies. Mature export links, free trade agreements and a strong logistics and shipping network help exporters from Australia access these crucial markets.

1. International Monetary Fund, *World Economic Outlook Database*, October 2014.

2. Department of Industry and Science, Office of the Chief Economist, *Resources and Energy Quarterly*, June 2015, p. 72.

3. Department of Industry and Science, Office of the Chief Economist, *Resources and Energy Quarterly*, March 2015, p. 2.





# Opportunities in exploration and development

Australia is an enticing destination for resource exploration. The country has vast deposits of minerals and primary energy resources in proven, underexplored or unexplored sites. To facilitate exploration, Australia's governments (at national, state and territory levels) provide comprehensive geoscience data to help investors make informed decisions.

## Vast deposits awaiting discovery

Despite high levels of production, Australia's economic demonstrated resources (EDR) deposits for major mineral commodities have risen through discoveries at new and known sites over the past three decades. These resources can sustain current levels of mine production for many years to come.

But there is more to be found. The Australian continent remains effectively underexplored, particularly at depths of greater than 100 metres. Since 1990, 12 new world-class mineral deposits have been discovered and in 2013, several companies announced the discovery of maiden resources at their existing sites.<sup>10</sup>

## Comprehensive geoscience data

Australia's governments have developed major geoscience programs to provide explorers with pre-competitive information and datasets on brownfield and greenfield mineral provinces.

Geophysical information, including regional gravity, deep seismic and high-resolution airborne magnetic data, is supplemented with geological maps, databases of geochemical and mineral occurrences and deposits, geographic information system (GIS) datasets, reports and interpretative products.

Geoscience Australia ([geoscience.gov.au](http://geoscience.gov.au)) provides an entry point to fundamental geoscience data and information. The site allows investors and explorers to access geoscience information at a national level and refines searches down to the regional and local level via pathways to the relevant state and territory datasets.

## Multiple development-ready projects

There is a substantial pipeline of 180 publicly announced and feasibility stage projects in Australia, providing a broad range of new investment and partnership opportunities for international firms.<sup>11</sup>

As at April 2015, there were 55 projects at the publicly announced stage of the investment pipeline, with a combined value of between A\$62 billion and A\$81 billion. This pipeline includes eight iron ore projects worth over A\$11 billion, nine coal projects with a combined value of more than A\$10.7 billion, and seven oil, gas and liquefied natural gas (LNG) projects with a combined value of over A\$67 billion.

In addition, there are 125 projects at the feasibility stage of the investment pipeline, with a combined value of A\$143 billion. These include 37 coal projects with a combined value of A\$54 billion, 13 iron ore projects (A\$21 billion), and seven oil, gas and LNG projects (A\$30 billion).

10. Geoscience Australia, *Australia's Mineral Resources Assessment 2013*, Chapter 2.

11. Department of Industry and Science, Office of the Chief Economist, *Resources and Energy Major Projects*, April 2015, pp. 10-12.

An aerial photograph of a large offshore oil platform in the North Rankin Complex, North West Shelf Project, Western Australia. The platform is a complex of steel structures, including a central processing unit, a helipad with a green and yellow landing pad, and various support structures. A support vessel is visible in the lower right corner of the image. The ocean is a deep blue, and the sky is clear.

## OFFSHORE PETROLEUM EXPLORATION ACREAGE RELEASE

In Australia, offshore petroleum exploration and development is regulated by a title system. Petroleum activities can occur only if a company holds a valid title, which provides holders with an exclusive right to apply for further approvals to conduct safe petroleum operations in the area.

The issuing of new exploration permits is facilitated through the Offshore Petroleum Exploration Acreage Release. Every year, the Australian Government releases a number of vacant offshore petroleum areas for which companies can bid for exploration permits (usually within a six- or 12-month timeframe).

The 2015 Acreage Release comprises 29 areas located across eight basins in the offshore areas of the Northern Territory, the Territory of Ashmore and Cartier Islands, Western Australia, South Australia, Victoria and Tasmania. Twenty-three areas are available for work programs bidding and six areas for cash bidding. All release areas are supported by pre-competitive geological and geophysical data and analysis.

Visit [petroleum-acreage.gov.au](http://petroleum-acreage.gov.au) for more information.

# Unconventional gas

Australia has some of the world's largest reserves of proven and probable unconventional gas. These include coal seam gas (CSG), shale gas and tight gas reserves.

## Abundant resources

Australia's CSG resources are estimated to be an EDR of 35,905 PJ (33 Tcf), with an additional 65,529 PJ (60 Tcf) of sub-economic demonstrated resources and very large inferred CSG resources. EDR reserve life is estimated to be around 150 years at current rates of production.<sup>12</sup>

CSG production grew rapidly during the 2000s and now accounts for around 12 per cent of Australia's total gas production. In Queensland, it accounts for 89 per cent of gas production. The last decade's rapid growth in exploitation of Queensland's CSG resources occurred due to increased knowledge on the scale of the resource, a supportive policy environment, and opportunities to increase its economic value as an energy source for electricity generation and feedstock for LNG production.<sup>13</sup>

Shale gas production in Australia is an emerging industry. The US Energy Information Administration (EIA) estimates there is 437 Tcf of 'technically recoverable' shale gas resources in Australia, which represents nearly 400 years of Australia's current annual domestic gas usage.<sup>14</sup>

The EIA identified the Canning Basin in Western Australia as the area with the largest shale gas resources in Australia, estimated to contain 235 Tcf.<sup>15</sup> Australia's estimated shale gas resource is almost twice the size of its conventional gas resources, and almost equivalent to the resource estimate for all other sources of its gas combined.<sup>16</sup>

## Favourable project economics

In most cases, Australia's unconventional gas reserves are conveniently located close to existing and planned infrastructure, reducing development costs and financial risk.

The first commercially prospective unconventional gas basin is the Cooper Basin on the border of South Australia and Queensland, a region with existing infrastructure that has been supplying gas to south-eastern Australia for more than 40 years. Over 5,000 kilometres of pipelines have been laid from the Cooper Basin to gas markets in eastern and southern state capitals and to the liquids load-out facility at Port Bonython, South Australia.<sup>17</sup>

The CSG to LNG projects in Queensland involve the construction of three of the largest gas transmission lines in Australia (between 420 and 530 kilometres long). Each pipeline will link production wells in the Surat Basin to the LNG plants located on Curtis Island near Gladstone.

Several projects are currently being pursued to increase access to key infrastructure and transmission networks. The proposed North East Gas Interconnector is currently being progressed to link the Northern Territory's significant gas resources to eastern states.<sup>18</sup> The Australian Government also has a A\$5 billion concessional loan facility to promote infrastructure investment across northern Australia and fund major infrastructure projects such as ports, railways, pipelines and electricity generation.<sup>19</sup>

Where there is a critical mass of projects and infrastructure, gas producers can manage commercial and operational risk by investing in shared transmission infrastructure and capacity to connect their production facilities.

12. Geoscience Australia, Coal Seam Gas Fact Sheet. See: [australianminesatlas.gov.au/education/fact\\_sheets/coal\\_seam\\_gas.html](http://australianminesatlas.gov.au/education/fact_sheets/coal_seam_gas.html).

13. Department of Industry and Science, Office of the Chief Economist, Gas Market Report, November 2014, p. 3.

14. US EIA, EIA/ARI World Shale Gas and Shale Oil Resource Assessment, Chapter 3 Australia, June 2013.

15. As above.

16. Department of Industry and Science, Office of the Chief Economist, Gas Market Report, November 2014, p. 4.

17. Department of Manufacturing, Innovation, Trade, Resources and Energy, Roadmap for unconventional gas projects in South Australia, December 2012, p. 178.

18. Northern Territory Government, Department of the Chief Minister website. See: [dcm.nt.gov.au/territory\\_economy/north\\_east\\_gas\\_interconnector](http://dcm.nt.gov.au/territory_economy/north_east_gas_interconnector).

19. Infrastructure Australia website. See: [infrastructureaustralia.gov.au](http://infrastructureaustralia.gov.au).

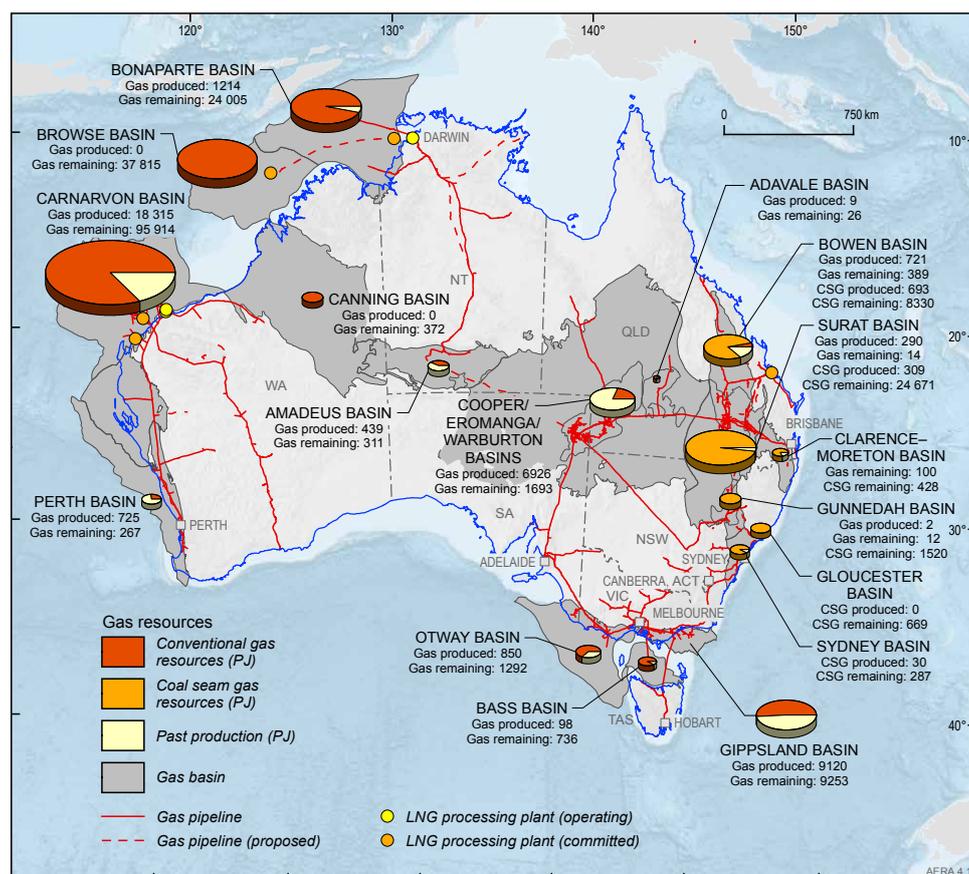
# Opportunities in operations and maintenance

Australia's substantial pipeline of brownfield and greenfield oil and gas projects offers a wealth of long-term supply chain opportunities for operations and maintenance companies. Participants can choose from a wide range of petroleum and conventional and unconventional gas projects across the country. There is also high demand for innovative mining equipment, technology and services (METS) across all resources sub-sectors.

## Oil and gas

The oil and gas sector is a major component of Australia's economy, contributing A\$29.5 billion to the country's merchandise exports in 2014.<sup>20</sup> As at April 2015, there were 27 oil, gas and LNG projects – including 13 at the committed stage – worth a combined A\$200 billion.<sup>21</sup>

**FIGURE 3: AUSTRALIA'S GAS RESOURCES**



© Commonwealth of Australia (Geoscience Australia) 2014. Source: Carson, L. 2014, Australian Energy Resource Assessment, Second Edition.

20. Australian Bureau of Statistics, Cat. No. 5368.0 International Trade in Goods and Services, Australia, Table 32a. Merchandise Exports, Industry, June 2015.

21. Department of Industry and Science, Office of the Chief Economist, *Resources and Energy Major Projects*, April 2015, p. 21.

## Large pipeline of projects

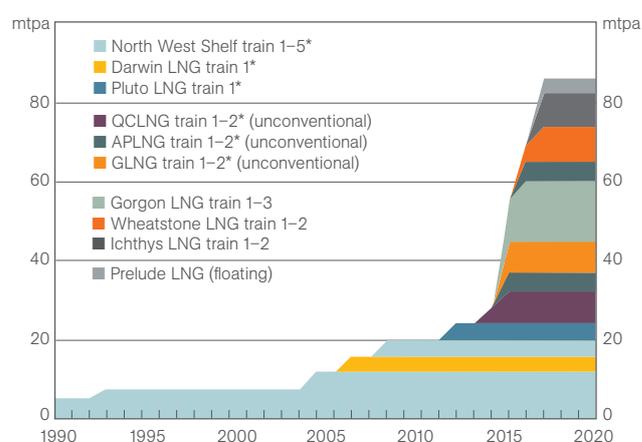
A strong pipeline of new and planned conventional oil and gas projects offers long-lasting opportunities for international investors. Based on projects that are committed or considered highly likely to proceed, the Australian oil and gas industry's total operational expenditure in the years to 2035 is estimated to be A\$411.5 billion.<sup>22</sup>

In 2013, Australia was the world's third largest LNG exporter, producing just under 10 per cent of global LNG exports.<sup>23</sup> By 2018, Australia is expected to become the largest global producer of LNG, with annual capacity of around 85 Mt.<sup>24</sup>

Between 2007 and 2012, a total of eight new LNG projects received final investment approval. Two have begun production while the remainder are under construction.<sup>25</sup> It is estimated this would represent almost a quarter of current global capacity and 60 per cent of new global capacity.

## FIGURE 4: AUSTRALIAN LIQUEFACTION

### Nameplate capacity



Source: Reserve Bank Bulletin, March 2015.

## FIGURE 5: AUSTRALIA'S LNG PROJECTS

Commence production	Project under construction	Company	Value (US\$b)	Capacity (Mt)
2015	Gorgon LNG (WA)	Chevron, Shell, ExxonMobil	54	15.6
2015	Gladstone LNG (QLD)	Santos, Total, Petronas, KOGAS	18.5	7.8
2015	Australia Pacific LNG (QLD)	Origin Energy, ConocoPhillips, Sinopec	24.7	9
2016	Wheatstone (WA)	Chevron, Woodside, KUFPEC, TEPCO, Kyushu Electric Power Company	29	8.9
2017	Prelude (WA)	Shell, INPEX, KOGAS, CPC	12.6	3.6
2017	Ichthys (NT)	INPEX, Total	34	8.4
<b>Total</b>			<b>172.8</b>	<b>53.3</b>

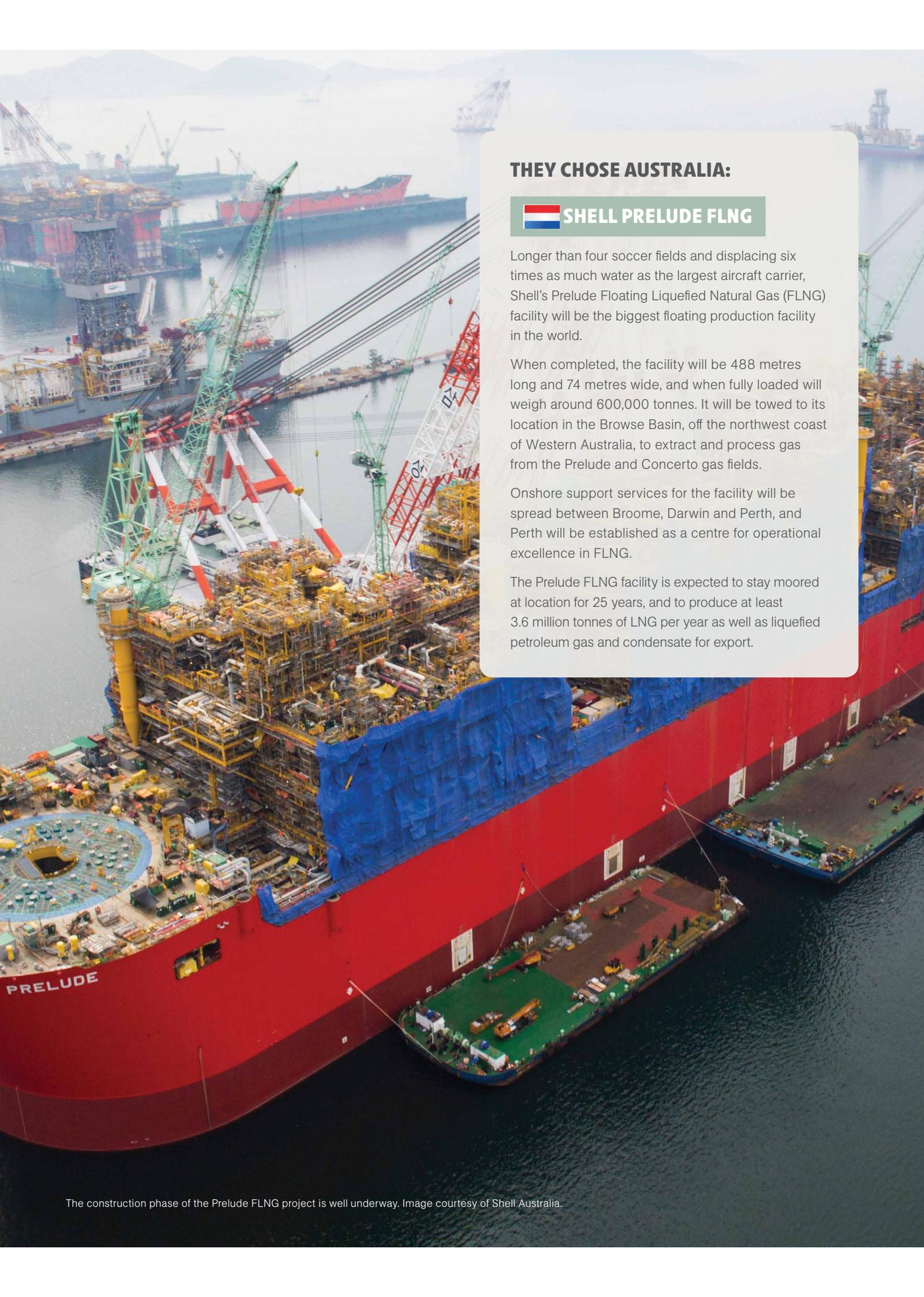
Source: Department of Industry and Science, Office of the Chief Economist, *Resources and Energy Major Projects – Projects Listing*, April 2015.

22. Deloitte Access Economics, *Advancing Australia – Harnessing our comparative energy advantage – Supplementary Analysis – Australian Petroleum Production and Exploration Association Limited*, November 2012, p. 3.

23. RBA, *Bulletin, Australia and the Global LNG Market*, March Quarter 2015, p. 35.

24. As above.

25. As above.



## THEY CHOSE AUSTRALIA:

### SHELL PRELUDE FLNG

Longer than four soccer fields and displacing six times as much water as the largest aircraft carrier, Shell's Prelude Floating Liquefied Natural Gas (FLNG) facility will be the biggest floating production facility in the world.

When completed, the facility will be 488 metres long and 74 metres wide, and when fully loaded will weigh around 600,000 tonnes. It will be towed to its location in the Browse Basin, off the northwest coast of Western Australia, to extract and process gas from the Prelude and Concerto gas fields.

Onshore support services for the facility will be spread between Broome, Darwin and Perth, and Perth will be established as a centre for operational excellence in FLNG.

The Prelude FLNG facility is expected to stay moored at location for 25 years, and to produce at least 3.6 million tonnes of LNG per year as well as liquefied petroleum gas and condensate for export.

## Tap into global supply chains and expertise

The large concentration of multinational oil and gas companies with expanding operations in Australia provides investors and international firms with significant opportunities to enter their supply chains. Many are undertaking projects that will require operational support and maintenance services. Firms offering innovative technologies that can help increase the productivity and efficiency of new and existing projects will find markets across the Australian oil and gas sector.

In Queensland's LNG industry alone, new entrants can participate in:

- › **upstream activities:** An estimated 350 to 500 new wells per annum need to be drilled, presenting opportunities for drill rig service companies
- › **midstream activities:** Up to four underground, high-pressure gas transmission pipelines are needed to link gas fields, creating maintenance opportunities
- › **downstream activities:** The establishment of six LNG trains by 2016 will mean that each liquefaction facility requires substantial services during the construction period and over its operational lifetime.

The critical mass of participants within the oil and gas sector reduces risk for new entrants, who can spread their activities across different customers, geographies, sub-sectors and projects. Newcomers can further reduce risk and costs by entering the Australian market through partnerships and joint ventures with local supply chain companies. Support services include:

- › **Project Connect:** An online service that lists project opportunities and connects Australian businesses with industry suppliers
- › **Achilles Supply Base:** A vendor pre-qualification and supplier management system for the oil and gas sector
- › **Industry Capability Network:** An independent networking organisation that connects local suppliers and service providers to meet the requirements of local projects
- › **Industry Technology Facilitator:** A not-for-profit organisation comprising members of the oil and gas industry that focuses on identifying technology needs, fostering innovation and facilitating the development and implementation of new technologies.

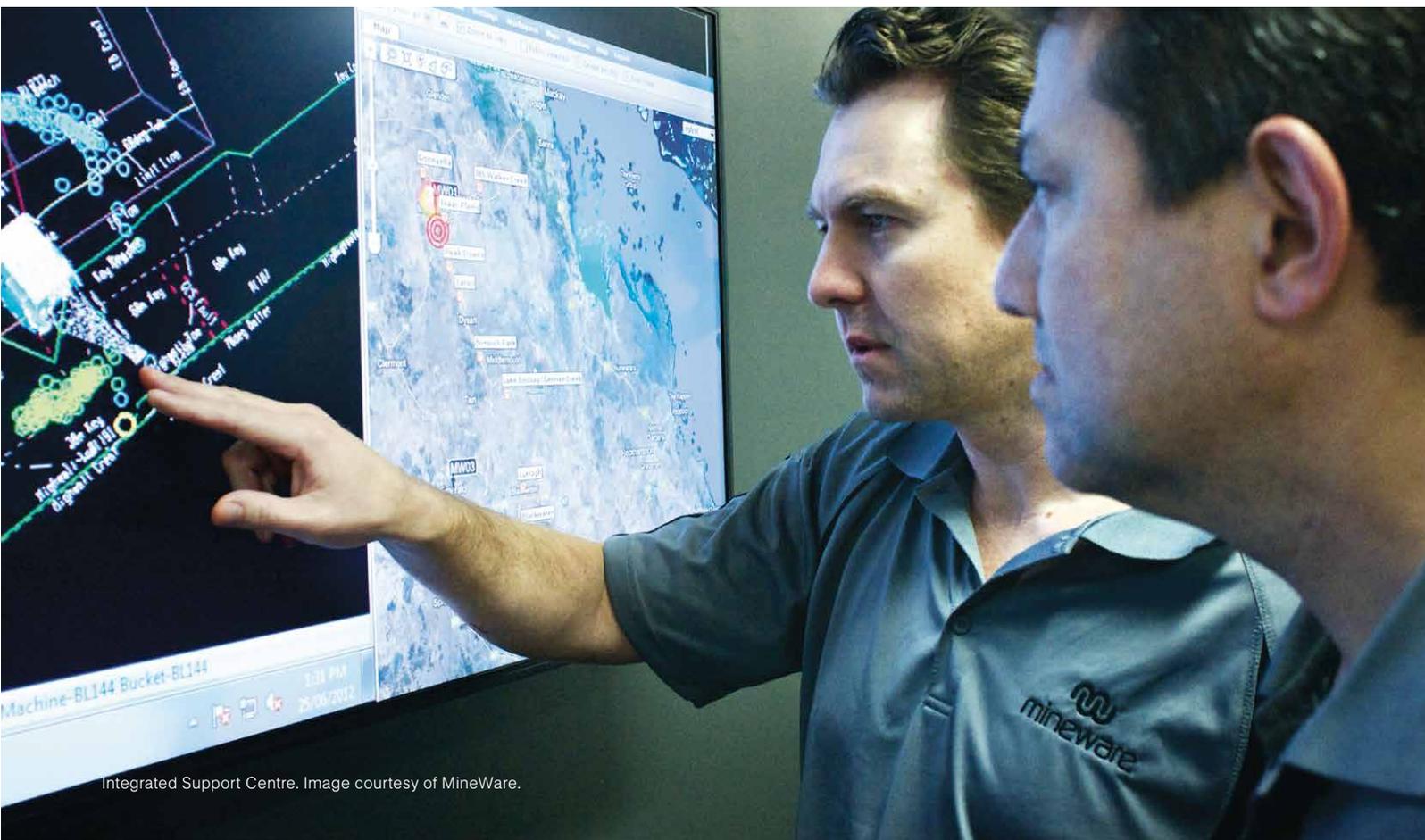
Investors can also learn from the experience of global companies operating in Australia, who bring knowledge of contemporary extraction methods developed in Australia and other leading oil, conventional and unconventional gas jurisdictions such as Canada and the USA.

Global companies with oil and gas operations in Australia include Chevron, ConocoPhillips, ExxonMobil, PetroChina and Shell. Engineering, procurement and construction management firms such as Bechtel, Halliburton, Mitsubishi, Schlumberger and Technip also have businesses in Australia.

## Innovative R&D in oil and gas

Investors can participate in research activities with Australia's world-class research institutions, universities and centres of excellence. For example, Australia is home to:

- › Chevron's second Global Technology Centre, IBM's fifth oil and gas research centre, and Shell's first floating LNG training and research facility
- › CSIRO, which is developing new technologies for oil and gas exploration and production, with a focus on petroleum systems, oil recovery, flow assurance and unconventional gas
- › Queensland University of Technology's Institute for Sustainable Resources, which has partnered with Schlumberger to establish a geotechnical laboratory
- › University of Queensland's Centre for Coal Seam Gas, which undertakes research in water, geophysics and geochemistry of CSG, petroleum engineering, and social performance and community impact
- › Australian Resources Research Centre
- › Western Australian Energy Research Alliance
- › University of Western Australia Institute of Energy and Minerals.



Integrated Support Centre. Image courtesy of MineWare.

### THEY CHOSE AUSTRALIA:

#### ENERSIGHT CORPORATION

In 2013, Canadian oil and gas software provider Enersight Corporation opened an office in Brisbane, its first outside North America. The Canadian company expanded into Australia after attracting a second Australian client that converts CSG to LNG. The company says adding a second CSG-to-LNG client has made it the dominant player in Australia's unconventional field development planning market.

'In addition to its large coal seam gas projects, Australia has a burgeoning unconventional industry for shale gas and oil,' says Don Merritt, Vice President for Enersight Australia. 'Being the dominant player in the North American shale gas planning market, we are very excited by the potential for growth of Enersight in Australia.'<sup>26</sup>

### THEY CHOSE AUSTRALIA:

#### MINESENSE TECHNOLOGIES

Canadian company MineSense Technologies provides products and services that improve the ore recovery process. Its proprietary ground-penetrating sensor technology integrates with material-handling equipment to measure and report the grade of the ore.

In December 2012, MineSense established a subsidiary in Brisbane, Queensland. The city's strategic location across three international time zones, proximity to many of Australia's largest resource and mineral deposits – including coal, base metals, CSG and petroleum – and highly skilled workforce make it an ideal location for the company's business.

MineSense is also a member of the Australian Cooperative Research Centre for Optimising Resource Extraction (CRC ORE). MineSense's technological capabilities combine with CRC ORE's innovative early waste removal approaches to provide ore upgrading opportunities to customers.<sup>27</sup>

26. See: [austrade.gov.au/Invest/Investor-Updates/2013/0815/Canada-s-Enersight-expands-to-Australia](http://austrade.gov.au/Invest/Investor-Updates/2013/0815/Canada-s-Enersight-expands-to-Australia).

27. See: [minesense.com/news/385](http://minesense.com/news/385).

# Mining equipment, technology and services

As one of the world's largest producers of resources and a major market for several global mining conglomerates, Australia is a prime destination for companies in the METS sector. International firms will find a ready market for innovative solutions and exciting opportunities to partner with local firms on R&D initiatives.

## Diversified market looking for innovative solutions

Attracted by Australia's rich and diverse resources, many multinational resources companies have operations here, many of which have a high demand for METS and prefer their suppliers to co-locate.

Australia's resources sector has fuelled much of its economic development in recent years, and continuing demand from Asia's growth markets for Australian commodities means the outlook remains positive. However, the sector is transitioning from the investment to the production phase. It is continually looking for ways to improve productivity and reduce costs, including through embracing innovation and adopting sustainable operating models and reporting systems. The focus is on improving asset management and maintenance, and streamlining production from existing operations.

With several projects commencing commercial production, METS companies with solutions to these challenges will find many business opportunities in Australia.



Mine worker using customised software. Image courtesy of MRT.

## Partnering opportunities

The Australian METS sector is globally renowned for the quality and sophistication of its products and services. The METS industry contributed more than A\$90 billion to the Australian economy in 2012, with current exports exceeding A\$27 billion. The industry has grown roughly five-fold over the past 15 years. As at 2013, there were more than 270 METS firms.

Australian METS firms are active across the complete mining supply chain including exploration, mine development, education and training, equipment and supplies, mine safety and communication, mine software and consulting, water management, environmental management and rehabilitation, and mineral processing and beneficiation.

The multifaceted sector offers a wealth of partnering opportunities for new entrants on both Australian and global mining projects.

## Mining optimisation: sensing and data analytics

Australia has an established track record in mining IT innovation, combining strengths in complex data analytics and sensor technologies to develop novel solutions that assist global companies in simulating, visualising and monitoring all aspects of mine operation. Capability areas include 3D mapping, predictive maintenance and condition monitoring, remote automation and robotics, and optimised resource extraction.

## Innovative R&D in METS

The Australian mining industry is one of the largest investors in R&D in Australia, injecting A\$2.83 billion in 2013–14. There are opportunities for international METS firms to access state-of-the-art public and private R&D facilities and work with researchers who are leaders in their field.

There are also numerous private R&D facilities in Australia focused on exploration, mining technologies and training, including:

- › Alcoa Technology Delivery Group
- › Outotec Global Competence Centre for Grinding Technologies
- › Metso Global Centre of Excellence
- › BASF Global Mining Research and Development Centre
- › BHP Global Technology Centre
- › GE Skills Development Centre
- › IBM Natural Resources Solution Centre
- › Rio Tinto Centre for Materials and Sensing.

# Opportunities in energy efficiency and renewables

Energy efficiency and renewables are emerging industries with enormous growth potential in Australia. As the country moves to a less carbon-intensive economy, its diverse renewable energy sources and access to innovative R&D provide significant opportunities for international investors. There are also opportunities to invest in providing off-grid solutions, including to companies in energy-intensive industries such as mining and manufacturing.

## Growing demand for renewable energy and energy storage

The Australian Government has agreed to a greenhouse gas emissions target of 26 to 28 per cent below 2005 levels by 2030. The Government has allocated A\$500 million in 2015–16 and A\$750 million in 2016–17 to purchase emission reductions from successful bidders at the lowest cost. The Australian Government has also introduced a Renewable Energy Target (RET) that will result in more than 23.5 per cent of Australia's electricity being derived from renewable sources by 2020.<sup>28</sup>

The strong uptake of renewable energy is leading the growth in energy storage technologies in Australia. As the price of energy storage technology comes down, it opens up more opportunities for energy storage trial projects in Australia's energy wholesale, transmission and distribution network, end user, and off-grid markets.<sup>29</sup>

## Diverse renewable energy resources

Australia has significant and widely distributed wind, solar, geothermal, ocean and bioenergy sources that are largely underdeveloped.

### Wind

Australia has some of the best wind resources in the world, primarily located in south-western, southern and south-eastern coastal regions but also extending hundreds of kilometres inland.<sup>30</sup> Australia's substantial onshore wind resources provide significant potential for large-scale grid-connected wind farms.

### Solar

Australia has the highest solar radiation per square metre of any continent in the world. Opportunities exist for small- and large-scale deployment of grid-connected systems and off-grid remote locations.

### Geothermal

Australia has considerable hot rock and hot sedimentary aquifer resources. The local industry is progressing through proof-of-concept projects. Opportunities exist for further demonstration projects offering 'first-mover' advantages.

### Ocean energy (wave and tidal)

Australia has large undeveloped ocean resources with demonstration projects in progress. As the technology advances towards commercial readiness, there are substantial resources available for development.

### Bioenergy

Potential bioenergy resources in Australia are large and diverse. Unused biomass residues and wastes are a significant under-exploited resource. The commercialisation of second-generation technologies will open up a range of new feedstock from non-edible biomass for biofuels and electricity generation.

28. Department of the Environment. See: [environment.gov.au/climate-change/renewable-energy-target-scheme](http://environment.gov.au/climate-change/renewable-energy-target-scheme).

29. AECOM, Energy Storage Study, Funding and Knowledge Sharing Priorities, 13 July 2015, pp. 77-78.

30. Geoscience Australia, Australian Energy Resource Assessment – second edition, 2014, Section 9.1.2.

# Innovative R&D in energy efficiency and renewables

International companies can partner with and seek out commercialisation opportunities with Australia's globally renowned scientific research institutions and universities. This includes organisations such as the CSIRO, which have a number of research programs and demonstration projects on renewable energy technology.

## Going off the grid

The off-grid industrial sector is a market with significant growth potential. It consumes 12.4 TWh of energy per annum or 79 per cent of total off-grid electricity produced. The value of the Australian off-grid market has been estimated at A\$600 million.<sup>31</sup> This consists of approximately 213 MW of renewable project opportunities in the short to medium term and an additional 854 MW or more than A\$2 billion in the longer term.

## THEY CHOSE AUSTRALIA:



Located at the Tonsley precinct in Adelaide, a new Siemens workshop for servicing turbines and heavy equipment is helping South Australia compete as a national centre for technology and engineering.

The new Siemens turbine maintenance workshop demonstrates how key 'Industry 4.0' principles are implemented. For instance, the new workshop has a reduced footprint, delivers up to 65 per cent more output than previously possible and has a 22 per cent faster turnaround time for maintenance work.

The workshop is adjacent to TAFE South Australia and Flinders University, and Siemens is working closely with research and education partners to build a vibrant culture of innovation and collaboration.

## THEY CHOSE AUSTRALIA:



In March 2014, French company Neoen and partner Megawatt Capital Investments acquired the 270 MW Hornsdale Windfarm project from Investec.

The project, located near Jamestown in South Australia, will take advantage of exceptional winds to become one of Australia's most competitive renewable wind installations. Construction is due to start late 2015 and be completed by early 2017, according to Franck Woitiez, Managing Director, Neoen Australia.

At the ACT's first wind-energy reverse auction in February 2015, Neoen and Megawatt Capital Investments were awarded a 20-year feed-in-tariff for the 100 MW first stage of the project.

Hornsdale Windfarm is expected to deliver enough energy to meet 15 per cent of Canberra's electricity needs. This is expected to result in a 372,000 tonne reduction in the ACT's carbon emissions each year – the equivalent of taking 108,000 cars off the road.

## Solar plants

Neoen is very much in expansion mode, with plans to install several solar plants ranging from 10–30 MW in size around New South Wales in Dubbo, Narromine, Griffith, Parkes and Gilgandra.

This trend is evidenced by Neoen's recent acquisition of the DeGrussa solar hybrid power plant – Australia's largest off-grid power plant developed, built and operated by German energy company juwi AG. It will also reduce diesel consumption and cut carbon emissions by more than 12,000 tonnes of CO<sub>2</sub>.

The 10.6 MW solar power plant, containing 34,080 solar panels spread over 20 hectares, will be built in the desert at the DeGrussa copper and gold mine about 900 kilometres from Perth.

The project was acquired with the assistance of the Clean Energy Finance Corporation, which committed nearly A\$15 million in finance, while the Australian Renewable Energy Agency provided A\$20.9 million.

31. AECOM, Australian Remote Renewables: Opportunities for Investment, September 2013, p. 3.

## THEY CHOSE AUSTRALIA:



**FIRST SOLAR**

Rio Tinto is on track to reduce power costs using solar energy at its Weipa bauxite mine in Queensland, which began operating in August 2015. US company First Solar developed the 1.7-MW solar power plant comprising 18,000 PV solar panels that incorporate its thin-film technology. The venture is believed to be the first between the solar energy industry and a major miner.

According to Jack Curtis, vice-president of business development in Asia at First Solar, the project could act as a template for similar undertakings with other miners in Australia and overseas.

'We really see this project, and Australia as a market, as the incubation location for a much more global platform for global collaboration with mining companies like Rio Tinto,' says Curtis in an interview with the *Australian Financial Review*.

'What we find very encouraging about this project is that Rio Tinto has no reason to participate in the solar industry but for the fact that it does provide them with a commercial and economic alternative that is viable,' he adds. 'It validates to us that solar has a much bigger role to play outside the renewable space and in much larger industries such as mining.'

# A gateway to Asia

Ten of Australia's top 12 export markets are in the Asian region. Resources and energy companies can take advantage of Australia's proximity to Asia – and its strong trade, investment and cultural ties – to enter the world's most energy-hungry and industrialising markets.

Australia is a major supplier of resources and energy to the region. In 2013–14, the country's total energy and resources exports were A\$195 billion. More than 86 per cent of these exports – worth over A\$160 billion – went to Asian countries.<sup>32</sup> With vast deposits of oil, gas and mineral resources, Australia is well positioned to continue supplying Asia.

## Free trade agreements

Australia has nine FTAs currently in force, with countries covered by these FTAs accounting for 42 per cent of Australia's total trade. This coverage will increase significantly as the recently concluded FTA with China, accounting for 23 per cent of Australia's trade, comes into force once ratified by the Australian Parliament (forecast to be late 2015).

Negotiations in the Trans-Pacific Partnership (TPP) Agreement, of which Australia is a member, concluded in October 2015. The deal now faces ratification by each of the 12 member countries.

A further five FTA negotiations are being undertaken – two bilateral FTAs and three plurilateral FTAs. These FTAs will further help exporters from Australia access new markets and expand trade in existing markets. The countries covered by these negotiations account for a further six per cent of Australia's trade.

### FTAs in force

- › ASEAN-Australia-New Zealand FTA
- › Australia-Chile FTA
- › Australia-New Zealand Closer Economic Relations
- › Australia-United States FTA
- › Japan-Australia Economic Partnership Agreement
- › Korea-Australia FTA
- › Malaysia-Australia FTA
- › Singapore-Australia FTA
- › Thailand-Australia FTA

### FTAs signed (but not ratified)

- › China-Australia FTA
- › Trans-Pacific Partnership (TPP) Agreement<sup>33</sup>

### FTAs under negotiation

- › Australia-Gulf Cooperation Council (GCC) FTA
- › Australia-India Comprehensive Economic Cooperation Agreement
- › Indonesia-Australia Comprehensive Economic Partnership Agreement

- › Pacific Agreement on Closer Economic Relations (PACER) Plus<sup>34</sup>
- › Regional Comprehensive Economic Partnership (RCEP)<sup>35</sup>
- › Trade in Services Agreement (TISA)<sup>36</sup>

## A sophisticated logistics network

Australia has a sophisticated logistics network that offers extensive, frequent and timely services to Asia. A strong outbound shipping capacity services Asian markets, with more than 10 companies offering weekly services to China.

## An investment destination for Asian firms

Many of Asia's leading multinational companies have made large and ongoing investments in Australia's resources and energy sector, including:

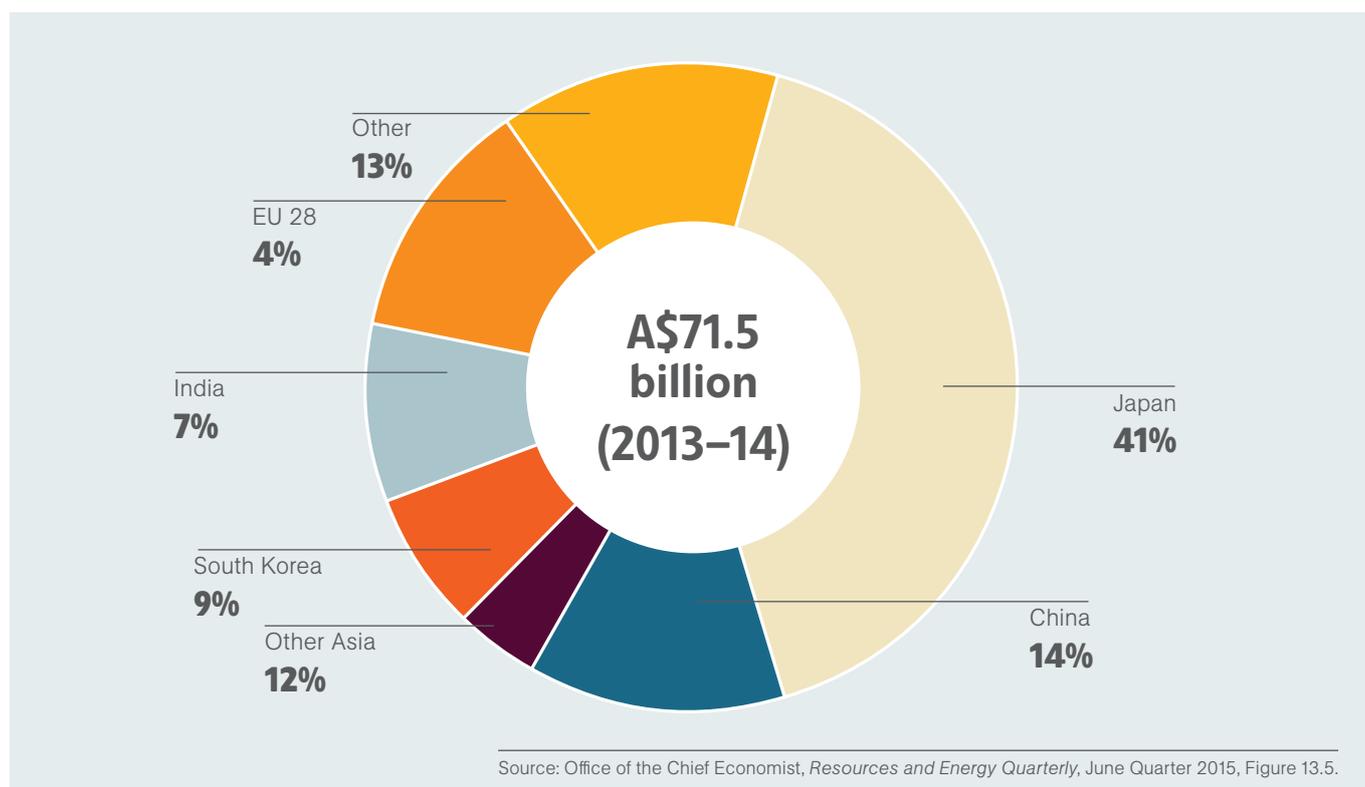
- › Adani
- › Baosteel
- › China Steel Group
- › Formosa
- › INPEX
- › KOGAS
- › Mitsui
- › POSCO
- › Samsung
- › Sinopec.

### THEY CHOSE AUSTRALIA:

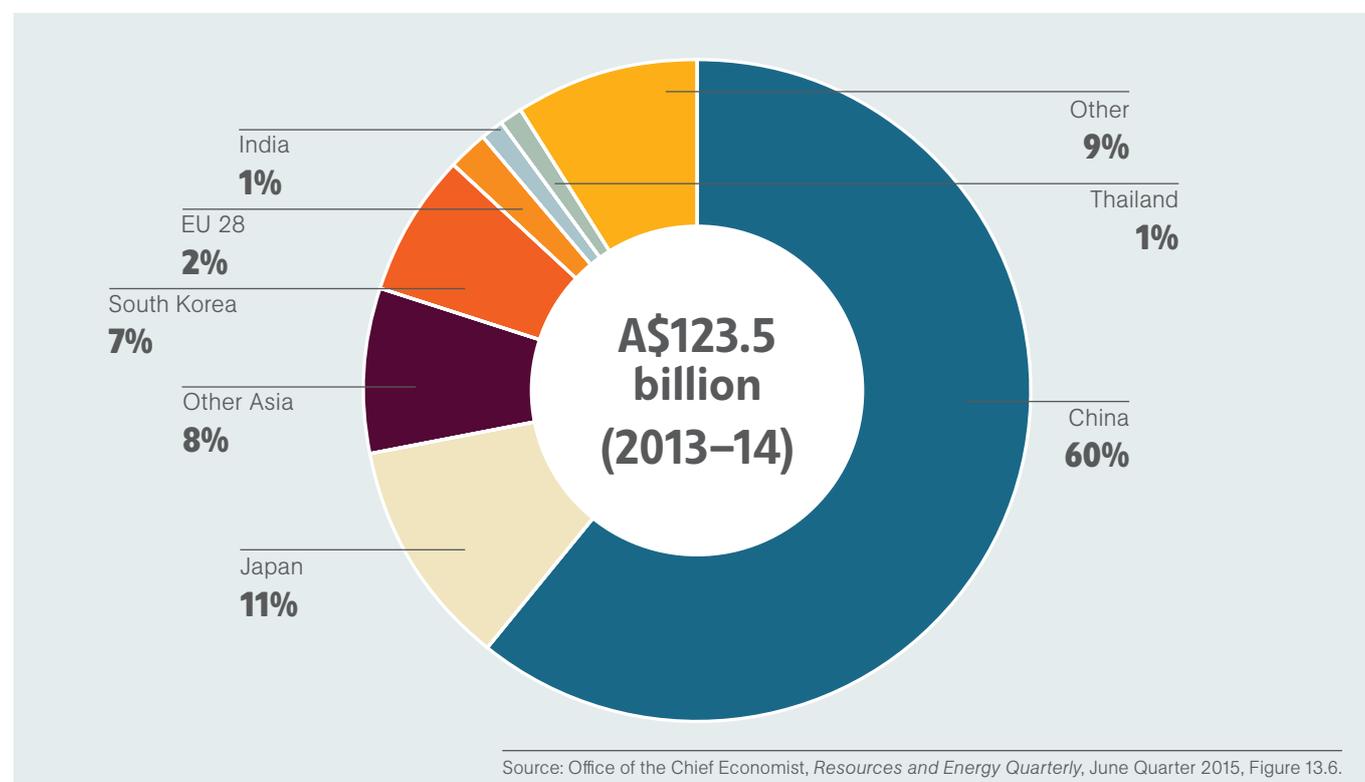
#### LANDBRIDGE GROUP

In November 2014, China's Landbridge Group, a privately owned company based in Shandong Province, invested A\$200 million in Australia's oil and gas sector through its acquisition of Brisbane-based WestSide Corporation. This strategic acquisition provides Landbridge Group with significant reserves and exploration interests in Queensland.

**FIGURE 6: EXPORT DESTINATIONS FOR AUSTRALIA'S ENERGY COMMODITIES**



**FIGURE 7: EXPORT DESTINATIONS FOR AUSTRALIA'S RESOURCES COMMODITIES**



32. Department of Foreign Affairs and Trade website, *Free Trade Agreement – About free trade agreements*. See: [dfat.gov.au/trade/agreements](http://dfat.gov.au/trade/agreements).

33. TPP: Australia, Brunei Darussalam, Canada, Chile, Japan, Malaysia, Mexico, New Zealand, Peru, Singapore, the United States and Vietnam.

34. PACER Plus: Australia, Cook Islands, Kiribati, Marshall Islands, Micronesia, Nauru, New Zealand, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu.

35. RCEP: ASEAN members and Australia, China, India, Japan, Korea and New Zealand.

36. TiSA: Australia, the United States and EU, with a subset of WTO members.

# An innovative location

Australia is globally renowned as an innovative country. A modern ICT infrastructure, high levels of investment, generous R&D tax incentives for business, and strong intellectual property protection have helped Australia develop an illustrious record of world-class R&D outcomes and capabilities.

## Commonwealth Scientific and Industrial Research Organisation

CSIRO is ranked in the top one per cent of scientific institutions worldwide in 15 of 22 research fields. Its National Research Flagships bring together Australian universities, publicly funded research institutions, the private sector and international organisations in large-scale multidisciplinary research partnerships.

CSIRO undertakes significant research across the resources and energy sector. The Minerals Down Under Flagship works across the minerals value chain to grow Australia's resource base, increase the productivity of the minerals industry and reduce its environmental footprint.

## Cooperative Research Centres

The Cooperative Research Centre (CRC) program provides businesses with an opportunity to pursue public-private research collaborations that aim to achieve commercial outcomes.

Twenty-two CRCs linked to the resources and energy sector have undertaken collaborations across the world. These collaborations have involved leading Australian and international commercial players and Australia's best research institutions. CRCs active in 2015-16 include:<sup>37</sup>

- › CRC for Optimising Resource Extraction
- › Deep Exploration Technologies CRC.

## Other public R&D facilities

Australia has a number of public facilities that focus on resources and energy R&D, including:

- › ARC Centre of Excellence in Ore Deposits (CODES)
- › Australian Centre for Geomechanics
- › Australian Geophysical Observing System
- › Australian Resources Research Centre
- › Centre for Exploration Targeting
- › Centre for High Definition Geophysics
- › Curtin Institute of Minerals and Energy
- › Minerals and Energy Research Institute of Western Australia
- › University of Queensland Sustainable Minerals Institute
- › University of Western Australia Institute of Energy and Minerals.

## R&D Tax Incentive

The Australian Government's R&D Tax Incentive program aims to help more businesses innovate by offsetting some of the costs of R&D. It is open to firms of all sizes in all sectors that are conducting eligible R&D.

The program's two components are:

- › a 43.5 per cent refundable tax offset to eligible entities with an aggregated turnover of less than A\$20 million per annum
- › a 38.5 per cent non-refundable tax offset for all other eligible entities (entities may be able to carry forward unused offset amounts to future income years).

37. Department of Industry and Science, CRC Directory, July 2015-16, p. iii.



## THEY CHOSE AUSTRALIA:



**CHEVRON**

### GLOBAL TECHNOLOGY CENTRE

Chevron's Global Technology Centre (GTC) in Perth was established in 2007 to align with the company's long-term energy growth strategy.

Chevron is the operator and a major joint-venture partner in the massive Gorgon and Wheatstone LNG projects. Perth was selected as the location of the GTC due to its talented regional technology experts, proximity to Chevron's interests in the region, and opportunities to pursue R&D alliances with universities and industry partners.

The centre provides R&D services and integrated technology solutions in process safety, environmental stewardship, LNG processing, subsea engineering, technical geophysics, exploration, reservoir management, enhanced oil recovery and deep water operations. It works closely with Curtin University, the University of Western Australia and the CSIRO.<sup>38</sup>

## THEY CHOSE AUSTRALIA:



**IBM NATURAL RESOURCES**

### SOLUTION CENTRE

Located in Perth, IBM's Natural Resources Solution Centre is a state-of-the-art facility where resources and energy companies can fast-track the development of innovative technologies and business strategies.

<sup>38</sup> See: [chevrontechnology.com/our-businesses/technology-leadership-and-partnerships/global-technology-centre](https://www.chevrontechnology.com/our-businesses/technology-leadership-and-partnerships/global-technology-centre).

# A supportive regulatory environment

The Australian Government recognises the significant contribution of the resources and energy sector to the economy. It has announced several measures to encourage investment, including investing in the resources and energy sub-sectors that are crucial to Australia's long-term economic growth and future prosperity.

## Exploration Development Incentive

New discoveries are vital to the resources and energy sector. To encourage exploration for new mineral deposits, the Australian Government is providing A\$100 million over three years (ending in 2016–17) for an Exploration Development Incentive. The incentive will allow small exploration companies to deduct the cost of greenfield exploration costs against their taxable income.

## One-stop shop for environmental assessments

The Australian Government is committed to removing perceived 'green' tape. In December 2013, it reached an agreement with all Australian state and territory governments to establish a single approval process for environmental assessments and approvals.

The 'one-stop shop' eliminates duplication and expedites approval processes, making it easier and faster for companies to embark on exploration projects while ensuring they meet high standards of environmental protection.

The Australian Government has also signed a new assessment bilateral agreement with the Queensland Government. A bilateral assessment agreement with the New South Wales Government is being finalised.

## Streamlined regulatory processes

In February 2014, a new streamlined approach for offshore petroleum and greenhouse gas activity environmental approvals came into effect, reducing regulatory burden while maintaining high environmental standards. The process removes duplication between two sets of laws, and is expected to save industry and environmental groups an estimated A\$120 million annually.

The National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) will be the sole assessor for offshore petroleum and greenhouse gas activities in Australian waters. Established in 2012, NOPSEMA ensures Australia's offshore petroleum and greenhouse gas storage industries are safe and environmentally responsible, and conform to best-practice regulations.

## Boosting national productivity and competitiveness

The Australian Government is undertaking initiatives to boost the productivity and competitiveness of the resources and energy sector, particularly in relation to skills and labour. These include:

- › conducting a review of the vocational education and training sector
- › improving labour laws and reviewing Australia's workplace relations framework
- › reviewing the working visa requirement and framework.

# Key industry and government agencies

## Australian Government

Commonwealth Scientific and Industrial Research Organisation (CSIRO)	Australia's national science agency, CSIRO is the country's leading multidisciplinary research organisation. It plays a vital role in enhancing collaboration within the Australian national innovation system.	<a href="http://csiro.au">csiro.au</a>
Department of Industry, Innovation and Science	Australian Government agency focused on driving economic growth, productivity and competitiveness by bringing together industry, energy, resources, science and skills.	<a href="http://industry.gov.au">industry.gov.au</a> <a href="http://business.gov.au">business.gov.au</a>
Geoscience Australia	National geoscience agency that provides geoscientific advice and information to the Australian Government, industry and other stakeholders.	<a href="http://ga.gov.au">ga.gov.au</a>
Office of the Chief Economist	Provides independent economic research, data, analysis and advice to governments, industries and other stakeholders on issues affecting Australia's energy and resources sectors.	<a href="http://industry.gov.au/Office-of-the-Chief-Economist">industry.gov.au/Office-of-the-Chief-Economist</a>

## State and territory governments

Australian Capital Territory Government	<a href="http://business.act.gov.au">business.act.gov.au</a>
New South Wales Government	<a href="http://industry.nsw.gov.au">industry.nsw.gov.au</a>
Northern Territory Government	<a href="http://investnt.com.au">investnt.com.au</a>
Queensland Government	<a href="http://business.qld.gov.au/invest">business.qld.gov.au/invest</a>
Government of South Australia	<a href="http://statedevelopment.sa.gov.au">statedevelopment.sa.gov.au</a>
Tasmanian Government	<a href="http://investtasmania.com.au">investtasmania.com.au</a>
Victorian Government	<a href="http://invest.vic.gov.au">invest.vic.gov.au</a>
Government of Western Australia	<a href="http://dsd.wa.gov.au">dsd.wa.gov.au</a>

Industry organisations		
Austmine	An industry body representing the Australian mining equipment, technology and services sector.	<a href="http://austmine.com.au">austmine.com.au</a>
Australian Petroleum Production and Exploration Association	The peak body representing Australia's oil and gas exploration and production industry.	<a href="http://appea.com.au">appea.com.au</a>
Industry Capability Network	An independent networking organisation that connects local suppliers and service providers to meet the requirements of local projects.	<a href="http://icn.org.au">icn.org.au</a>
Minerals Council of Australia	Represents Australia's exploration, mining and minerals processing industry, nationally and internationally, in its contribution to sustainable development and society.	<a href="http://minerals.org.au">minerals.org.au</a>
Clean Energy Council	The peak body representing Australia's clean energy sector. An industry association made up of more than 550 member companies operating in the fields of renewable energy and energy efficiency.	<a href="http://cleanenergycouncil.org.au">cleanenergycouncil.org.au</a>
Australian Renewable Energy Agency	A commercially oriented agency established to improve the competitiveness of renewable energy technologies, and increase the supply of renewable energy in Australia.	<a href="http://arena.gov.au">arena.gov.au</a>

# How Austrade can help

## How Austrade can help

The Australian Trade Commission – Austrade – contributes to Australia's economic prosperity by helping Australian businesses, education institutions, tourism operators, governments and citizens as they:

- › develop international markets
- › win productive foreign direct investment
- › promote international education
- › seek consular and passport services.

## What we provide

Working in partnership with Australian state and territory governments, Austrade provides international investors with the information needed to establish or expand a business in Australia. Services for international investors include:

- › initial coordination of investment enquiries and assistance
- › information on the Australian business and regulatory environment
- › market intelligence and investment opportunities
- › identifying suitable investment locations and partners in Australia
- › advice on Australian government programs and approval processes.

## Accessing Austrade's investment services

Austrade's investment services are free of charge and are focused on productive foreign direct investment outcomes of strategic importance to the Australian economy, to build capability and enhance productivity.

[austrade.gov.au/invest](https://austrade.gov.au/invest)

[info@austrade.gov.au](mailto:info@austrade.gov.au)



Australian Government  
Australian Trade Commission



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