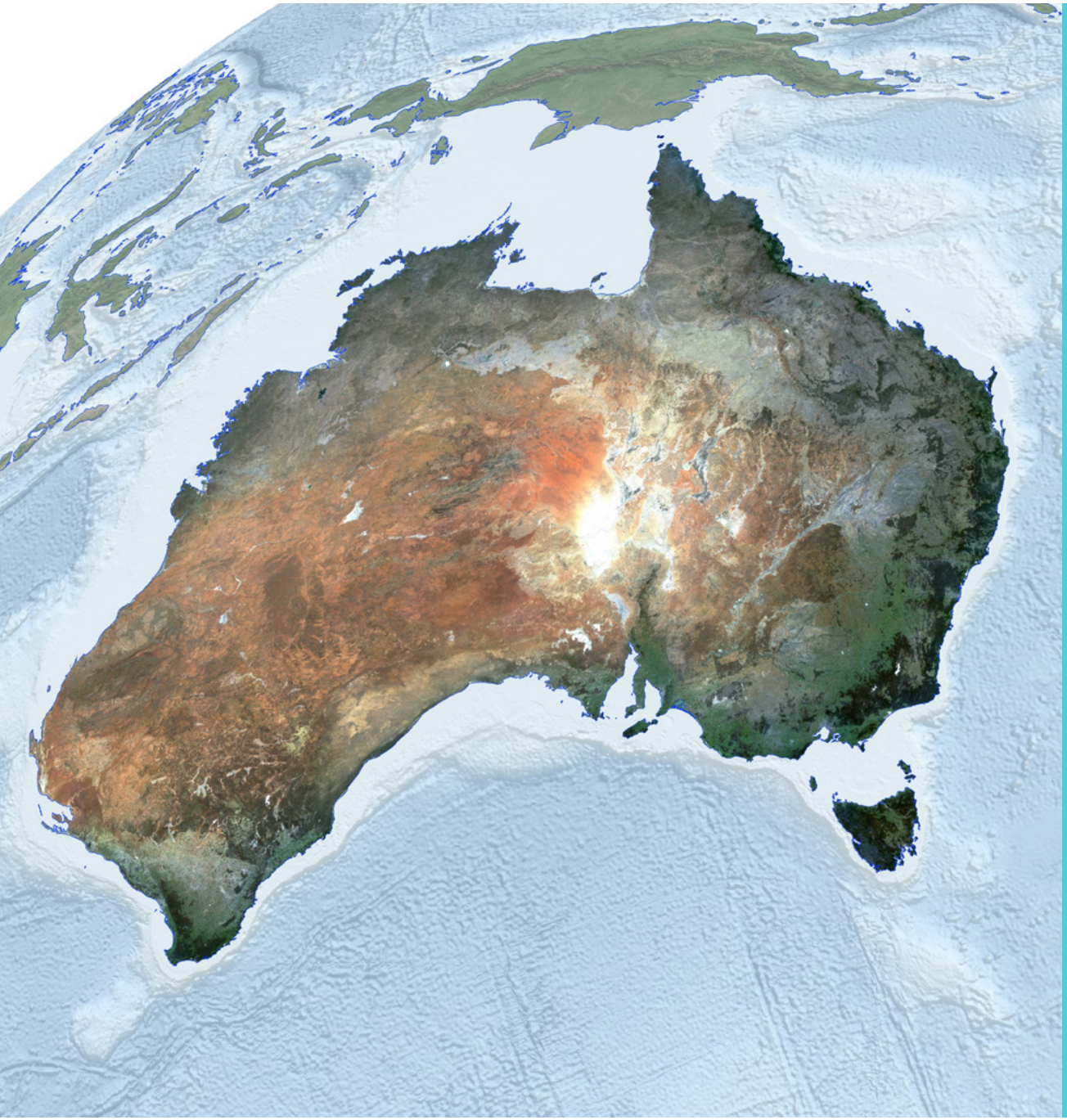

Resources 2030 Taskforce

Australian resources—providing prosperity for future generations

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Front cover image: Satellite image of Australia. An Australian winter as seen from the spectral bands of a satellite. This image combines hundreds of images between 2013 and 2015 into a typical winter view of Australia from space.
Image source: GeoScience Australia

Resources 2030 Taskforce

Australian resources—providing prosperity for future generations

Contents

Chair's Foreword

In accordance with the Terms of Reference and on behalf of the other Taskforce Members, I am pleased to present the final report prepared by the Resources 2030 Taskforce for Senator the Hon Matthew Canavan, Minister for Resources and Northern Australia. This report contains 29 recommendations spanning a number of thematic topics that seek to ensure Australia's resources sector can continue to provide prosperity for future generations.

Australia's resources sector is undeniably strong and widely regarded as a model of excellence. However, global changes and opportunities arising in all areas of the sector are so significant and rapid that we must adapt and improve to maintain and strengthen our global standing.

This report contains recommendations that the Resources 2030 Taskforce believes will best help the sector advance and be more globally competitive in the medium to long term. These recommendations were formed after months of consultation across the resources sector and will form the bedrock of the first National Resources Statement for almost 20 years. They will ultimately benefit all Australians.

It is clear from the numerous and considered submissions we received from sector experts that many things should and can change. It is equally clear that this will not be easy. As the report states, government and industry need to tackle some contentious and complex issues.

We believe one priority should be for the Australian Government to take leadership in reforming and consolidating regulations to reduce duplication. Unnecessary duplication is one of the most significant inhibitors of the sector's progress.

As the states and territories carry most of the regulatory burden, the federal government should lead at the national level and set an example for jurisdictions on appropriate reforms. This is imperative for many reasons, not the least of which is that tomorrow's competitive resources sector must ensure its operations are appropriately regulated and broadly supported by communities.

Closely linked to the reform and consolidation of regulations is the need for federal, state and territory governments to cooperate and collaborate more effectively, especially on policies and legislation. The various industry players throughout the resources sector must also improve how they interact. This includes those specialising in geoscience and exploration through to those in research and development, engineering, the equipment and technology services sector, minerals processing, and community engagement, including engagement with Indigenous people.

Delivering bold reforms cannot happen without such partnerships. To this end, the taskforce recommends re-invigorating the resources agenda of the Council of Australian Governments' Energy Council. Although energy was not within the taskforce's scope, it is clear from submissions that if the resources sector is to strengthen its standing and add value, it will need to rely heavily on access to affordable and reliable power. This is particularly relevant to efforts to develop and diversify the economies of regional communities.

As the National Resources Statement is developed, the Minister for Resources and Northern Australia will further consider how the taskforce's recommendations will be implemented. However, we envisage that industry and all levels of government will share in funding initiatives. We also strongly believe that the National Resources Statement should include a mechanism to track the progress and completion of work to adopt recommendations contained in this report.

The report respects the taskforce's terms of reference and faithfully reflects what we heard and learnt. I would like to acknowledge and sincerely thank my fellow taskforce members, Mike Henry, Mayor Joyce McCulloch, Dr Chris Pigram, Will Robinson, Erica Smyth AC, Paul Flynn, Professor Marcia Langton, Adrienne Rourke and Professor Stephen Smith. They each were genuinely committed to developing this report, and their expertise and experience were—and remain—invaluable.

The taskforce was supported by a small, dedicated team at the Department of Industry, Innovation and Science who made up the taskforce secretariat. Ably led by experienced general manager Dr Gino Grassia, they did an extraordinary job undertaking a plethora of activities associated with the work of the taskforce.

Andrew Cripps
Chair, Resources 2030 Taskforce
31 August 2018

The taskforce

This report presents the recommendations of the Resources 2030 Taskforce to significantly enhance the performance and competitiveness of Australia's resources sector. The taskforce's ambition is to create a successful, technologically advanced, forward-looking sector that is able to attract and cultivate the best and brightest people. This will enable the sector to capture more investment, add more jobs and deliver prosperity to Australians, particularly those in regional communities.

The Resources 2030 Taskforce was established by the Minister for Resources and Northern Australia, the Hon Matt Canavan, on 28 March 2018 to guide the development of a National Resources Statement, which will be the first since the late 1990s. The Minister asked the taskforce to recommend bold and attainable reforms for the resources sector.

The taskforce is comprised of a range of industry experts, including:

- Mr Andrew Cripps, former Queensland Minister for Natural Resources and Mines (Chair)
- Mr Mike Henry, President Operations, Minerals Australia, BHP
- Cr Joyce McCulloch, Mayor, Mount Isa City Council
- Dr Chris Pigram, former CEO of Geoscience Australia
- Mr Will Robinson, Managing Director, Encounter Resources Limited
- Ms Erica Smyth AC, Chair, Advisory Board, National Offshore Petroleum Safety and Environmental Management Authority
- Mr Paul Flynn, CEO and Managing Director, Whitehaven Coal
- Professor Marcia Langton, Foundation Chair, Australian Indigenous Studies, Faculty of Medicine, Dentistry and Health Sciences, University of Melbourne
- Ms Adrienne Rourke, General Manager, Resource Industry Network
- Professor Stephen Smith, Professor of International Law, University of Western Australia.

The taskforce undertook targeted consultations and received submissions on the topics set out by its terms of reference. These topics included:

- communities
- innovation and technology
- environment
- investment
- exploration and business development.

The taskforce's Chair, Andrew Cripps, also met with ministers from all states and the Northern Territory, as well as the Shadow Minister for Resources and Northern Australia, Jason Clare MP.

Dr Pigram has recused himself from deliberations of the Resources 2030 Taskforce concerning Chapter 8 relating to environmental matters to avoid any apparent or potential conflict with his role as Chair of the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development. Accordingly, he has had no involvement in formulating recommendations 20 to 24.

The taskforce thanks all those who gave their time to contribute to this process. This report represents the taskforce's views in light of the consultations, drawing on their own expertise.

The Resources 2030 Taskforce (left to right):
Professor Stephen Smith; Dr Chris Pigram; Ms Adrienne Rourke; Mr Will Robinson; Mayor Joyce McCulloch; Mr Andrew Cripps (Chair); Mr Mike Henry; Mr Paul Flynn; Ms Erica Smyth AC; Professor Marcia Langton.
Image source: Peter Crichton © Australian Government

1.

Executive summary

Image source: BHP

Australia has an abundance of natural resources, many of which have been in demand for years. The achievements of Australia's resources sector are remarkable and contribute to the nation's wealth and living standards. They also place Australia in a strong economic position globally.

This success is the result of decades of hard work, risk taking and highly innovative ventures by hundreds of thousands of Australians. Through vision and sheer hard work, Australia has built world-class industries, workforces and capabilities that have captured resources investment.

However, Australia can do even better. It can capture more investment, create more jobs, improve environmental management and community engagement, and ultimately generate more prosperity. At the same time, it can enhance its global position.

This is not a fanciful ambition. A massive and long-term economic opportunity is on offer, and as one of the world's great trading and resources nations, Australia has much to gain.

Global demand for resources continues to grow, a trend that is expected to continue over the coming decades.[1] This is being driven by population growth and the expansion of a more aspirant middle class in developing and emerging economies. Demand is increasing for metals, energy and petroleum products for both traditional applications and those brought about by the digital age. Much of this growth will be in the Indo-Pacific region, which will mean that four of the five largest economies in 2030 will be on Australia's doorstep: China, India, Japan and Indonesia.

The taskforce firmly believes Australia can fulfil the ambition for 2030 and beyond of having the world's most advanced and successful resources sector, delivering sustained prosperity and social development for Australians.

Realising this ambition will not be easy. Nevertheless, the taskforce noted a general mood of confidence and optimism through their consultations, backed partly by the past successes of Australia's resources sector. The sector now generates exports worth $226 billion per year—more than half of Australia's estimated total exports for 2017–18.[2] It has enriched the lives of all Australians by growing the economy and helped lift millions of others in the wider Indo-Pacific region out of poverty. The income it generates for workers, shareholders and governments helps to pay for life-changing services such as those provided by schools and hospitals. It also continues to help close the gap for Aboriginal and Torres Strait Islander people by enabling them to live healthy and prosperous lives. Critically, it remains the lifeblood of many regional and remote communities.

The resources sector involves many different trades and professions, scientific disciplines and industries. These range from the foundational mapping of geology, and exploration and development to full-scale quarrying and extraction, the decommissioning of operations and site rehabilitation. Other important players in the sectors are the technology, services and equipment suppliers that support these activities.

The sector extends to the relevant regulatory and policy-making agencies of governments, and the public and private research institutions that develop new ideas into new solutions. Importantly, it also includes people who work in the communities in which various sector industries operate. When this report talks about the resources sector, it is referring to this broad group of people.

To progress, Australia's resources sector requires a focused and collaborative effort across industry, governments, research bodies and community stakeholders to improve on current performance and address the significant opportunities and challenges presented by a rapidly changing world.

1 United States Office of the Director of National Intelligence (2013), *Natural Resources in 2020, 2030, and 2040: Implications for the United States*.
2 Department of Industry, Innovation and Science (2018), *Resources and Energy Quarterly - June 2018*, p. ii.

Some of these opportunities and challenges are strategic and long-term. An example is the unprecedented shift in the geopolitical balance with the rise of China, India and emerging Asian economies such as Singapore, South Korea, Indonesia and Vietnam. This will generate new markets for Australia's resources but also increase competition.

Technological disruption will increasingly challenge and change traditional business models. The rise of social media, evolving community expectations and the rapid transit of information, and disinformation, will mean businesses and governments will have to work harder and smarter to earn the trust of citizens and communities. Only a sector that has a high-quality resources base and the support of the community to operate will prosper.

Some challenges are already familiar. For example, growing competition for investment and global market share means Australia must have economic, regulatory and policy settings that can attract such investment. The sector also needs to have access to, and the ability to build, a skilled and diverse workforce.

To clarify these opportunities and challenges, and what needs to be achieved, the taskforce set the following broad reform agenda.

1. Promote the Australian resources sector as the best place to invest

   Better promote the sector's capabilities, capacities and strengths to both domestic communities and the rest of the world by:

   a) developing a more integrated approach, supported by better information to inform potential investors about opportunities, and market Australia as an attractive place to invest

   b) showcasing Australia's world-class expertise in resources exploration and development, environmental management and engineering, technology and services

   c) strengthening the focus of agencies responsible for attracting inbound resources investment to take a more holistic approach across all levels of government and business

   d) better promoting Australia's resources export capabilities and focusing on industry strengths, including globally renowned higher education.

2. Establish a stronger base to guide and drive innovation

   Ensure Australia has a sector-wide innovation system and institutions that position it at the global forefront by:

   a) coordinating and developing new knowledge, technologies, techniques and human capabilities to address long-term, sector-wide challenges in areas such as environmental performance (water, rehabilitation and pollutant management), exploration and development, and improving business productivity.

3. Build stronger communities and stronger regions

   Work more closely with communities to make those relationships more collaborative and effective, and enable better planning by:

   a) developing regional sustainability plans to strengthen community resilience, better deliver the benefits of resources development, and plan to create more diverse regional economies not solely reliant on the resources sector

   b) ensuring there is an effective baseline of community consultation and support for new and existing resources projects

   c) developing best-practice models for community engagement, and strategies to promote greater awareness and support for the resources sector

   d) considering providing incentives and removing disincentives to attract and retain workers, and for businesses to locate and operate in regional communities

   e) driving better outcomes for Aboriginal and Torres Strait Islander people.

4. Provide a high-quality resources base for future generations

   Work strategically to discover and develop new resources regions by:

   a) developing a mechanism for co-funding for—and identifying a body to drive—the UNCOVER agenda, which will position Australia at the forefront of finding and developing new under-cover mineral and petroleum deposits for decades to come

   b) expanding the vital pre-competitive geoscience effort

   c) taking a more strategic and coordinated approach across all levels of government to promote the development of new resources regions

   d) examining opportunities to add more value in battery and other critical mineral downstream industries.[3]

5. Develop the future workforce

   Attract and support a skilled workforce, which is the foundation and future of the industry, by:

   a) developing a more coordinated national curriculum for earth sciences and resources sector qualifications at the tertiary and the vocational education and training (VET) levels

   b) promoting secure and long-term career prospects by offering continuous upskilling and retraining of existing employees to enable workplace and professional mobility

   c) ensuring Aboriginal and Torres Strait Islander communities have access to education, training and employment strategies tailored to their needs.

3 Critical commodities are metals, non-metals and minerals that are considered vital for the economic wellbeing of the world's major and emerging economies, yet whose supply may be at risk due to geological scarcity, geopolitical issues, trade policies or other factors (Geoscience Australia 2018).

6. Improve the sector's environmental performance

   Renew the focus on promoting the sector's positive environmental performance and developing more efficient and effective environmental regulations by:

   a) showcasing the sector's commitment to high environmental standards to build community trust and support

   b) streamlining approvals at federal, state and territory levels, including by creating a one-stop-shop approach for onshore and offshore projects

   c) removing unnecessary or duplicative regulation.

An important factor in securing the sector's long-term future is the need for governments and industry to reinvest more resources-generated returns in innovation and research.

Also vital is a greater focus on collaboration, partnerships, and scientific and technological innovation. Governments will need to work more openly, and more effectively support the industries from which they derive so much revenue. Industries across the sector will need to collaborate more with each other and with governments to tackle common resources challenges. They must also engage more effectively and transparently with the communities in which they operate, to promote the benefits they bring and also to listen and respond to communities' concerns and needs.

To this end, the taskforce believes a high-level strategic ministerial advisory group is needed to guide the vision set out in this report. The advisory group's members would be drawn from governments, industry, communities and research organisations, and would:

- advise government and industry on emerging contemporary and longer-term challenges and possible responses, including better ways to engage with communities
- drive deeper collaboration between the mining, oil and gas, and resources equipment, technology and services sectors to build a whole-of-sector image and approach
- examine and prioritise the sector's research and development efforts to focus on the long term, including but not limited to those involving geoscience, exploration, environmental management, innovation and technology, and critical minerals. There should be particular consideration of sector-wide issues that are often not prioritised
- analyse the future workforce needs of the sector and advise on strategies to create a pipeline of skills to meet those needs.

The advisory group should be agile and draw heavily on existing expertise and knowledge from government, industry and research institutions. It is not intended to be an implementing body, nor bureaucratic. Instead, it would advise institutions such as the Council of Australian Governments (CoAG) Energy Council, which the taskforce believes would benefit from a rejuvenated long-term resources agenda.

The group can provide an important sector-wide forum to identify the main issues and priorities, and prompt action based on expert advice and insight. The taskforce believes that the creation of this group, combined with its proposed actions on data management reform, the improved sustainability of regional communities and more engaging promotion of careers for resources professionals (particularly Aboriginal and Torres Strait Islander people) will better place the sector to capture future opportunities in a changing world.

2.

Taskforce recommendations

To achieve the goals set out in Chapter 1, the taskforce has prepared the following list of recommendations, grouped under six themes. Each theme is covered in more detail in chapters 4–9.

Positioning the sector for the future

1. A strategic ministerial advisory group should be established to drive reform and promote the long-term national interests of the resources sector. The group would work in collaboration with industry, states and territories, communities, research bodies and the federal government towards the 2030 ambition of being the most advanced and successful resources sector in the world. The group would:
    a. advise governments and industry on emerging contemporary and longer-term opportunities, challenges and possible responses to meet the 2030 ambition
    b. drive collaboration between the mining, oil and gas, and resources equipment, technology and services sectors for a whole-of-industry approach to sector improvement
    c. examine and prioritise the sector's research and development (R&D) efforts to focus on the long-term requirements of the sector, including but not limited to those involving geoscience, exploration, environmental management, innovation and technology, and critical minerals
    d. analyse the future workforce needs of the resources sector and advise on how to create a pipeline of skills to meet demand.
2. Resources ministers on the Council of Australian Governments Energy Council should agree and lead a strategic national reform agenda for the resources sector that is informed by the strategic ministerial advisory group and the National Resources Statement.
3. Governments and industry should further develop Australian resources equipment, technology and services sector capabilities and business opportunities, including by finding ways to increase the interoperability of machinery, equipment and systems.
4. Governments should undertake regular benchmarking of domestic and international policies and regulatory frameworks affecting the resources sector to identify opportunities for improvement and ensure competitiveness.
5. Governments should collaborate with industry to implement best-practice regulatory frameworks pertaining to the quarrying and extractive industries with a view to addressing issues relating to the sector's domestic and international competitiveness. This should be done by examining business input costs and improving planning processes to help ensure the continued economic feasibility of these resources. This will protect their availability and ensure a reliable and affordable supply of raw materials for the building and construction industries.
6. Governments should work with industry and local communities to develop strategies to enhance and grow competitive downstream resources processing industries in key regional centres.

Attracting investment by promoting Australia's world-class strengths

7. Governments and industry should collaborate on a strategy to better promote Australia's world-class strengths as a destination for inbound investment in the resources sector, including by:
    a. considering changes required in the agencies responsible for attracting inbound investment, in order to strengthen their focus on the resources sector and support international investors to invest in resources sector opportunities in Australia
    b. developing an approach to showcase Australia's attractiveness as an investment destination, including its strengths in the resources equipment, technology and services sector
    c. developing a compendium of national investment opportunities in the resources sector to inform potential investors.
8. Governments and industry should better promote Australia's resource export capabilities, with a focus on its strengths in the environmental management and restoration economy, the resources equipment, technology and services sector and higher education.

Finding and developing new resources

9. Governments and industry should develop a Resources Data Strategy to advance collaboration on data collection and analysis. The strategy would cover ways to:
    a. improve the scope and curation of geoscience, environmental and heritage data
    b. improve data access and discoverability.
10. The federal government should amend the Australian Bureau of Statistics' data collection categories to better capture and quantify greenfield exploration expenditure.

11. Governments should support and develop a mechanism to attract and deploy co-funding for UNCOVER initiatives, to harness research and make a step change in exploration success rates in under-cover terrains and provide high-quality resources for future generations of Australians.
12. Governments and industry should determine which body will drive the implementation of UNCOVER initiatives.
13. The federal government should expand the Exploring for the Future program to make it a national initiative, both onshore and offshore.
14. Governments should work with industry and local communities to identify and promote priority new basins and provinces for greenfield development. This could include the alignment of policies, information and investment services, and encourage a shared vision for infrastructure to develop the basins and provinces as efficiently as possible.
15. Governments should develop strategies to facilitate value-adding for prospective battery and critical minerals domestically.

Building strong communities

16. Building on existing materials, governments, industry and communities should develop a comprehensive set of credible best-practice guidelines and standards for community engagement. These would incorporate guidance on the timeliness of engagement, local procurement reporting and strategies, including Indigenous businesses, employment and skills development, and engagement with Aboriginal and Torres Strait Islander communities and traditional landowners.
17. Governments, local councils, industry and communities should collaborate to establish integrated, long-term sustainability plans to promote economic diversification and resilience for resource-dependent regions.
18. Governments should investigate the fiscal and regulatory frameworks (such as fringe benefits tax and zonal tax incentives) that encourage or discourage individuals to live and work, and businesses to locate and operate, in rural and regional areas associated with resource activities.
19. Industry, governments and communities should collaborate to build positive sentiment towards the resources sector nationally.

Improving environmental performance

20. Governments should develop an environmental management economy to further bolster Australia's competitive advantage in this area. This should include developing nationally consistent approaches and methodologies for continuous life-of-mine rehabilitation, offshore operations decommissioning, early closure planning and legacy site management.
21. Governments should streamline regulatory frameworks, including by developing bilateral agreements to create one-stop-shops for onshore and offshore environmental assessments and approvals.
22. As part of the 2019 review of the *Environment Protection and Biodiversity Conservation Act 1999*, the federal government should consider:
    a. a definition of 'significant impact'
    b. the efficacy of the water trigger
    c. the biodiversity offsets framework.
23. Governments and industry should establish a national repository for the storage, management and distribution of environmental, biodiversity and heritage data.
24. Governments, industry and other stakeholders should develop holistic approaches to basin and landscape planning and project approvals, to consider cumulative impacts and promote mutually beneficial outcomes on shared resources such as water and land.

Workforce and skills

25. Governments and industry should map the skills needs of the resources sector for 2030 and beyond.
26. Governments should better coordinate earth sciences and other resources-focused curricula at university and VET levels that target the longer-term needs of the sector, as informed by the skills map.
27. Industry should re-skill, upskill and better support current and prospective resources workers, promoting a culture of continuous learning. This should include initiatives aimed at increasing the attractiveness of the sector for all workers and increasing female participation in the resources workforce.
28. The resources sector should develop strategies to improve the perception and realities of careers in the resources sector (mining, oil and gas, and resources equipment, technology and services sectors) and the regions where it predominantly operates.
29. Governments and industry should develop education and training strategies for Aboriginal and Torres Strait Islander communities that better target their unique cultures and learning styles to maximise participation and retention in the workforce, including the resources sector.

3.

The value of the sector

Image source: Thinkstock

Australia's resources sector is undeniably one of the most advanced resources producers in the world. It has enviable, high-quality reserves of several key commodities, a skilled workforce and best-practice regulations and operations.

From the gold rush era through to the development of today's strong global commodities market, the sector has driven the nation's development, particularly in regional Australia, and shaped the economy. It has attracted foreign investment and human capital. It has helped to develop new industries and technologies, and encouraged a reorienting of Australia's foreign and trade policies towards the Indo-Pacific region where key customers reside.

The next few decades will be critical in determining how Australia maintains and strengthens its global position—as new international competitors emerge and it becomes more challenging to discover and extract new domestic high-quality reserves.

To provide a concrete baseline, the taskforce has analysed the resources sector's current and future opportunities and challenges. It has attempted to quantify the large spread of benefits the resources sector delivers to Australians and the world, and explain why Australia needs to maintain and strengthen the sector.

Driving Australia's economy

In 2016–17, Australia's top 10 exports included iron ore and concentrates, metallurgical and thermal coal, natural gas, gold, aluminium ore and concentrates, and crude petroleum. Together they represented 46 per cent of goods and services exports.[4]

This is a very different landscape to half a century earlier when exports were dominated by wool, wheat, beef and sugar. In 1963–64, these agricultural sectors accounted for more than 55 per cent of Australia's exports by value.[5]

This rapid structural shift primarily arose due to new, Asia-led demand, an initially sluggish supply response and the tripling of resources commodity prices between 2004 and 2011. Australian commodity producers then responded to surging prices with an unprecedented level of investment to unlock new deposits, remove bottlenecks and upgrade transport infrastructure. These investments fundamentally transformed the Australian resources sector, with resources and energy production and exports now at twice 2004 levels.

Today, the resources and mining services sectors are Australia's strongest economic performers. They underpin the nation's high standards of living, notably reflected in Australia's high-quality education and health services. **The resources sector is one of Australia's largest industries in terms of gross value added, accounting for around 7 per cent of Australia's gross domestic product and over half of the nation's exports**.[6] Strong investment in the sector during the past decade has seen Australia emerge as one of the world's top suppliers of metallurgical and thermal coal and top exporters of iron ore and liquefied natural gas (LNG).

The sector also laid the foundation for a high-growth, high-employment economy and helped the nation avoid the worst effects of multiple global downturns. In 2017, Australia broke world records for the longest run of uninterrupted growth in the developed world. The resources sector played a key role in achieving this, particularly during the general economic downturn in the global financial crisis of 2007–10.

It is estimated that in the decade to 2013, the resources sector added 13 per cent to household disposable income and raised real wages by 6 per cent.[7] Those increases drove domestic demand for motor vehicles and many other consumer goods. In that respect, the resources sector helped raise both Australia's aspirations and its spending power.

Large new capacity investments in coal, iron ore and LNG, and significant export growth boosted incomes, superannuation and investment earnings and provided a resilient source of tax and royalty revenue. It has been estimated that the mining industry alone paid $12.1 billion in company tax and $11.2 billion in royalties in 2016–17.[8] These taxes and royalties have helped build communities through the construction of vital infrastructure such as power and water supplies, schools and roads.

Overall, the resources sector has made Australia more prosperous and secured its global reputation as a premier destination for resources project investment, and a globally competitive supplier of resources commodities and resources equipment, technology and services (resources services).[9]

The taskforce believes the sector needs to work smarter and more strategically to ensure it continues to shape Australia's future prosperity, delivering national income, growth and—crucially—well-paid jobs.

4 Department of Foreign Affairs and Trade (2017), *Australia's Top 25 Good & Services Exports*, fact sheet, www.dfat.gov.au/trade/resources/
5 Department of Foreign Affairs and Trade (2014), *Fifty years of Australia's trade*, p. 4, https://dfat.gov.au/about-us/publications/Documents/fifty-years-of-Australias-trade.pdf
6 Department of Industry, Innovation and Science (2018), *Resources and Energy Quarterly - June 2018*, p. 1; Australian Bureau of Statistics (2017), *Australian System of National Accounts, 2016-17*, cat. no. 5204.0
7 Downes, P., Hanslow, K. and Tulip, P. (2014), 'The Effect of the Mining Boom on the Australian Economy', Reserve Bank of Australia, research discussion paper, p. 1, http://rba.gov.au/publications/rdp/2014/pdf/rdp2014-08.pdf
8 Deloitte Access Economics (2018), *Estimates of royalties and company tax accrued in 2016–17*, Minerals Council of Australia, pp. 4–8.
9 Tulip, P. (2014), *The Effect of the Mining Boom on the Australian Economy*, Reserve Bank of Australia, https://www.rba.gov.au/publications/bulletin/2014/dec/pdf/bu-1214-3.pdf

Creating challenging and rewarding jobs

The resources sector is a significant employer in many regional and remote areas. While the sector directly employs 234,000 people, **Deloitte estimates that the sector's direct and indirect economic contribution via aligned supply and service industries supports approximately 1.1 million jobs across Australia**.[10]

The sector plays a particularly important function in developing and supporting local economies in resources-rich regions, as explained in more detail in Chapter 4: Positioning the sector for the future.

The Australian resources sector also has a strong city presence. A number of mining companies and resources services firms are headquartered in capital cities, supporting skilled jobs and new investment in metropolitan areas. In Sydney alone, the mining sector directly and indirectly supports 16,715 full-time jobs and 2,349 local businesses.[11]

The sector is highly skilled, technologically advanced and innovative. These attributes are reflected in the career opportunities it offers and the calibre of the people it employs. As it innovates and develops newer technologies to increase productivity and sustainability, it will offer even greater opportunities for Australians to work in the jobs of the future, in areas such as advanced sensor engineering, artificial intelligence and robotics.

The sector is also a strong employer of Aboriginal and Torres Strait Islander people, is committed to their development and is helping to close the gap in many regional and remote communities. This sector wants to build strong ties with the communities it works in and improve industry–community frameworks that create employment and empower Aboriginal and Torres Strait Islander people.

Aboriginal and Torres Strait Islander people made up 3.1 per cent of the resources workforce in 2013, the highest proportion of any Australian industry.[12] In mining, Indigenous employment grew 22.4 per cent between 2011 and 2016.[13] Over a longer timeframe—between 2006 and 2016—Indigenous employment in mining grew by two-and-a-half times. By comparison, non-Indigenous mining employment grew by one-and-a-half times over the same period.[14]

A strong resources sector will provide new and rewarding career pathways, jobs and learning opportunities for Australians into the future, and help to strengthen their communities.

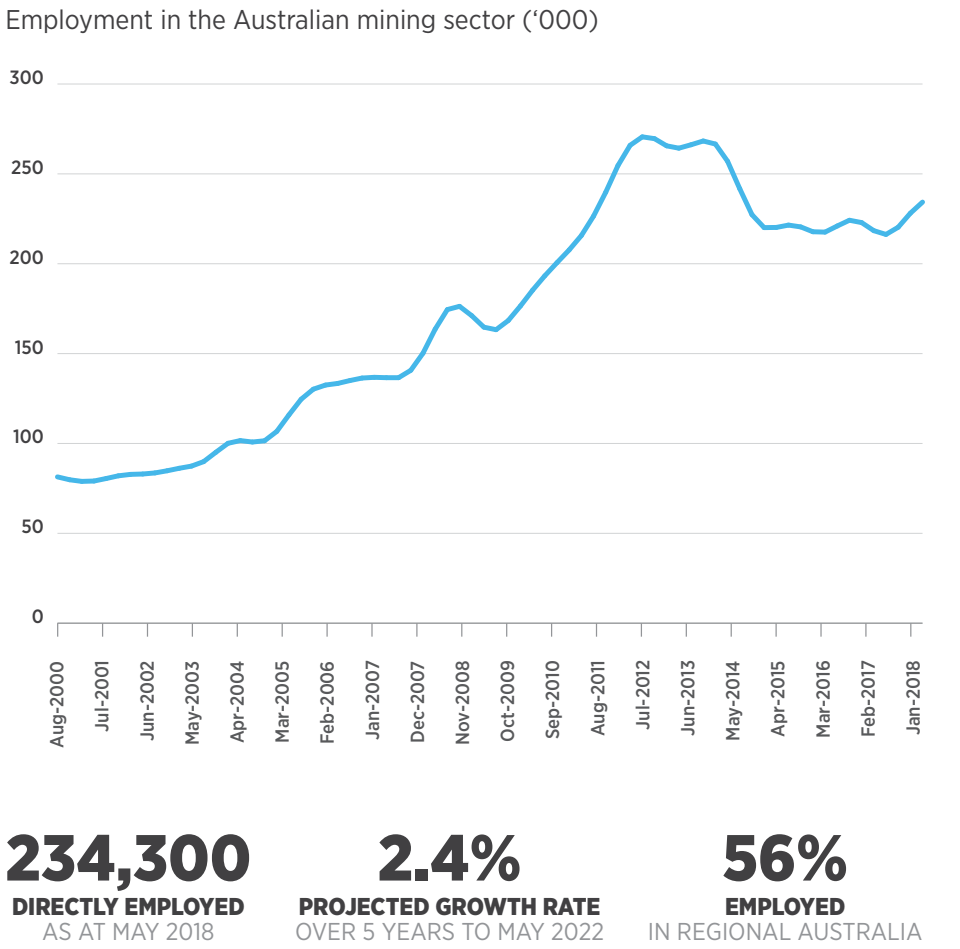

Figure 1: Direct employment in the Australian mining sector
(Source: ABS Labour Force Trend Data – cat. No 6202.0; Department of Jobs and Small Business, *Australian Jobs 2018*, p. 18)

10 Australian Bureau of Statistics (2018), *Labour Force, Australia, Jul 2018 data*, cat. no. 6202.0; Deloitte Access Economics (2017), *Mining and METS: engines of economic growth and prosperity for Australians*, Minerals Council of Australia.
11 NSW Minerals Council (2018), *NSW Mining Industry Expenditure Impact Survey 2016/17*, p. 28, http://www.nswmining.com.au/NSWMining/media/NSW-Mining/NSWMiningIndustryExpenditure.pdf
12 Australian Bureau of Statistics (2013), *Australian Social Trends - November 2013*, cat. no. 4102.0.
13 Australian Bureau of Statistics (2017), 'Aboriginal and Torres Strait Islander Census: Industry', media release, http://www.abs.gov.au/ausstats/abs@.nsf/MediaRealesesByCatalogue/142C08A784A1B5C0CA2581BF001EE22C
14 Department of Prime Minister and Cabinet (2018), *Closing the Gap*, p. 78, https://closingthegap.pmc.gov.au

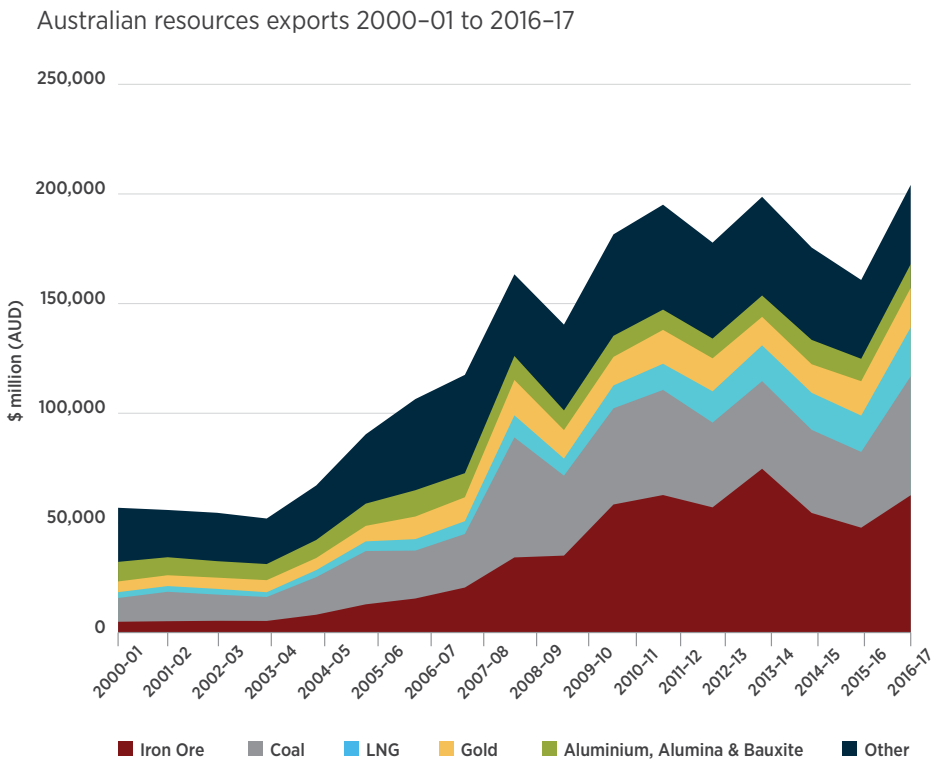

Figure 2: Australian resources exports 2000–01 to 2016–17
(Source: *Resources and Energy Quarterly, June 2018*)

Supporting strong regional communities

The resources sector has played a vital role in regional and remote Australia over the decades, with 56 per cent of its workforce located outside capital cities.[15] It has underpinned jobs and economic growth, and prompted the installation of major infrastructure and the development of thriving towns and communities. Today, it remains the lifeblood of many areas.

In the Pilbara region of Western Australia, for example, 36 per cent of the local workforce is employed in the mining sector.[16] Including the fly-in fly-out workers, it is estimated that the resources sector supported 93,839 full-time direct and indirect jobs in the Pilbara during 2015–16, accounting for $37.8 billion or 88 per cent of regional economic activity.[17] In the same period, the resources sector in the Bowen-Surat basin in Queensland supported 99,752 direct and indirect full-time jobs and contributed $18.6 billion to Queensland's regional economic activity.[18]

Major iconic regional towns have been developed on the strength of resources activities, as has almost every tropical port from Gladstone to Port Hedland.

Mount Isa was built on the back of vast mineral deposits of lead, copper, silver and zinc. The discovery of those deposits prompted rapid development of schools, hospitals, rail lines and post offices. Mount Isa is now one of the largest regional centres in outback Australia.

A stronger resources sector will help to generate a wider diversity of businesses in regional areas—such as those in agriculture, services, tourism and retail. This contribution is driven partly by sustainable coexistence and land management initiatives between the resources sector and local industry. For example, Glencore's award-winning Colinta cattle operation in the New South Wales Hunter Valley demonstrates that it is possible to run a successful pastoral business in close proximity to several active mining operations.[19]

Such diversity can help communities to flourish. It will also continue to provide employment opportunities to Aboriginal and Torres Strait Islander people living in these areas—opportunities that can include embracing new technologies as the world moves rapidly into the digital age.

15 Department of Jobs and Small Business (2018), *Australian Jobs 2018*, p. 18.
16 Australian Bureau of Statistics (2017), *Census of Population and Housing: Australia Revealed, 2016*, cat. no. 2024.0.
17 Deloitte Access Economics (2017), *Mining and METS: engines of economic growth and prosperity for Australians*, Minerals Council of Australia, p. 15.
18 Ibid, p. 16.
19 Glencore (2017), 'Colinta cattle awards point to successful coexistence', media release, 30 August 2017, http://www.glencore.com.au/en/media-centre/News/170830_Media-Release_Colinta-cattle-awards-point-to-successful-coexistence.pdf

Generating hi-tech innovation, skills and businesses

Advances in digital technology are disrupting industries, and rapidly and fundamentally changing business strategies and processes. For example, the Internet of Things is connecting products, value chains, business models and datasets in ways not dreamed of just a few years ago. This, combined with growth in the applications of artificial intelligence, is helping businesses to accelerate automation and their use of robotics, and in turn increase efficiency and streamline operations.

To prepare for challenges and seize new opportunities, the resources sector needs to keep a clearer eye on the horizon by applying innovation and technology.

Australia can do this, chiefly because it has such a sophisticated resources sector that has been at the forefront of mining innovation for decades. It has developed many world-first technologies that have improved productivity and generated value for the economy. Its innovations in metallurgy, for example, are now used worldwide, while innovations in logistics and remote operations have transformed the iron ore industry in Western Australia. Offshore, the sector has pioneered floating LNG.

Australia has some of the most efficient mines in the world. Many Australian businesses operate successfully on the global stage because of their innovative technologies and processes, as well as the quality of the resources in the ground.[20]

Another good example is the resources services sector, which is an incubator for some of the most innovative technologies and processes. Many resources services businesses are leaders in developing and applying innovative solutions. They partner with government-backed growth centres, Cooperative Research Centres and universities to deliver solutions needed by resources industries worldwide. They are playing a key role in ensuring the resources sector will be more successful in the future.

To ensure there is a steady stream of talent coming through to drive the resources sector in the innovative digital age, Australia's higher education system is skilling the next waves of young professionals and tradespersons. Such is its international reputation that graduates' resources knowledge and new-technology skills are in high demand globally.

As a world leader in the development of knowledge, technology and practices for the resources sector, Australia is well positioned to expand and enhance its role as a global centre of resources innovation, technology and under-cover geoscience. The sector continues to develop new processes, products and business models that are keeping Australian industries competitive and at the cutting edge, including in the vital fields of health, safety and environmental management.

Improving global environmental, health and safety standards

Australia's resources sector has worked hard to innovate and improve its environmental performance, and health and safety management processes. As a world leader in sustainable resources management it plays a critical role in sharing new technologies and processes, ensuring the resources sector becomes safer and more sustainable not just here at home but also globally.

As such, Australia has the potential to become a global centre for modern, competitive mining and petroleum activities that are underpinned by strong environmental stewardship, and health and safety standards.

For example, its offshore safety practices are highly regarded internationally, and the industry is one of the safest in the world with some of the lowest injury and fatality rates. The safety framework in the offshore petroleum industry is supported by an effective and robust health and safety regime, and an independent and competent regulator.

This is something Australia should promote more vocally around the word, while continuing to improve offshore operations so they remain contemporary and fit for purpose, and lead international practice.

Back onshore, the taskforce sees enormous opportunities to promote new knowledge and innovative practices in mine closure and rehabilitation, and create and commercialise solutions to industry-wide challenges such as tailings management.

The taskforce is also aware that the rapid expansion of social media means the resources sector is more open to scrutiny than ever before with information (and misinformation) moving rapidly through communities and interest groups. On the upside, it also means there is no better time to get the message out that the sector cares for its people and the environment, and to make facts and science more accessible to decision makers and the public.

Such developments would improve Australia's export standing with trading partners, cement its place as a world leader in standards and create more skilled jobs and diverse employment opportunities.

20 AME Research (2018).

Supplying commodities for the digital age

Australia is a major supplier of bulk commodities to the world. Minerals such as metallurgical coal and iron ore (for steel) and copper (for wiring) have helped to build houses, schools, hospitals, roads, railways, trains, ships and much more, while Australian coal, oil and gas deliver essential power supplies.

However, the world is much less aware that Australia also boasts an abundance of minerals that will fuel the new technology-driven digital age. Devices such as computers, televisions, tablets and smartphones all require these commodities. For example, around 25 minerals are used in manufacturing modern smartphones. Australian mines produce most of these elements—some can be hard to find anywhere else on earth.

Tantalum	Beryllium	Chromium	Nickel	Platinum
Palladium	Cobalt	Lithium	Ruthenium	Barium
Strontium	Zirconium	Lead	Antimony	Tin
Titanium	Copper	Gold	Zinc	Manganese
Aluminium	Gallium	Indium	Tungsten	Silver

Table 1: Common metals used in smartphone manufacturing that are mined in Australia
(Source: NSW Department of Industry, Resources and Energy)

The growing renewable energy market is also highly dependent on resources products to manufacture its hardware. For example, Australia produces 10 of the 16 minerals and metals needed to make a solar panel. Additionally, the nation is the world's largest producer of lithium, the feedstock for the modern batteries that are driving new energy solutions, such as electric cars and electric fuel cells.

Australia is the world's second largest producer of rare-earth elements, which are used to make hybrid vehicles, wind turbines, electronics, fuel cells, batteries, plasma screens, fibre optics and medical applications.[21] Its magnesium, phosphate rock and potash are also in demand for use in fertilisers for modern agricultural production. Australia also has large reserves of industrial diamonds, gold, lead, nickel, rutile, tantalum, uranium, zinc and zircon, which have myriad uses.

Australia needs to strengthen its position as a world-leading supplier capable of delivering the high-quality commodities the world demands today and will demand tomorrow.

Positioning for future opportunities

The increased global appetite for resources-dependent technologies and energy resources is offering Australia significant opportunities to improve its already strong resources sector, and discover and develop new high-quality resources.

Forward projections indicate that global demand for many commodities is set to increase (as demonstrated in Table 2). Australia has significant supplies to meet that demand, which is being driven on its doorstep by China, India, Japan and Indonesia, among other countries. Australia is in the right place to capture the many opportunities opening up in the Indo-Pacific region.

For example, while projected global demand growth for coal looks relatively flat over the coming years, India and a number of emerging Southeast Asian nations will continue to drive strong demand for Australia's coal exports toward 2022.[22] In Southeast Asia alone, coal demand is set to more than double to 390 metric tonnes carbon equivalent by 2040.[23] By virtue of its geographic proximity, Australia is exceptionally well placed to meet this growing demand.

	2018	2030	Growth
Iron ore (million tonnes)	2,107	2,372	+13%
Gold (thousand ounces)	148,620	172,906	+16%
Refined copper (thousand tonnes)	24,373	30,274	+24%
Finished nickel (thousand tonnes)	2,328	2,992	+29%
Aluminium (thousand tonnes)	62,382	94,884	+52%
Zinc (thousand tonnes)	14,664	18,858	+29%
Metallurgical coal (million tonnes)	326	458	+41%
Thermal coal (million tonnes)	1053	1214	+15%

Table 2: Forecast growth in world demand — selected commodities
(Source: AME Group, 2018 ; International Energy Agency, 2018)

Australia has a strong base in iron ore, coal and LNG. However, it is important to note that Australia's known ore reserves, and hence production in many commodities, have not grown since the turn of the century. This is despite extensive exploration activity and a growth in total resources. The dearth of high-quality reserves is holding back production, meaning Australia has lost significant global market share in gold, copper, nickel and zinc since 2000 (see Figure 3).

21 U.S. Geological Survey (2017), *Mineral Commodity Summaries 2016*, U.S. Department of the Interior
22 International Energy Agency (2017), *Coal 2017*, p. 3, https://www.iea.org/Textbase/npsum/coal2017MRSsum.pdf
23 International Energy Agency (2017), *Southeast Asia Energy Outlook 2017*, p. 81, https://www.iea.org/publications/freepublications/publication/WEO2017SpecialReport_SoutheastAsiaEnergyOutlook.pdf

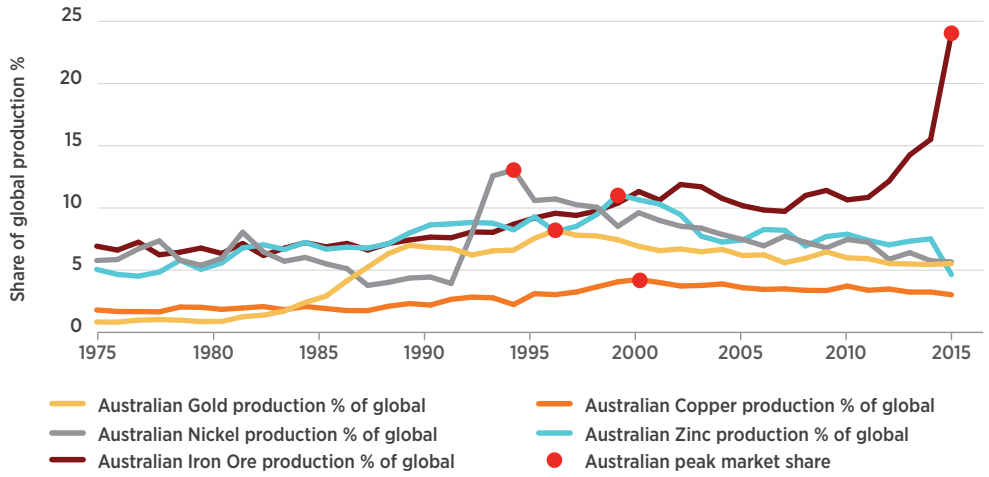

Figure 3: Selected production and reserve statistics
(Source: Geoscience Australia, 2017; United States Geological Survey, 2017)

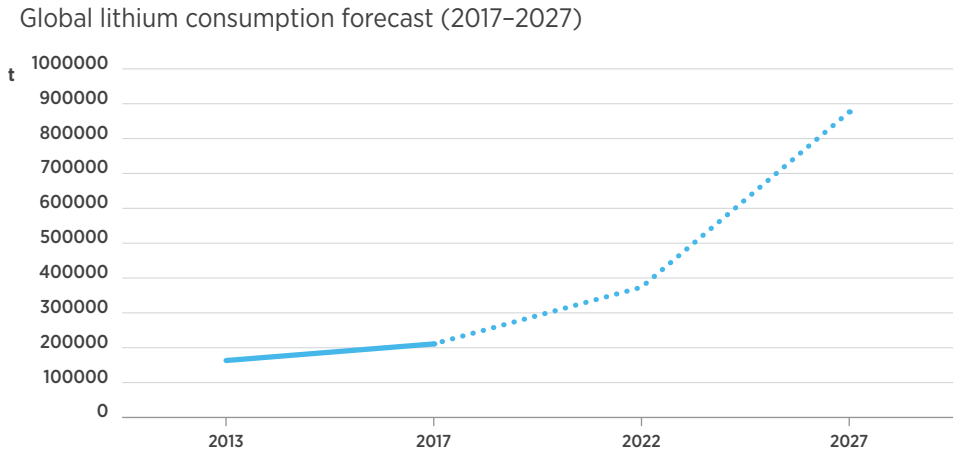

Figure 4: Lithium consumption projections, 2017–27
(Source: Roskill 2018, Lithium: Global Industry, Markets and Outlook 2018)

Copper is a good example with which to stress the urgency of finding new resources. Based on the demand projections in Table 2, at current prices the world will require an additional USD$40 billion of the metal each year to 2030. It is a similar story for lithium (see Figure 4). Driven principally by burgeoning demand for batteries for electric vehicles, global lithium consumption is projected to grow by more than 300 per cent to 2027.[24] Australia is the world's biggest producer and has significant lithium reserves, so is well placed to capitalise on this growing demand.

The sector also has the potential to harness opportunities in new export industries such as hydrogen. As nations such as Japan continue to pursue clean hydrogen, significant opportunities exist for Australia to meet such ambitious demands.

The next frontier for mineral exploration is the two-thirds of the continent lying beneath soil, sand, salt lakes and other cover that remains unexplored. Australia has an enormous opportunity in the vast areas of highly prospective geology under relatively shallow cover where new resources are difficult to identify and access using current techniques.

More strategic collaboration across the industry and with governments can ensure the sector continues to grow and be the backbone of Australia's economy for decades to come. Promoting its strengths in environmental management, its innovative resources services sector, its highly skilled workforce and its high standards and stable regulatory systems should drive inward investment. It should instil confidence around the world that Australia's resources exports meet the highest expectations.

While Australia has an impressive resource base, the raw numbers overstate the exploitable potential. In particular, much of the continent's geology and geography make the economics of developing remote or isolated resources very challenging. Also, the economically extractable part of Australia's resources, particularly in base metals, is likely to be significantly lower than commonly understood.

Australia urgently needs to find major new, high-quality, tier one resource bodies which can replenish its project pipeline and capitalise on growing global demand. It also needs better data and analytics to more accurately understand the true resource potential. Also important is the need to develop new technologies and processes to improve and expand the economic potential of developing new projects.

Getting these settings right will deliver prosperity for generations to come.

24 Roskill (2018), *Lithium: Global Industry, Markets & Outlook, 2018*, https://roskill.com/market-report/lithium

4.

Positioning the sector for the future

Image source: BHP

The future success of Australia's resources sector relies largely on working smarter, safer, cleaner and more efficiently than our competitors. Sector players need to identify and develop new resources, enhance workforce skills, manage environmental impacts more effectively and gain support across the broad spectrum of communities. Some improvements may be straightforward, while others will require step changes.

The taskforce believes that the ability of Australia's resources sector to succeed in the future will rely on two key factors.

1. Driving reform and taking innovative and collaborative approaches to addressing sector-wide challenges and opportunities. This will be enabled by planning and prioritising strategic, long-term research and development (R&D) to identify and commercialise new solutions.
2. Internationally competitive business and regulatory settings that encourage and help the sector to grow and succeed.

A key enabler of success will be the ability to harness new innovations and technologies, and Australia is well placed to lead the world in this area.[25] Good examples are the automation of drilling, excavation and truck and rail networks, which are safer and more productive.[26]

Future growth is expected to come from increased use of data and analytics, artificial intelligence coupled with automation, the deployment of advanced extraction techniques and the commercialisation of specialist technologies. These innovations and technologies have significant potential to improve the safety, productivity and competitiveness of the sector over the coming decades and to provide a range of exportable products and services.

Australia's approach to new innovations and technologies needs to be as modern and nimble as the hardware and software it is dealing with. It needs to stay on the crest of the technology wave and ensure its resources sector has the most comprehensive knowledge to make the most informed decisions.

New disruptive technologies can infiltrate markets rapidly, as shown by the fast development of unconventional Australian gas exports and the US shale oil and Canadian tar sands industries. They can also change the economics of resources projects, as previously unfeasible projects are made viable through technological innovation. A major example of this is how the Prelude Liquefied Natural Gas (LNG) facility has enabled the development of two of Australia's smaller offshore gas resources.

In the resources sector, new technologies and innovative solutions are resulting in new jobs, skills opportunities, support services and infrastructure in regional and metropolitan Australia. However, it is important to be fully aware that the uptake of new and increasingly digital technologies is broadening public concern about the impact on jobs, businesses and communities.

25 Deloitte (2016), *Innovation in Mining Australia 2016*, https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Energy-and-Resources/gx-au-en-innovation-in-mining.pdf
26 BAE Economics (2016), *Productivity and Innovation in the Mining Industry*, research report, http://www.baeconomics.com.au/wp-content/uploads/2016/12/Mining-innovation-12Apr2016.pdf

Woodside Energy: Reducing exposure to safety risks through intelligent assets

Woodside aims to be an industry leader in health and safety outcomes to protect people, communities and environments.

Building on remote operating capabilities in subsea, not-normally-manned platforms and LNG plant processes, Woodside entered a collaboration with the U.S. National Aeronautical and Space Administration (NASA) in late 2016. NASA has loaned Woodside a Robonaut 2 system to test ideas from operators, engineers and maintenance workers to make work safer. Woodside is currently exploring these insights in onshore and offshore robotics site trials.

Recently, Woodside joined BHP and Deakin University's Institute for Intelligent Systems Research and Innovation on a pre-emptive, remotely operated robotic intervention to release pressure in a standpipe at a Nickel West mine site.

The team iterated strategies, designed solutions and tested prototypes. Ultimately, a Deakin robot was successfully deployed, severing the pipe to release the built-up pressure. The robot was controlled from a safe distance, eliminating human exposure to an uncontrolled release of pressure, shrapnel or gases.

The experience was a live demonstration of how higher-risk activities might be supported by technology-based solutions. It also underlined the value that comes from different industries uniting with each other, and the tertiary sector, around a common challenge. Collaboration allows us to arrive at better solutions, faster.

Collaboration on strategic challenges and opportunities

A common theme in taskforce consultations was the lack of a cohesive, collaborative approach to long-term planning and reform in the resources sector. There has been a general assumption that the sector's past successes will somehow ensure future successes regardless of planning or intervention. However, insufficient collaboration and long-term strategic planning has led to inadequate responses to sector-wide issues regarding community support, industry reputation, the discovery of new resources and workforce skills. As such, the taskforce has identified a need for better collaboration on sector-wide issues.[27]

Stakeholders clearly believe that a push towards a longer-term, sector-wide strategic approach would better enable the innovation that is critical to success, yielding greater returns and improving the sector's global competitiveness.

This collaboration would ideally encompass as wide a representation of the resources sector as possible, including the mining, oil and gas and resources services sectors, supported by governments, researchers and the broader community.

To achieve this, the taskforce recommends establishing a strategic advisory group to drive reform and promote the long-term interests of the resources sector towards the 2030 ambition of being the most advanced and successful resources sector in the world. This advisory body would include representatives from—and drive collaboration between—federal, state and territory governments, communities, research bodies and the industry itself (including mining, oil and gas and the resources services sector).

The advisory group would be tasked with advising governments and industry of emerging contemporary and longer-term challenges and opportunities. The group is not intended to be an implementing body, nor bureaucratic, but would provide advice to existing institutions. It will need to be agile and innovative to keep up with new developments as they happen—or even predict them—and explore the best ways forward.

As part of its role, the group would advise on the sector's R&D priorities, including the critical long-term issues in the spheres of geoscience, exploration, environmental management, and innovation and technology. Consideration of sector-wide issues is essential, as they can often run second to more pressing project-specific issues.

The advisory group would also analyse future workforce needs and advise on ways to create a pipeline of skills to meet demand. At present there is a need for better matching of the skills being taught, and those needed for the sector's rapidly changing workforce. The current system is not as responsive as it could be and this is leading to current and expected skill shortages, discussed in more detail in Chapter 9: A workforce and skills for the future.

This will all help to ensure that the resources sector continues to underpin Australia's national prosperity for decades to come.

Research and development

Australia is well placed to drive innovation in the resources sector thanks to previous investments in mining and petroleum research infrastructure, such as in universities, research organisations and government bodies. As a result, it has world-class mining and engineering schools as well as the Commonwealth Scientific and Industrial Research Organisation and initiatives like METS Ignited, the Minerals Research Institute of Western Australia and Mining3, which fund or act as incubators for new ideas and technologies.

27 While Australia has two resources sector growth centres focused on building capability and stronger systems through collaborative, industry-led approaches—National Energy Resources Australia (NERA) and the METS Ignited growth centre—these centres remain focused on specific sub-sections of the wider resources sector.

Despite these strengths, longer-term R&D efforts could be improved to better reflect or predict what the industry will need to capture future opportunities. The taskforce feels that resources R&D is presently focused on short-term transactional projects. It is also cyclical and largely driven by individual institutions and businesses. There needs to be more coordination and collaboration on R&D to address common sector-wide challenges, set a longer-term strategic direction and build capacity in advance of industry needs. A coordinated and sustained R&D pipeline is critical to facilitate step-change breakthroughs and advances in technology. Further discussion on R&D related to improving exploration success can be found in Chapter 6: Finding and developing new resources.

Resources equipment, technology and services sector

The Australian resources equipment, technology and services sector (resources services) is an international success story. It is a world leader in producing unique, diverse, customer-focused solutions for exploration, extraction and processing equipment and engineering services, as well as contract mining, mine software products and other related equipment.[28]

There are notable areas of global excellence, particularly in Australia's mining equipment, technology and services (METS) sector—for example, 60 per cent of the world's mining computer software is developed in Australia.[29]

METS directly or indirectly employed 503,000 Australians and made an $86.2 billion gross value added contribution to the economy in 2015.[30] The sector is competitive across the entire resources supply chain, and has a strong global export presence[31] so the taskforce considers the METS sector should be broadened to refer to a resources services sector. METS alone grew at a rate of 6.5 per cent year on year between 2005 and 2015, delivering 150,000 new jobs during this period.[32] The broader resources services sector has the potential to play a dominant role in Australia's resources sector of the future and capture a significant share of a growing world market.

Despite this success, resources services companies still struggle to commercialise their ideas. The largely transactional nature of the relationships between the resources, resources services and research sectors means limited collaboration during the R&D process, which is partly responsible for an identified 'lack of alignment between problems and solutions'.[33]

The taskforce considers that the resources services sector will be an integral part of achieving an advanced and competitive resources sector by 2030. To ensure the resources services sector stays at the leading edge, or even strengthens its position, there needs to be a change in behaviour and relationships. In particular, there needs to be a greater focus on collaboration and alignment of priorities between governments, the research sector, the resources services sector and the broader resources sector.

The proposed strategic ministerial advisory group would seek to bring these groups together to ensure a strategic, long-term approach to collaboration and R&D.

Another important opportunity is to increase the interoperability of equipment and systems, to help maximise the capability and benefit of mining automation, integration and data analytics.[34] When equipment and systems can seamlessly connect, communicate and operate together, regardless of who made them, they are considered to be interoperable.[35] Without standards for interoperability, the adoption of emerging technologies is slower, and there's more risk in investing in technological solutions that can quickly become obsolete. Promoting greater interoperability could drive new business opportunities for local firms and reduce costs for operators.

Smaller resources services companies have been hindered in developing and commercialising universally compatible applications and technologies because companies preferred to develop bespoke systems and platforms.[36] The introduction of interoperability standards is expected to lower entry barriers and reduce development costs for third-party vendors and providers.[37]

Shifting towards open systems and standard platforms will enable greater collaboration and increase the commercialisation of resources services sector innovations and technologies. The National Energy Resources Australia Growth Centre notes that growing interoperability will result in greater adoption of automation.[38] For a similar reason, the METS Ignited *10 Year Sector Competitiveness Plan* focuses on the development of interoperability standards.[39] Work is also underway internationally by the Global Mining Standards and Guidelines Group to define interoperability and develop a universal roadmap to 'enable industry-wide alignment and identify a collaborative path forward to achieving mining interoperability'.[40]

28 Department of Industry, Innovation and Science (2018), *Industry Insights – Globalising Australia*, pp. 31–9, https://publications.industry.gov.au/publications/industryinsightsjune2018/documents/IndustryInsights_2_2018_ONLINE.pdf
29 Ibid, p. 39.
30 Ibid, p. 41.
31 Ibid, p. 39.
32 Ibid, p. 39.
33 Ibid, p. 41.
34 METS Ignited (2016), *Mining Equipment, Technology and Services: 10 year sector competitiveness plan*, p. 103, https://www.metsignited.org/Attachment?Action=Download&Attachment_id=79
35 CIM Magazine (2016), 'Systems in sync', 31 August, 2016, http://magazine.cim.org/en/technology/systems-in-sync/
36 METS Ignited (2016), *Mining Equipment, Technology and Services: 10 year sector competitiveness plan*, p. 84, https://www.metsignited.org/Attachment?Action=Download&Attachment_id=79
37 Department of Industry, Innovation and Science (2016), *Australian Industry Report 2016*, Commonwealth of Australia
38 National Energy Resources Australia (2018), *Preparing Australia's future oil and gas workforce.*
39 METS Ignited (2016), *Mining Equipment, Technology and Services: 10 year sector competitiveness plan.*
40 https://www.metsignited.org/Story?Action=View&Story_id=92

To ensure Australia's resources services sector is able to develop and compete internationally, the taskforce recommends governments and industry together design and promote approaches to increasing the interoperability of machinery, equipment and systems.

Reinvigorating government collaboration

During consultations in various jurisdictions, the taskforce heard that the Council of Australian Governments (CoAG) Energy Council's resources agenda has suffered from the recent intensified focus on energy policy. This has meant insufficient attention has been given to identifying and addressing strategic issues for the resources sector, slowing attempts at collaborative reform.

The taskforce believes that the federal government, in collaboration with states and territories, should agree on priorities to reinvigorate the resources reform agenda for the CoAG Energy Council to drive meaningful change in the sector. That reform agenda should draw on the taskforce's recommendations in this report, such as improving support for resource discoveries, better coordinating investment and basin development efforts, streamlining regulatory approvals, the pursuit of one-stop shops for onshore and offshore environmental assessments and approvals, and the development of a Resources Data Strategy.

The strategic ministerial advisory group proposed by the taskforce would be a key complementary body. Its role would be to advise resources ministers on the CoAG Energy Council how to set and deliver the reform agenda.

The importance of competitive business settings

Business and policy frameworks fundamentally affect the cost of doing business in Australia and, hence, the country's commercial attractiveness. To capture new capital and investment for growth in all areas of the economy, Australia needs competitive business settings that are continually updated and improved.

A recent survey by Canada's Fraser Institute raised concerns that Australia's attractiveness as a resources investment destination has slipped.[41] Australia experienced a 9 per cent decline in its regional median 'attractiveness' score between 2016 and 2017, according to the institute's annual survey of mining and exploration businesses.[42] This highlighted concerns regarding Australia's competitiveness, regulations and policies.

A number of submissions to the taskforce, including from the Minerals Council of Australia (MCA), the Australian Petroleum Production & Exploration Association (APPEA) and Rio Tinto argued that recent policy instability has had a negative impact on perceptions of Australia's sovereign risk. Examples included the minerals resource rent tax and the Australian Domestic Gas Security Mechanism. Given the high risk of resources projects—where there are very large capital requirements, long lead times between initial investment and revenue generation, and volatile markets—the sector requires as much stability, certainty and assurance as possible.

Business elements of particular importance for the sector are taxation, infrastructure, energy and effective, efficient and transparent regulatory frameworks that facilitate timely and predictable project approvals. Other elements include exploration, skills, communities and the environment.

Regulation and project approvals

In its consultations, the taskforce heard general concerns regarding the efficiency of Australia's regulatory frameworks, including from an investment attractiveness perspective. Australia's high standards in regulation and project approval processes are an incentive for businesses that value strengths in environmental management and workforce capability. However, while stakeholders feel that frameworks are generally effective, they are often inefficient, duplicative and difficult to navigate. This poses financial and time burdens for companies.

A general theme that arose from submissions to the taskforce was the desire for strong, independent regulation that is effective and efficient, and enables the achievement of evidence-based goals without imposing unnecessary costs. While stakeholders almost universally supported the intent of Australia's strong standards, many questioned how efficient the standards are at achieving their aims.

For example, the regulatory framework for mining and petroleum activities in Australia is complex, with a large variety of state and federal legislation, standards and processes. This complexity can negatively impact Australia's reputation as an attractive destination for investment.

There is a need to streamline processes to reduce duplication, complexity and uncertainty surrounding regulation. To make the point, consider the fact that there are approximately 150 statutes and more than 50 agencies regulating the petroleum industry in Australia.[43]

41 Fraser Institute (2017), *Survey of Mining Companies 2017*, https://www.fraserinstitute.org/sites/default/files/survey-of-mining-companies-2017.pdf
42 Ibid, p. 45.
43 Cullinane B. (2013), 'The supply chain: the key to Australia's success in resources', *Gas Today*, http://gastoday.com.au/news/the_supply_chain_the_key_to_australias_success_in_resources

Taskforce members also heard that policy and regulatory burden was cumulative over time, and that all Australian governments would benefit significantly from the introduction of a regular benchmarking process to examine and compare the policies and regulatory frameworks affecting the resources sector. Benchmarking would help governments to identify unnecessary compliance costs, enhance regulatory consistency and reduce regulatory duplication.

The taskforce therefore recommends that governments regularly benchmark policies and regulatory frameworks affecting the resources sector to ensure competitiveness and capture opportunities. States and territories that score highly against the criteria will be able to promote this success and encourage others to make similar improvements.

The issue of duplication in regulation and approval processes relating to the environment arose strongly in taskforce discussions and is further examined in Chapter 8: Improving environmental performance.

Tax regime

The sector's capital-intensive and long-term nature means resources taxes and royalties must be stable and internationally competitive to stimulate investment. In Australia, resources projects are subject to a range of taxes and royalties at state and national levels, which is one way the sector directly contributes to Australia's economy. **It has been estimated that the mining sector alone paid $12.1 billion in company tax, and $11.2 billion in royalties in 2016–17.**[44]

Resources-specific taxes are designed to ensure the community receives an adequate return from natural resources. However, the tax system can influence the rate at which resources are extracted and the capacity of future generations to enjoy the benefits.[45] A common theme raised during consultations was the strong belief that a portion of royalties paid by the sector should be allocated to developing and supporting regional communities—providing infrastructure, for example. Another portion should be reinvested to strengthen the sector, such as by funding long-term R&D.

The taskforce also heard that the tax system needs to keep pace with the evolving nature of the sector and competitor countries.

Stakeholders raised the issue of how capital costs are treated. Non-capital-intensive industries are able to immediately deduct costs for company tax purposes, while capital-intensive industries' costs are deductible over a longer period of time. As such, it takes longer for resources industries to recover costs, imposing an additional burden on them. Also, Australia's statutory write-off period for mining and petroleum assets is between 15 and 20 years, while those of international competitors are frequently less than 10 years.[46]

A number of taskforce submissions, including from the Institute of Public Affairs and Rio Tinto, explicitly recommended that Australia's company tax rate be reduced to 25 per cent, to improve international competitiveness and encourage investment.

Tax issues can be a barrier to investment in the resources sector, making Australia less attractive to investors than its competitors. Also, domestically, the tax system can be a major factor when resources professionals and other workers are weighing up the pros and cons of moving to rural and regional communities for work. This is described further in Chapter 7: Building strong communities.

Infrastructure

Public and private infrastructure is necessary for resources projects to be successful and financially viable, and makes them much more attractive to investors. Projects are often in regional and remote areas, and require access to transport (via air, road, rail and ports), power, water, accommodation and other social infrastructure.

Infrastructure keeps resources projects connected to markets and supports the development of new basins and greenfield sites. **For example, the $200 billion investment and planning for LNG infrastructure has been a critical factor in the increased development and export of Australia's LNG.** According to the Chief Executive of the APPEA, "the building of LNG trains in Queensland, Northern Territory and Western Australia has invented an export industry".[47]

Australia has long benefited from having strong and established infrastructure. However, it is facing new challenges to developing infrastructure to support the resources sector as new projects and resources are located more remotely.[48] Given the size of Australia, individual companies cannot always fully underpin the infrastructure or investment required to unlock remote resources or deliver them to market.

In submissions to the taskforce, Western Gas and ConocoPhillips said collaboration was needed between companies to enable and share common infrastructure—in particular pipelines and terminals of the oil and gas sectors. Industry should identify options where new and existing infrastructure can be shared. This can reduce costs and create new opportunities. This approach could benefit the entire sector and enable the development of previously uneconomic areas. Further discussion on infrastructure and the development of greenfield sites can be found in Chapter 6: Finding and developing new resources.

44 Deloitte Access Economics (2018), *Estimates of royalties and company tax accrued in 2016–17*, Minerals Council of Australia, pp. 4–8.
45 Australia's future tax system (2009), *Section 14: Natural Resource Charging*, consultation paper, http://taxreview.treasury.gov.au/content/ConsultationPaper.aspx?doc=html/publications/Papers/Consultation_Paper/section_14.htm
46 Australian Petroleum Production and Exploration Association (2018), submission to the Resources 2030 Taskforce.
47 Australian Financial Review (2015), 'Huge infrastructure turns LNG tap on', 6 October, 2015, https://www.afr.com/news/special-reports/energy-and-infrastructure/taking-the-lead-20151005-gk1ac5
48 The Chamber of Minerals and Energy of Western Australia (2018), submission to the Resources 2030 Taskforce.

Energy

Historically, Australia's abundant and low-cost coal resources were used to generate three-quarters of domestic electricity and deliver some of the cheapest electricity in the world.[49] This cheap, reliable power source was a comparative advantage for Australia in attracting investment to its resources and manufacturing sectors. However, over the last 10 years Australia's energy system has become more expensive and suffered a series of reliability issues.

The availability and cost of energy are particularly important for projects with long lead times, and for large industrial customers seeking secure and competitively priced energy. Uncertainty in Australia's energy market has become a barrier to investment in energy-intensive projects and industries. The taskforce received many submissions, including from the MCA and Rio Tinto, strongly supporting the need for a stable energy policy. Other submissions suggested a pathway be established to develop a nuclear energy industry in the longer term.

Further submissions to the taskforce indicate that the cost of energy is heavily impacting Australia's cement, concrete and aggregates industry. The production of concrete is an energy-intensive process and therefore highly exposed to changes in price and reliability.

The taskforce also heard that Australia needs affordable and reliable energy to support new growth opportunities that will add value to its global supply chains—in downstream processing, for example. While energy is not within the taskforce's terms of reference, it is an important input cost that can impact on the competitiveness of the resources sector.

Australia has a well demonstrated historical capacity to leverage downstream processing to create more value from its resources wealth. It refines bauxite, zinc and nickel. It smelts aluminium, refines and smelts copper, and manufactures steel. It has also had significant success in processing and converting gas to create a world-leading LNG export industry. These downstream industries are the foundation of many key regional centres such as Gladstone and Whyalla, whose economic prosperity relies on the jobs they provide and the local businesses they support.

However, many downstream processing operations continue to struggle and the future of some operations is challenged.

The taskforce recommends that governments work with industry and local communities to develop strategies to enhance and grow competitive downstream processing industries in key regional centres.

Cement, concrete and aggregates industries

One part of the resources sector in Australia that is often overlooked in terms of its important contribution to the national economy are the quarrying and extractive industries. These industries produce raw materials including sand, rock, gravel, clay, limestone and gypsum, which are used both individually and in the production of cement, concrete and aggregates. The industries add significant value to Australia's mineral and energy sector, as well as supplying critical products that underpin much of the country's infrastructure and built environment.

In particular, cement, concrete and aggregates are a central feature of modern life, being part of homes, places of work and recreation, public service delivery and transportation. **Every year, each Australian consumes approximately eight tonnes of aggregates through their use of homes, roads, office buildings, stadiums and other infrastructure**.[50]

Across Australia, there are around 18,000–20,000 direct and approximately 100,000 indirect jobs in the concrete, cement and aggregates industries.[51] However, these industries supply a critical input into the building and construction industry, which supports an extraordinary 1.1 million jobs throughout the country.[52]

The taskforce acknowledges the industry is a large but sometimes underappreciated component of the Australian resources sector. The cement, concrete and aggregates industry is primarily concerned with future access to raw materials. The two main issues affecting access to raw materials is the reliability and availability of supply, and the geographic location of the resources relative to concrete batching sites and end use locations.

Competing land use, urban sprawl and planning laws have contributed to making raw materials more difficult to access. Australia does not have a shortage of raw materials, but it does have the longest haul distance in the world. This means the cost of transport accounts for up to 25 per cent of the total material cost.[53] As geographical distance from the raw materials to the concrete batching site and end use location increases, relatively cheap materials become expensive. The taskforce believes that as demand increases, ready access to raw materials will be essential for the affordability of future infrastructure projects.

49 Geoscience Australia (2018), 'Energy Basics', accessed 12 July 2018, http://www.ga.gov.au/scientific-topics/energy/basics
50 Cement Concrete and Aggregates Australia (2018), submission to the Resources 2030 Taskforce.
51 Cement Concrete and Aggregates Australia (2018), 'Industry Overview', https://www.ccaa.com.au/iMIS_Prod/CCAA/Industry/Overview/CCAA/Public_Content/INDUSTRY/Industry.aspx?hkey=14f29928-6116-4082-a694-654aaabf00f5; Australian Bureau of Statistics (2018), 'Labour Force, Australia', cat. no. 6291.0, trend.
52 Ibid.
53 Cement Concrete and Aggregates Australia (2018), submission to the Resources 2030 Taskforce.

Across the states there is an inconsistent approach to the regulation of the industry. In some states, the quarrying and extractive industries are regulated as a mining activity, while in other jurisdictions they are subject to planning legislation. There are also challenges with the additional layers of local government, environmental policy and planning overlays. Further, responsibility for planning and approvals are often split across local and state governments.

Advocacy groups representing the quarrying and extractive industries have been asking for states to develop and adopt formal industry strategies and for heavy construction materials to be more widely recognised as an essential input into the conveniences and activities of modern life.

With the release of its Extractive Resources Strategy, the Victorian Government has been praised by industry for proactively developing modern regulatory arrangements to govern the quarrying and extractive activities.[54] The development of the strategy was driven by increasing input costs due to the growing geographic distances between resource locations and project sites.

Industry groups are now recognising the Victorian strategy as a best-practice approach. The strategy has six broad themes:

- resource and land use planning
- transport and local infrastructure planning
- efficient regulation
- confident communities
- environmental sustainability
- innovative sector.

Therefore, to ensure all Australian industries are able to access the cement, concrete and aggregates needed for development, the taskforce recommends governments should amend regulatory and planning frameworks covering the quarrying and extractive industries to improve the sector's competitiveness and access to affordable materials.

54 Government of Victoria (2018), *Helping Victoria Grow: Extractive Resources Strategy*, June 2018.

Recommendations

1. A strategic ministerial advisory group should be established to drive reform and promote the long-term national interests of the resources sector. The group would work in collaboration with industry, states and territories, communities, research bodies and the federal government towards the 2030 ambition of being the most advanced and successful resources sector in the world. The group would:
    a. advise governments and industry on emerging contemporary and longer-term opportunities, challenges and possible responses to meet the 2030 ambition
    b. drive collaboration between the mining, oil and gas, and resources equipment, technology and services sectors for a whole-of-industry approach to sector improvement
    c. examine and prioritise the sector's research and development efforts to focus on the long-term requirements of the sector, including but not limited to those involving geoscience, exploration, environmental management, innovation and technology, and critical minerals
    d. analyse the future workforce needs of the resources sector and advise on how to create a pipeline of skills to meet demand.
2. Resources ministers on the Council of Australian Governments Energy Council should agree and lead a strategic national reform agenda for the resources sector that is informed by the strategic ministerial advisory group and the National Resources Statement.
3. Governments and industry should further develop Australian resources equipment, technology and services sector capabilities and business opportunities, including by finding ways to increase the interoperability of machinery, equipment and systems.
4. Governments should undertake regular benchmarking of domestic and international policies and regulatory frameworks affecting the resources sector to identify opportunities for improvement and ensure competitiveness.
5. Governments should collaborate with industry to implement best-practice regulatory frameworks pertaining to the quarrying and extractive industries with a view to addressing issues relating to the sector's domestic and international competitiveness. This should be done by examining business input costs and improving planning processes to help ensure the continued economic feasibility of these resources. This will protect their availability and ensure a reliable and affordable supply of raw materials for the building and construction industries.
6. Governments should work with industry and local communities to develop strategies to enhance and grow competitive downstream resources processing industries in key regional centres.

5.

Attracting investment by promoting Australia's world-class strengths

Image source: Thinkstock

Feedback to the taskforce overwhelmingly suggests that Australia is an attractive investment destination yet faces considerable risks should it become complacent.

New investment is required to sustain the resources sector over the decades to come. This will fund the exploration and development of new basins and provinces, and the building of facilities and infrastructure required to extract and process products. It will also facilitate subsequent expenditure in production operations and replacement investment to maintain output capacity, as well as contributing to investments in innovation throughout the resources supply chain. All these developments create jobs, contribute to national wealth and reinforce Australia's reputation as a resourceful country—in both senses of the word.

However, Australia will only be able to extend its global resources leadership if it improves public attitudes towards the sector and better promotes its world-class industry, resources base, labour and research strengths, and proximity to markets. The goal should be to market Australia globally as a trusted supplier, and as a low-risk and preferred destination for inbound investment.

This requires a more integrated and collaborative approach to such promotion, supported by more accurate and comprehensive information to highlight projects and opportunities to the most appropriate audiences. More broadly, it should also promote Australia's world-class expertise in resources exploration and development; environmental management; and engineering, technology and services. It should also include constructive efforts to improve community sentiment, which is essential for increasing investor and community confidence in the sector.

Benefits will also accrue by carefully reviewing and strengthening the focus of agencies responsible for attracting inbound investment and export promotion, to see if improvements can be made. This will require cooperation across all levels of government and business.

Strength through collaboration

The taskforce heard that greater collaboration between governments and industry to promote the sector is fundamental if Australia is to realise future opportunities and ensure investor confidence. In particular, it heard that Australia must rise to meet demand-driven challenges. Its customers increasingly have a greater choice about where they purchase products, and there will be more competitors in global markets—witness the recent rise of the United States as an energy exporter on the back of new and disruptive shale oil and gas technologies.

As stronger competitors emerge, some will offer lower-cost products. These products may be sourced from more accessible resources deposits or they may be geographically closer to their markets. Some competitors will be more cost-competitive due to regulatory differences, perhaps through lower safety or environmental management standards. These projects may be more attractive to international companies who seek to spread their risk via a portfolio of global projects and who consider price the key factor determining their bottom line.

Other more traditional competitors are facing the same challenges as Australia in attracting investment. Some, such as Canada, are actively repositioning and rebranding themselves as positive and globally competitive investment destinations by better promoting their resource investment strengths.

To remain competitive, the taskforce heard that Australia should more clearly, accurately and energetically convey to investors its resources sector strengths throughout the entire resources supply chain. Australia must make it plain that it is a sophisticated and innovative driver of technology, and has skilled employees and world-class practices in health and safety, environmental management and community engagement.

If Australia is to demonstrate that it is open and ready for new investment, these proven strengths must be better communicated not just in global investment boardrooms but also directly to current and potential trading partners and to the broader community.

Case study: How Canada is repositioning itself as a sustainable resources centre

Like Australia, Canada recognises that it cannot rely solely on past achievements. So it has set a national goal to establish Canada as the uncontested and leading mining nation.

The Government of Canada is placing itself at the forefront of efforts to promote a more positive resources investment climate. It is focusing on better promoting Canada's mineral potential, regulatory and fiscal environment, competitive industries, skilled workforce, access to markets, innovation climate and supportive resources services clusters.

In 2017, the federal, provincial and territorial ministers responsible for mining called for a Canadian Minerals and Metals Plan to solidify Canada's global position and better communicate its competitive advantages at home and abroad.

The decision to develop the plan recognises that, to be a global resources leader, new vision, goals and actions are needed to foster growth and reflect the realities of climate change, Indigenous participation, sustainable development and social acceptability.

The Canadian Minerals and Metals Plan will set a national goal to establish Canada as the world's premier mining nation. It will recognise that to achieve this goal Canada needs to improve in some areas, such as enabling infrastructure, adopting innovation and clean technologies, setting clear and predictable regulatory regimes, earning community acceptance, nurturing greater participation of Indigenous peoples, and developing better overall global reach and reputation.

The plan will take into account the views of mining industry stakeholders, Indigenous partners and the public. It will identify specific and coordinated actions that can be pursued by all levels of governments. Industry, non-government organisations and municipalities will play a key role in the plan's implementation, and partnerships with Indigenous peoples will be critical to its overall success.

Canadian federal, provincial and territorial partners are seeking input from stakeholders throughout 2018 and into 2019, before a final plan is released.

These efforts are strengthened through accompanying industry initiatives. For example, the *Towards Sustainable Mining* (TSM) initiative, developed by the Mining Association of Canada in 2004, is a corporate social responsibility program to improve the industry's environmental and social practices.

The TSM provides tools and indicators to drive performance and ensure key mining risks are managed responsibly. Member companies subscribe to a set of principles, backed by performance indicators that companies report on annually. Companies exhibit leadership by engaging with communities, driving world-leading environmental practices and committing to the safety and health of employees and surrounding communities. The TSM already has global reach, having been adopted by other countries including Argentina, Botswana, Finland, Spain and the Philippines.

www.minescanada.ca | www.mining.ca

Positioning to meet increasing global demand

Australia is the world's leading exporter of iron ore, metallurgical coal, alumina and bauxite. It is ranked second for gold, thermal coal and LNG exports, and third for uranium and zinc production.[55] Australia also ranks highly for a range of other commodities, including copper, nickel, silver and oil, and is well respected for its export capabilities and strengths in environmental management, higher education and its resources equipment, technology and services sector.

This strong position has been hard-won over many years, yet an overarching impression that came through in the preparation of this report was how easy it is to lose.

Taskforce members remain concerned that many stakeholders believe investment dollars are 'drying up'. There is a risk that the sector could too easily rest on its laurels and assume that the conditions that led to the recent major investments in coal, iron ore and LNG somehow remain in place—simply dormant and awaiting the next tier one deposit.

A more proactive and determined effort is needed, along with a sector-wide realisation that no part of the resources sector can be left on autopilot. Unless Australia is prepared and flexible enough to respond to upswings and changes in global demand (for traditional and new products), it will not be able to take full advantage of the vast resources wealth, both onshore and offshore.

Australia must also scan the horizon constantly for opportunities in the production, processing and export of the new materials that are, and will be, needed to build the technologies and products of the future. Rare earths, and battery and critical minerals are noteworthy in this respect.

55 Department of Industry, Innovation and Science (2018), *Resources and Energy Quarterly - June 2018*.

The nation needs to create an environment that will position it as a safe haven for investment. To this end, it needs a better understanding of what will drive future domestic and foreign direct investment. This necessitates understanding how Australia can position itself to compete against highly mobile capital investment flowing to opportunities in other countries.

The sector needs to better understand the full range of impacts it faces from geopolitical events. For example, what are the potential effects of unpredictability and volatility in geopolitical relations, including trade relations, among Australia's key trading partners in the Indo-Pacific region? How do the ongoing developments on the Korean Peninsula and in the South China Sea—as well as developments in tariffs and trade, and the rules-based trading system—affect Australia as a resources nation?

Central to a more proactive approach will be how the sector can better collaborate to promote Australia's strengths as a destination for inbound investment. To achieve this, the taskforce recommends a more strategic approach to marketing and communicating Australia's strengths and assets, and engaging more effectively with domestic and global investors.

Collaboration is essential to attract investment and promote Australia's capabilities overseas

Australian history is full of examples of international involvement and partnerships. Take higher education, a field in which Australia is forecast to soon be the second largest global destination for overseas students, overtaking the United Kingdom.[56] The country's education institutions provide training for a large number of students, including in the technical disciplines required throughout the resources sector.

This engagement adds greatly to Australia's international reputation as a leading destination for skills training. It also creates life-long positive relations with other countries that build familiarity and trust, and enhances the world's view of Australia as a preferred destination for future business and investment.

The taskforce considers this a solid example of how similar benefits could be achieved in the resources sector, with governments and industry collaborating to create a strategy to better showcase industrial and academic strengths to overseas partners and attract more inbound investment. Businesses across the resources supply chain are already active in overseas markets, where Australia is perceived as a global leader. The nation's academic and research capabilities and personnel are also well known and highly regarded. However, all areas of the resources sector stand to gain if there is a more strategic, integrated, inclusive and collaborative national approach to engaging its international partners.

Strengthening Australia's investment agencies

The resources sector contributed 7 per cent of Australia's gross domestic product in 2016–17, and its commodity export earnings are forecast to reach a record high of $238 billion in 2018–19.[57] However, it is important to ensure that the value of this sector is commensurately reflected in the levels of support provided by inbound investment agencies.[58]

Given the importance of the sector to the Australian economy, the taskforce believes that the country would benefit from improved or strengthened coordination between federal and state agencies to develop inbound investment strategies and manage investment queries.

The inbound investment agencies should play a more pivotal role in promoting Australia's capabilities and strengths in the resources sector. They should also promote Australia's expertise in environmental management, its resources services, and its education and R&D institutions in more inclusive, strategic and sector-wide ways.

The taskforce believes there should be a greater focus on the role of Australian agencies responsible for promoting investment and supporting international investors. As such, it suggests that governments review their institutional settings and structures, including by asking:

- Are investment agency mandates appropriately defined?
- Are activities coordinated across governments?
- Is resourcing sufficient?
- Are agency structures appropriate?
- Is there sufficient emphasis on the resources sector?

Showcasing sector-wide strengths

The taskforce believes that Australia requires a strategy to showcase its sector-wide strengths, especially to overseas audiences, and to further improve its efforts to bring customers, suppliers and investors together. Many Australian organisations, particularly in the resources services sector, have said there are insufficient opportunities and no consistent national approach to emphasise capabilities across the supply chain. Many competitor nations are more active in promoting their technologies and abilities on a global stage.

To regain the initiative, a strategy could better coordinate governments, industry and academia for inbound and outbound expansion activities. Any strategy should be ready to grasp opportunities at conferences and trade events that are regularly held in Australia, such as the annual International

56 Centre for Global Higher Education (2018), *The UK in the global student market: second place for how much longer*, p. 2, http://www.researchcghe.org/perch/resources/publications/the-uk-in-the-global-student-market.pdf
57 Department of Industry, Innovation and Science (2018), *Resources and Energy Quarterly - June 2018*, pp. ii, 1.
58 The investment agencies include Austrade; Invest Canberra; NSW Department of Industry; InvestNT; Trade & Investment Queensland; Government of South Australia, Department for Trade, Tourism and Investment; Tasmanian Government, Department of State Growth; Invest Victoria; Government of Western Australia, Department of Jobs, Tourism, Science and Innovation.

Mining and Resources Conference or the Australian Petroleum Production and Exploration Association (APPEA) Oil and Gas Conference.

However, the taskforce is particularly concerned that a greater collective national effort is needed for outbound activities. An example is the collaboration between Austrade and National Energy Resources Australia (NERA) to send a joint Australian delegation to the world-renowned Gastech Conference in Barcelona, Spain. This NERA initiative promotes Australian oil and gas businesses across the supply chain, from equipment, services and technology firms through to R&D organisations, innovative start-ups, and education and training providers. It seeks opportunities and reinforces Australia's status as the second-largest LNG exporter in the world and as an international leader in technology innovation. Expomin in Chile is another example with regard to the resources services sector.

Another aspect of the showcasing strategy could consider just how effective the range of conferences and events held in Australia really are. Consideration could also be given to whether individual events compete against each other, including issues of duplication and positioning in a crowded global events space. Overall, can such events be better used to promote a more coordinated approach?

It would also be useful to consider whether the showcasing strategy might eventually involve a major one-off international investment conference or trade event modelled on Germany's Hannover Messe, a leading trade fair for industrial technology. This event would bring industry and investors together to showcase innovation throughout the resources supply chain, including the resources-focused education and training sector. It would also provide opportunities to link with a range of supporting activities.

The taskforce appreciates that such events pose logistical and funding challenges and need precise positioning if they are to engage relevant overseas parties and deliver a return on investment. It recommends relevant government agencies consider it as part of a broader resources-focused investment strategy.

Informing potential investors

The taskforce is aware that many overseas investors perceive Australia as a difficult place in which to establish and bring new investment. Some international companies have even said there is a lack of information on current and upcoming projects across the nation.

The taskforce considers that current mechanisms to promote investment lack coordination and fail to adequately explain and highlight Australia's strengths. For example, investors who approach a state government office overseas may wonder why they are referred to a different Australian agency for another piece of the investment jigsaw. Each agency may not be able to present a holistic picture of national opportunities.

Federal, state and territory agencies have a remit to promote investment within their domains but overseas investors should also receive a comprehensive national description of current and emerging opportunities for investment whenever they make contact with government investment agencies. This should not only give investors a more informed view but will also instil trust by demonstrating that Australia is a nation that conducts business holistically and strategically.

The taskforce therefore recommends that governments and industry should collaborate to provide information on potential projects through the development and promotion of a compendium of national investment opportunities in the resources sector. Such a compendium would be prepared by federal and state inbound investment agencies in consultation with industry.

Recommendations

7. Governments and industry should collaborate on a strategy to better promote Australia's world-class strengths as a destination for inbound investment in the resources sector, including by:
    a. considering changes required in the agencies responsible for attracting inbound investment, in order to strengthen their focus on the resources sector and support international investors to invest in resources sector opportunities in Australia
    b. developing an approach to showcase Australia's attractiveness as an investment destination, including its strengths in the resources equipment, technology and services sector
    c. developing a compendium of national investment opportunities in the resources sector to inform potential investors.
8. Governments and industry should better promote Australia's resource export capabilities, with a focus on its strengths in the environmental management and restoration economy, the resources equipment, technology and services sector and higher education.

6.

Finding and developing new resources

Image source: Shell

Australia's successes in quickly capitalising market opportunities and capturing a large share of investment have depended largely on the accessibility and quality of its resources base. Therefore, adding to this resources base with new tier one resources is critical for attracting investment and establishing a stronger resources sector for decades to come.[59]

Australia is highly prospective as two-thirds of the continent remains unexplored. The most significant opportunities, therefore, lie in improving exploration of its unexplored or greenfield areas. Despite this, the majority of exploration expenditure over the last two decades has been dedicated to brownfield areas.[60] This has happened partly because capital markets want to reduce risk and secure quick returns, but also because of a lack of applied knowledge and effective technologies available to explore frontier areas.[61]

Australia is going further than many countries to tackle the challenge of unlocking frontier areas. Despite this, exploration capabilities must be further enhanced for the nation to be able to promote new investment opportunities and open new mines, as well as improve the exploration of brownfield sites. The key to achieving this goal will be improving access to new and existing geoscientific data and advanced scientific research. Applying the same solution to a different and more challenging problem is not going to produce the same outcome. There should also be a more strategic and coordinated approach to promoting the development of new resources regions.

The importance of a data strategy

While the exploration and development of new basins or provinces is predominantly undertaken by industry, the taskforce believes that governments also have a role in promoting new areas and helping to reduce the risks involved in exploration. This role is important because major mining companies tend to focus their global exploration capital where they believe they will get the best returns.

In recent decades an increasingly large proportion of the total capital invested in exploration has come from the risk-capital market rather than mining companies. The risk-capital market has a typically short-term investment horizon, meaning incentives aren't necessarily aligned with the longer-term national interest. Furthermore, resources is a cyclical industry. So, while there is typically a market response to periods of high-commodity prices, characterised by greater exploration expenditure, these cycles tend to be shorter than required for longer-term, sustainable greenfield exploration programs.

The taskforce has suggested that one important way governments can promote new areas and help reduce risk in investment is to collect, integrate and make available additional pre-competitive geoscience data. Such data reveals a region's geological properties, helps exploration teams generate targets and has historically underpinned Australia's exploration industry.[62] Submissions to the taskforce raised the need to expand and enhance this data and increase access to it.[63]

This could significantly improve the way data is analysed and integrated, leading to more effective targeting and evaluation of potential resources.

Much of this would have been technologically impossible just a few years ago, but the rapid advances in high-performance computing, modelling and visualisation, cloud services and big data analytics mean it is now feasible.

These opportunities bring their own challenges too. Data must be collected and organised in an agile but also systematic way that enables collaboration, compatibility and operability, so meaningful information can be extracted. The current system, with data held in multiple agencies and databases under different frameworks and formats, and a backlog of existing data awaiting digitalisation, limits progress.

The taskforce recognises there is an opportunity to realise significant additional value from Australia's existing data, painstakingly collected over many decades, and deliver this to the exploration sector. It sees the benefits of having a holistic long-term Resources Data Strategy for the sector, focused on improving the scope and curation of geoscience data and other important data sets such as those on the environment, biodiversity and heritage. The strategy would include data analyses that provide not just access but intelligence and insights too.

This would not only reduce the risk of exploration investment but would also help governments make more informed decisions and better coordinate and prioritise research efforts.

It is also recommended that the Resources Data Strategy include establishing and maintaining a national environmental and heritage repository. This would help to enhance environmental management practices and outcomes, and improve information transparency to build community trust. Further discussion on the management of environmental, biodiversity and heritage data can be found in Chapter 8: Improving environmental performance.

59 Tier one resources generally refer to resources of a sizable value and quality that can drive the development of a new basin or province.
60 Australian Bureau of Statistics (2018), *Mineral and Petroleum Exploration, Australia*, cat. no. 8412.0.
61 AMIRA International (2017), 'Unlocking Australia's Hidden Potential', http://www.amirainternational.com/. See also http://uncoveraustralia.org.au for more information.
62 Geoscience Australia (2015), 'Value to the Nation', http://www.ga.gov.au/value-to-the-nation
63 Transform Exploration (2018); Association of Mining and Exploration Companies (2018); the Australian Petroleum Production and Exploration Association (2018), submissions to the Resources 2030 Taskforce.

The taskforce recognises that there is currently a broader, ongoing discussion regarding data and its management, especially in the resources sector. However, the taskforce feels that the need for a data strategy in this area is sufficiently important for the long-term ambition of the sector to warrant being recommended in this report. This decision was supported by submissions to the taskforce that also emphasised the importance of geoscience and environmental data.[64]

The taskforce also believes a precise metric is needed to accurately understand where exploration efforts are being directed. This can better inform governments and industry when planning. At the moment there is no accurate way of measuring exploration expenditure in greenfield sites.[65] The Australian Bureau of Statistics (ABS) 'new deposit' data has generally been used as a proxy for greenfield exploration spend. However, the definition of 'new deposit', and hence the data collected, also captures feasibility studies on some existing brownfield deposits and additional drilling of historical discoveries to upgrade geological certainty.

This method is believed to currently over-inflate the spend in greenfield developments and overstate the true effort towards greenfield exploration. The taskforce therefore recommends that ABS data collection categories be amended to more precisely capture and quantify true greenfield exploration expenditure and activity.

Unlocking hidden resources through scientific research

Areas that have already been explored are, not surprisingly, near the surface. Unlocking new frontier areas is critical to finding the next tier one resources in Australia. But these areas, which make up two-thirds of Australia, are currently unexplored largely because of technical barriers. The current approaches and exploration tools used in near-surface exploration are insufficient for deeper areas.

The provision of new and better integrated data will be important in unlocking new greenfield or frontier areas. The UNCOVER initiative was established to enhance exploration capabilities in these frontier areas. Coordinated by AMIRA International and UNCOVER Australia, UNCOVER was designed to focus Australia's relevant geoscience effort on providing the knowledge and technology to substantially increase the success rate of mineral exploration in under-cover areas.[66] This has involved well-supported teams from industry, academia, the CSIRO and geological surveys working together to establish an integrated national approach.

UNCOVER has been very successful and widely supported. It has identified the following priority areas:

- research and development
- exploration technology
- historical data compilation and analytics
- new data acquisition.

UNCOVER has also identified what is needed to improve long-term exploration performance in frontier areas, which is central to the industry's future success. Satisfying these needs is beyond the capacity of an individual organisation but possible with collaborative partnerships.

A number of actions identified by UNCOVER are already happening. These include acquiring new data through Geoscience Australia's (GA's) Exploring for the Future program, developing exploration technology through the MinEx CRC (a cooperative research centre) and Deep Earth Imaging through the CSIRO.

UNCOVER is such a huge, complex and valuable undertaking, that more could be done to bolster its coordinated implementation. The Association of Mining and Exploration Companies, in its submission to the taskforce, also highlighted the need to support and promote UNCOVER.

The taskforce therefore recommends that the federal government develop a mechanism to attract funding for UNCOVER to advance scientific research in under-cover areas to provide high-quality resources for future generations of Australians.

The estimated cost to deliver the 15-year UNCOVER plan amounts to less than 1 per cent of the current royalty revenue received by governments.[67,68] A small part of the current royalty revenue could be reinvested in science and research to deliver the next wave of discoveries that can provide resources and sustain government revenue streams for future generations of Australians.

The taskforce also considers that implementation of UNCOVER will require an overarching entity or custodian to ensure its long-term objectives are met. This entity or body will be responsible for driving the implementation of UNCOVER's initiatives and reforms. Therefore, the taskforce recommends that a body is selected or created to ensure the initiatives are implemented.

The taskforce has made these recommendations given the potential of UNCOVER to improve exploration performance in Australia. This new sustainable, funded research model, aimed at delivering step changes in exploration success, will help to develop Australia's longer-term resources base.

64 Minister for Resources, Victorian Government (2018); Government of South Australia (2018), submissions to the Resources 2030 Taskforce.
65 Gold Road Resources (2018), submission to the Resources 2030 Taskforce.
66 AMIRA International (2017), 'Unlocking Australia's Hidden Potential', http://www.amirainternational.com/. See also http://uncoveraustralia.org.au for more information.
67 Ibid.
68 Deloitte Access Economics (2018), *Estimates of royalties and company tax accrued in 2016–17*, Minerals Council of Australia, pp. 4–8.

Using data to drive investment

Exploring for the Future is a four-year program (2016–20) led by Geoscience Australia in collaboration with state government and Northern Territory Government partners. Its mission is to acquire new data on underexplored areas in Northern Australia and South Australia using innovative tools and techniques.[69]

The program aims to better understand the hidden resources potential of frontier regions. The data is already being publicly released, and by 2020 the program will have delivered a comprehensive collection of geological and hydrological data that will inform policy development, resources identification and best-practice land management.

The program has been successful so far in delivering new pre-competitive geoscience in frontier areas and driving strong collaboration and innovation among geoscience communities. The program has also successfully illustrated how new and pre-competitive geoscience can drive investment.[70] For example, one of the reasons for Anglo American's recent return to the Australian exploration scene was based on world-class datasets being delivered through Exploring for the Future and other programs. The company was also keen to be close to Australia's innovation ecosystem as it strives to improve under-cover mineral exploration.[71]

A submission to the taskforce further recognised the value of the program and suggested that it, or its equivalent, be rolled out in other parts of Australia.[72] As a result of Exploring for the Future's success, the taskforce believes there is a compelling reason to extend the program nationally, and recommends including offshore exploration.

Promoting a strategic approach to developing new basins or provinces

While good geological information plays a critical role in helping to open and develop greenfield regions, long-term strategic planning by industry and governments would enhance investment attractiveness. This planning (encompassing infrastructure, land use, policy and industry development) is important because it shows that governments will support resources development. This gives investors, businesses and the community longer-term confidence and helps them make decisions with more certainty.

However, the taskforce found that existing strategic plans are scarce and those that do exist lack detail. This has influenced the economic viability of new projects. This need for strong strategic plans was also raised numerous times in submissions to the taskforce, especially in relation to petroleum development and shared infrastructure.[73]

Such plans should also take into account aligning policy, information and investment services when identifying and promoting new basins or provinces for greenfield development. This is primarily to counteract inconsistencies over policy and regulatory frameworks. For example, offshore development is jointly provided by the federal and respective state or territory governments. Onshore development is administered by the states and territories.

The taskforce heard that this difference in administrators can confuse investors, which erodes confidence in the longer-term stability of Australia's regulatory regimes.

The efficient development of new basins and provinces also needs a shared government–industry approach to infrastructure. The case study below highlighted some of the factors that help the development of a basin and a new industry.

69 Geoscience Australia (2018), 'Exploring for the Future', http://www.ga.gov.au/eftf
70 Geoscience Australia (2015), 'Value to the Nation', http://www.ga.gov.au/value-to-the-nation
71 MiningNews.net (2018), 'Anglo American returns to exploration in Australia', 6 June 2018, https://www.miningnews.net/discovery/news/1339602/anglo-american-returns-to-exploration-in-australia
72 Government of South Australia (2018), submission to the Resources 2030 Taskforce.
73 Western Gas (2018), ConocoPhillips (2018), submissions to the Resources 2030 Taskforce

Surat Basin: Home to one of the world's largest coal seam gas (CSG) operations

The Surat Basin is the engine room of the east coast gas industry, which is helping to propel Australia towards becoming one of the world's largest liquefied natural gas (LNG) exporters.

The basin covers parts of northern New South Wales and southern Queensland. It and the associated LNG facilities on Curtis Island in Gladstone are home to a $70 billion gas industry. Approximately two-thirds of the gas produced on Australia's east coast is CSG from Queensland.

The Australian Petroleum Production and Exploration Association (APPEA) says the basin's tremendous potential was identified in the early 1990s. However, technical challenges and initially higher production costs than those in established conventional gas production, prevented large-scale development until there was the opportunity for industry to use CSG as the feedstock for LNG exports.

APPEA says it has been this conversion of CSG to LNG that has drawn unprecedented investment to unlock the Surat Basin resource.

In Queensland, the state government has taken a proactive role to develop the basin – breaking new legislative and policy ground to usher in a new era of CSG operations. The government put in place a policy and legislative framework that has helped to grow a pioneering industry in the basin and at Gladstone in a sustainable way.

The simultaneous construction of three major LNG projects in Queensland did present challenges but, according to Dr Malcolm Roberts, APPEA's Chief Executive, "the ability to overcome these challenges and develop this once-in-a-generation economic opportunity for Australia was assisted by a number of factors".

"Certain access to the resource, strong demand for natural gas, bipartisan government support and the creation of strong and enduring partnerships with stakeholders and local communities have all assisted," he said.

"Bipartisan Queensland Government support was a necessary condition for success in the basin. It recognised the need for new sources of gas supply, the opportunity to diversify the state's economic activity, deliver jobs and economic growth and help meet the growing global demand for LNG. Clear and consistent policies and government's willingness to work with industry and other stakeholders to arrive at outcomes that benefited all parties were vital to the basin's sustainable resource projects."

The establishment of the GasFields Commission Queensland in 2013 has also encouraged consultation and information sharing between the basin's landholders, communities and industries.

"With decades of gas industry development ahead, there is a growing confidence that the foundations have been laid for stronger, longer-lasting collaboration and partnership opportunities," the Commission's CEO Carolyn Collins said.

Companies active in the Surat Basin include Australian companies Santos, Origin Energy and Senex Energy and large multinational corporations such as Shell, ConocoPhillips, Petronas, CNOOC, Kogas, Tokyo Gas, Sinopec and Total.

www.appea.com.au | www.gasfieldscommissionqld.org.au

Capturing downstream processing opportunities

The benefit to Australia of large-scale resources development has been enormous, and there's weight behind the argument to extend this beyond just extraction and into infrastructure development and commercial downstream processing. If Australia approaches this broader development strategically, there will be more opportunities across the supply chain and more success stories like the Surat Basin-Gladstone region, the North West Shelf, Darwin LNG and the Pilbara.

One example is the rapidly growing lithium market. As a major reserve-holder of lithium—and the world's biggest producer—Australia is on the cusp of significant new opportunities for the export of this mineral. However, the resources sector must also decide if there are other opportunities it can seize to add value to its lithium resource. Is there an opportunity to develop new, efficient and clean processing technologies to support upstream electrochemical processing? Or, could a manufacturing base be created for lithium battery components?

As was raised in submissions to the taskforce, Australia has the opportunity to shape new mineral markets and meet burgeoning global demand for new-era or 'critical' minerals.[74] The United States government has drawn up a list of 35 critical minerals—Australia is the top producer of three of them, with identified reserves of 14 others.[75]

Among these critical commodities are the rare earth elements (REE) used in the manufacture of smartphones, flat screen monitors, wind turbines, electric cars, solar panels and many other high-tech applications.[76]

The taskforce therefore recommends that strategic plans be developed to capture new opportunities, and encourage and enable the value chain of critical minerals in Australia. These plans should consider how Australia can get more value from its raw materials by taking advantage of these opportunities.[77]

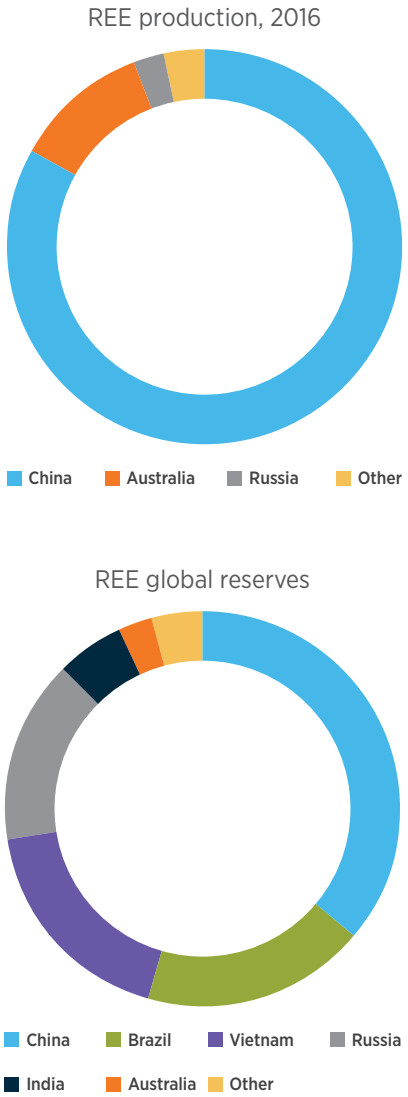

Figure 5: Rare earth elements production and reserves (2016 estimate). (Source: U.S. Geological Survey (2017)

74 Rio Tinto (2018), submission to the Resources 2030 Taskforce
75 United States Geological Survey (2018), 'Interior Releases 2018's Final List of 35 Minerals Deemed Critical to U.S. National Security and the Economy', 18 May 2018, https://www.federalregister.gov/documents/2018/05/18/2018-10667/final-list-of-critical-minerals-2018
76 Geoscience Australia (2018), 'Critical Commodities', http://www.ga.gov.au/about/projects/resources/critical-commodites
77 Rio Tinto (2018); Association of Mining and Exploration Companies (2018), submissions to the Resources 2030 Taskforce.

Recommendations

9. Governments and industry should develop a Resources Data Strategy to advance collaboration on data collection and analysis. The strategy would cover ways to:
    a. improve the scope and curation of geoscience, environmental and heritage data
    b. improve data access and discoverability.
10. The federal government should amend the Australian Bureau of Statistics' data collection categories to better capture and quantify greenfield exploration expenditure.
11. Governments should support and develop a mechanism to attract and deploy co-funding for UNCOVER initiatives, to harness research and make a step change in exploration success rates in under-cover terrains and provide high-quality resources for future generations of Australians.
12. Governments and industry should determine which body will drive the implementation of UNCOVER initiatives.
13. The federal government should expand the Exploring for the Future program to make it a national initiative, both onshore and offshore.
14. Governments should work with industry and local communities to identify and promote priority new basins and provinces for greenfield development. This could include the alignment of policies, information and investment services, and encourage a shared vision for infrastructure to develop the basins and provinces as efficiently as possible.
15. Governments should develop strategies to facilitate value-adding for prospective battery and critical minerals domestically.

7.

Building strong communities

Image source: Gulkula Mining Company

Resources operations affect a range of communities, each with different perspectives and needs. Gaining community support through comprehensive engagement is imperative for the success of investment decisions and fundamental in building positive public sentiment towards the resources sector.

One major positive impact is employment: the resources sector is the backbone employer in many regional communities and a consistently strong employer of Aboriginal and Torres Strait Islander people in regional Australia.[78]

Community engagement and Indigenous agreements

Australia is at the forefront of community engagement in the resources sector. To stay there it must first resolve the disparity between the quality of community engagements, including Indigenous agreements.

This is caused by the varying knowledge, experience and needs of each community, and individuals' skills and capabilities. Also, while several guidelines, standards and industry policies exist—such as those produced by the Minerals Council of Australia (MCA) and the Department of Industry, Innovation and Science—they offer a range of varying and, at times, conflicting advice. There is no one credible standard source.

The taskforce has heard that companies across the sector are not held accountable to a common standard on community engagement and Indigenous agreements. Some agreements demonstrate a high standard of community engagement, consultation and negotiation. Others do not. Some simply provide financial incentives, which do not improve the overall quality of life for these marginalised communities or promote better outcomes in education, healthcare or employment.

To address this, the taskforce recommends governments, industry and community experts collaborate to produce one consolidated set of credible best-practice guidelines and standards for community engagement and Indigenous agreements. This would help to level the playing field across all communities impacted by the resources sector. It would streamline existing advice and fill information gaps.

The taskforce suggests a first step would be to comprehensively analyse and review existing advice, standards and frameworks to create a set of best-practice guidelines. The existing material may include:

- those developed by federal government departments
- those developed by industry, including Rio Tinto, MCA and BHP's collective model
- the international Towards Sustainable Mining initiative adopted by Canada
- the Organisation for Economic Cooperation and Development (OECD) Mining Regions and Cities community initiatives
- the Queensland Government's approach to establishing Indigenous Land Use Agreements with individual Traditional owner groups, which can be used by new companies seeking to conduct resource activities in an area.

The new consolidated guidelines would be a minimum benchmark for industry when initiating negotiations and developing mutually beneficial outcomes for all stakeholders. They would also be the main collective repository of transparent and accessible information, and a reputable and long-lasting resource. Furthermore, they would provide advice for both national and international companies wanting to invest in the Australian resources sector.

Specific areas of focus could include:

- guidance on how the Native Title regulatory framework is best applied to Indigenous agreements
- guidance on periodic reviews to consider changes in a project and commitments over its entire life cycle
- recommendations on the timeliness of engagement
- strategies for local procurement and small business integration with larger resources companies
- guidance on consistent reporting of social impact data, employment, regional content and procurement statistics.

The guidelines would need to be credible and workable, endorsed by the broader resources sector and kept up to date. This could be done by an advisory group with members from industry, governments and communities.

Indigenous employment, businesses and training opportunities

Over the last decade, the resources sector has made a large contribution to the economic empowerment of many Aboriginal and Torres Strait Islander people.[79] Many resources projects operate in or near traditionally owned land, and Aboriginal and Torres Strait Islander communities. In the Pilbara region of Western Australia, more than 60 per cent of mineral operations lie next to Indigenous communities.[80]

The Native Title framework has successfully provided opportunities for industry to beneficially engage Aboriginal and Torres Strait Islander people through negotiated agreements such as Indigenous Land Use Agreements and others focused on achieving employment, cultural heritage and educational outcomes. These agreements aim to drive national economic growth and community support for resources

78 Based on 2016 Census data, the mining sector is a top-10 employer of Aboriginal and Torres Strait Islander people (ABS Census 2016, 'Aboriginal and Torres Strait Islander Census: Industry'). Moreover, Aboriginal and Torres Strait Islander employment in the mining sector grew 22.4% between 2011 and 2016 (Australian Bureau of Statistics (2017), 'Aboriginal and Torres Strait Islander Census: Industry', media release, http://www.abs.gov.au/ausstats/abs@.nsf/MediaRealesesByCatalogue/142C08A784A1B5C0CA2581BF001EE22C).

79 Australian Bureau of Statistics (2013), *Australian Social Trends, Nov 2013*, cat. no. 4102.0.

80 Langton, M. and Mazel, O. (2015), 'Poverty in the Midst of Plenty: Aboriginal People, the 'Resource Curse' and Australia's Mining Boom', *Journal of Energy & Natural Resources Law*, June 2015.

projects. They also aim to empower marginalised communities to overcome socio-economic barriers in education, training, employment, healthcare and the provision of infrastructure.[81]

These communities rely heavily on the resources sector to provide jobs and training, and help them escape welfare dependency and have a long-term sustainable income.

However, there are communities living close to or in resources-rich regions that remain marginalised and experience 'poverty in the midst of plenty'.[82]

This presents an opportunity to do even more in the field of Indigenous engagement and promote Indigenous economic development through employment opportunities, industry training programs, increased procurement of goods and services from Indigenous small businesses, and broader health and education benefits. These outcomes will help close the gap.

The taskforce identified Indigenous business development as an important area in which to provide adequate support and remove barriers that may discriminate against or limit Indigenous entrepreneurs and the economic participation of Indigenous small businesses. Initiatives that can help members of these communities become more work-ready and to build skills and capacity can also help promote good governance for Indigenous leaders. A more in-depth discussion on skills and the workforce as they relate to communities can be found in Chapter 9: A workforce and skills for the future.

To encourage and recognise industry and government initiatives there needs to be more benchmarked, transparent and publicly accessible data. This data would report the number of Indigenous small businesses and local suppliers contracted by resources companies and highlight the benefits to the community of local resources projects.

There also needs to be a move away from a 'tick the box' approach to a more inclusive approach to distinguishing between companies that demonstrate a genuine commitment to sustainable Indigenous engagement and those that are uncommitted and effectively misusing the system. The data could be further used for baseline monitoring and future strategic planning.

Sustainable planning to create more resilient regions

Many regional (and some urban) communities rely on the economic fortunes of the resources sector, and often on one large employer. While this drives economic growth during a project's operational life, there is an inherent risk that factors beyond the control of communities—such as resources depletion and economic decisions made in distant headquarters—will impact those communities sooner or later.

These impacts on communities can be abrupt, leading to job losses and service closures. With an adequate plan and appropriate risk mitigation, resources-rich regions can be more sustainable and can continue to attract talent regardless of such factors and decisions.

Planning is important to identify and address uncertainties throughout a project's life cycle. This is particularly the case in pre- and post-resources development phases. When a project starts, the community needs to accurately forecast the rate of population growth so sufficient infrastructure can be developed, such as affordable housing, and education and healthcare services. It also needs to safeguard against the closure of these services if or when resources operations cease.

Over the next decade, as many mines and offshore operations reach the end of their operating lives, challenges associated with mine closures and decommissioning, existing and new rehabilitation programs and closure management strategies will be increasingly relevant.[83] Communities should play a key part in helping to manage these closures and their impacts.

Most industry–community programs and social impact assessments are conducted on an organisational level, site by site. They do not address the cumulative and regional impacts on communities of overlapping and concurrent operations. Regional sustainability plans could identify and provide a more integrated approach[84] and incorporate existing state initiatives such as social impact assessments, some of which are administered by the Queensland Government.

To address the complex multidimensional component of social challenges, governments, local councils, industry and communities need to devise a coordinated and collective approach.[85]

The taskforce therefore recommends the development of strategic sustainability plans to help communities in resources-rich regions build resilience to better adapt to closures. This is a holistic approach that accounts for the entire life cycle of resources developments and aligns with a region's demographics and its own future vision. Such a plan could anticipate changing requirements for the workforce and infrastructure, and predict barriers to economic growth.

Long-term sustainability plans could create more resilience partly by diversifying the economy, attracting more talent and showcasing a vibrant community and sustainable region with a long-term, post-resources future. In these ways, strategic regional planning could combat the urgent changes that happen now as a resources project reaches the end of its operational life or, conversely, when one starts and puts significant demand on existing resources.

81 Langton, M. (2015), *From conflict to cooperation: transformations and challenges in the engagement between the Australian minerals industry and Australian indigenous peoples*, Minerals Council of Australia, 2015.
82 Langton, M. and Mazel, O. (2015), 'Poverty in the Midst of Plenty: Aboriginal People, the 'Resource Curse' and Australia's Mining Boom', *Journal of Energy & Natural Resources Law*, June 2015.
83 Rio Tinto (2018), submission to Resources 2030 Taskforce, p.10.
84 Everingham, J. (2012), *Towards Social Sustainability of Mining – The Contribution of New Directions in Impact Assessment and Local Governance*, Centre of Social Responsibility in Mining, Sustainable Minerals Institute.
85 Rio Tinto (2018), submission to Resources 2030 Taskforce, p.19.

Some regions that are reaping the benefits of strategic sustainable planning are Mount Isa, Broken Hill and Kalgoorlie-Boulder, which have formed the Australian Mining Cities Alliance. This was done to share knowledge, experiences and ideas, and meet common challenges (see the case study 'Mining communities take charge of their destinies'). Sustainability plans should consider existing successful planning management programs and initiatives such as the Alliance, as well as state sustainable planning legislation and other social impact assessments and platforms. Collective approaches such as BHP's pilot program in Port Hedland and the OECD Mining Regions and Cities program should also be considered.

In terms of attracting and retaining talent, the taskforce suggests strategic sustainability plans could help the sector better understand what encourages and discourages people from living in particular communities and regions. This was prompted when the taskforce heard that local regions should try to attract talent by focusing on promoting the benefits and opportunities a regional lifestyle can offer. One proposal was to incentivise regional relocation by amending the zonal tax rebate.

Another approach discussed was to address corporate disincentives, such as the fringe benefits tax. Without it, industry may find it easier to provide accommodation and other support for existing employees and in turn tempt more new workers to relocate to remote regions. The taskforce agrees that further consideration of fiscal and regulatory incentives to attract and retain talent is required.

Strategic sustainability plans could also consider ways to support local training and leadership opportunities and career development to retain skills and talent in regional communities.

In time, such plans could evolve to resemble the Smart Cities Plan model being developed by the Australian Government's Department of Infrastructure, Regional Development and Cities, in collaboration with industry, state and territory governments, and local councils.

Building Australia-wide community support for the resources sector

Effective engagement between governments, industry and communities is vital to gaining community acceptance for resources projects. This involves listening to and acknowledging community concerns, understanding and supporting their needs and, in doing so, developing robust relationships. Effective relationships are founded on open, transparent conversations, timely and frequent consultation, and constructive negotiation.

The sector operates in an environment increasingly challenged by differing regional and national community expectations. Communities rightly want more access to accurate information on resources activities and evidence of the sector's environmental awareness. Digital media and social media platforms have enabled activists and anti-resources protestors to more easily share disinformation and influence decision making at the broader community level. This is often to the detriment of local communities, which do not always share their opinions.

The taskforce identifies this as an opportunity for communities, industry and governments to work together to better promote the benefits of the resources sector and share success stories.

The taskforce believes this is a shared responsibility and all stakeholders must fulfil their individual roles. Industry must deliver on its corporate social responsibilities and governments need to provide more support to vulnerable communities in rural resources regions.

Underpinning the taskforce's recommendations is a need for governments—state, territory and, in particular, local—to consider the distribution of wealth from the resources sector back into regional communities. Combined with the other recommendations, this can help communities become more proactive and prosper. It will help them to feel empowered to sit at the table and drive negotiation discussions on community expectations and needs.

Mining communities take charge of their destinies

For the Australian communities whose livelihoods are based on resources operations, predicting and planning for the future can be a difficult exercise. These often regional communities live and work every day with the resources sector's changing fortunes, as reserves are discovered or dwindle, technologies alter and the demand for commodities shifts.

Some communities find that forward planning and partnerships across regions can help to make their local economies more resilient, and ensure more of the benefits of resources operations flow to local people and businesses.

The local councils of three of Australia's most iconic mining towns are a good example. In late 2017, the Kalgoorlie-Boulder, Mount Isa and Broken Hill councils formed the Australian Mining Cities Alliance.

With all three dependent on finite mining operations, the alliance gives them a common voice and is a forum to learn from each other's experiences.

"It allows us to talk about our challenges, our commonalities and what mining and our local economies will look like in the future," says Broken Hill Mayor Darriea Turley, a co-director of the alliance with the Kalgoorlie-Bolder and Mount Isa mayors.

"As isolated mining communities, we live thousands of kilometres apart but the alliance is giving us one voice to raise our issues at all levels."

Know-how and knowledge sharing through the alliance is helping these regions diversify their economies so they can better adapt to changing circumstances.

"We have to factor in a lot of change—things like mine closures, new discoveries, fly-in fly-out workforces, local apprenticeships and careers in mining, and water, housing stock and air travel issues," Mayor Turley says.

"The alliance is helping us work through shared challenges and collaborate with our mining partners, so our communities can have a better lifestyle and mining can grow."

The alliance aims to be a common voice for other Australian mining cities—its membership is growing and will also include mining companies to enable the fullest cooperation.

It has a multi-year research agenda to support evidence-based planning and decision making and is initiating a long-term advocacy program to support regional mining communities.

Recommendations

16. Building on existing materials, governments, industry and communities should develop a comprehensive set of credible best-practice guidelines and standards for community engagement. These would incorporate guidance on the timeliness of engagement, local procurement reporting and strategies, including Indigenous businesses, employment and skills development, and engagement with Aboriginal and Torres Strait Islander communities and traditional landowners.
17. Governments, local councils, industry and communities should collaborate to establish integrated, long-term sustainability plans to promote economic diversification and resilience for resource-dependent regions.
18. Governments should investigate the fiscal and regulatory frameworks (such as fringe benefits tax and zonal tax incentives) that encourage or discourage individuals to live and work, and businesses to locate and operate, in rural and regional areas associated with resource activities.
19. Industry, governments and communities should collaborate to build positive sentiment towards the resources sector nationally.

8.

Improving environmental performance

Image source: Stantec Australia

Improving the environmental footprint of Australian resources activities is crucial to unlocking the sector's continued long-term success and sustainability. Many resources companies recognise communities' rising expectations regarding environmental conservation and management. They have developed new practices and implemented strict guidelines and operating procedures to reduce their environmental impact.[86] Many businesses go above and beyond the already high minimum requirements set by governments. These actions have reduced the sector's environmental footprint, minimised the long-term impacts of development and facilitated effective rehabilitation.

The taskforce observed that the few companies with poor environmental records fuel doubt about the whole sector's commitment and ability to minimise its environmental impact. Acknowledging the reality of the sector's environmental performance and demonstrating a commitment to improvement are important in developing and maintaining a positive social licence to operate, and ensure communities are aware of the facts rather than the fictions in order to gain their support.

The taskforce sees the increasing global focus on environmental stewardship as having the potential to be more of an opportunity than a risk. If effectively and transparently promoted, it will bolster Australia's position as a preferred supplier to global markets and a destination for investment.[87] In this regard, the Australian resources sector needs to continue to identify, develop and adopt new measures and technologies to reduce carbon emissions from its operations. The industry has made important progress in reducing its emissions and can make further significant reductions by adopting new technologies and more efficient processes.

These include carbon capture and storage initiatives, adopting high-efficiency and low-emission generation technologies, and greater deployment of stand-alone renewable energy and hybrid energy generation systems off the grid, for operations in remote areas.

Developing Australia's environmental management and restoration economy

The significant steps the resources sector has taken to reduce its environmental footprint have seen it become a leading voice in the global debate around sustainability and the need to build environmental protection into production planning and operations as well as corporate policy.[88] As discussed in Chapter 5: Attracting investment by promoting Australia's world-class strengths, promoting the sector's environmental performance will also allow Australia to differentiate itself in the eyes of resources commodity buyers and investors. Australia is well placed to promote its environmental protection frameworks and ethical supply chains to position itself as an attractive source of digital age minerals, such as rare earths.

The sector's ability to reduce its environmental footprint has been underpinned by world-class research and development (R&D). This has significantly contributed to the sector's capacity in ecological restoration, remedial actions and biodiversity offsets. There's an opportunity here for Australia to develop its environmental management and restoration economy. This could add significant value to the resources sector if the United States is anything to go by. Estimates suggest that in the United States alone the environmental restoration economy is worth US$25 billion annually and supports 220,000 jobs.[89] Capturing a

86 BHP (2018), Environment and Climate Change — our requirements, rttps://www.bhp.com/-/media/documents/ourapproach/governance/180529_environmentclimatechange.pdf?la=en; Rio Tinto (2018), Our approach to environmental management, https://www.riotinto.com/documents/RT_Rio_Tintos_approach_to_environmental_management.pdf; International Council on Mining and Metals (2015), Sustainable Development Framework: ICMM Principles, https://www.icmm.com/website/publications/pdfs/commitments/revised-2015_icmm-principles.pdf; Minerals Council of Australia (2018), submission to the Resources 2030 Taskforce.

87 McHugh, B. (2017), 'Australian miners back ethical supply of minerals as illegal mining in Africa impacts gorilla habitat', *ABC News*, 15 September 2017, http://www.abc.net.au/news/rural/2017-09-11/door-opens-for-aussie-miners-to-replace-conflict-minerals/8874774

88 Minerals Council of Australia (2018), submission to the Resources 2030 Taskforce; Mudd, G. (2009), *The Sustainability of Mining in Australia: Key Production Trends and Their Environmental Implications for the Future*, Department of Civil Engineering, Monash University and Mineral Policy Institute, p. iii.

89 ARC Centre for Mine Site Restoration (2018), submission to the Resources 2030 Taskforce.

proportion of this global restoration economy could deliver significant financial benefits to Australia and enhance its global reputation for operational excellence.[90]

Australia could also use its high-quality R&D to help commercialise new research, development and intellectual property in the restoration industry.[91] In other words, developing ideas and innovations into viable businesses and services at local, regional and national levels.

Greater support for an environmental management and restoration economy presents benefits for the broader resources sector. Encouraging commercialisation and new business development is expected to help decrease the overall costs of environmental management activities and techniques. In many cases, research programs have developed techniques that can reduce or remove the impact of resources activities. Lower costs may well encourage more widespread adoption of these activities across the sector and more positive environmental outcomes.

Developing this economy can also capitalise on changes within the resources sector. Coming years will see more offshore infrastructure and onshore mine projects reaching the end of their operational lives.[92] Decommissioning, mine closure and rehabilitation of these projects are going to need expertise to improve the environmental performance of decommissioning.[93] Using local capabilities could reduce costs and fuel demand for these services.

This capability (including activities, techniques and intellectual property) could then be exported to international operations.[94]

To fully support commercialisation and develop expertise and exports, the taskforce believes governments should implement clear frameworks that govern offshore decommissioning, mine closure and rehabilitation. These frameworks should provide nationally consistent approaches and methodologies for life-of-mine planning and progressive rehabilitation. Clear, robust frameworks will provide certainty for the resources and resources equipment, technology and services sectors to invest in new environmental management techniques. Developing these practices should build on lessons learnt from experiences with legacy sites, the rehabilitation of which could also be a focus of the frameworks.[95]

Streamlining government–industry engagement through improved environmental approvals

Australia's modern environmental assessment processes have successfully balanced new development with environmental protection. This has allowed substantial development of resources with minimal long-term impact on the environment.[96] There are opportunities for reforms that can reduce complexity and duplication in environmental assessment processes while maintaining stringent environmental protections. The taskforce believes that key reforms in this area can facilitate more efficient, timely and affordable environmental assessment. If properly implemented, these reforms will allow Australia to continue to protect the environment and encourage new resources to be developed in more sustainable ways.

State-based environmental regulation

Each state or territory government has specific regulations governing new resources development. Poor alignment between these regulations has created a complex system of environmental assessment approvals for resources projects to navigate. This system's complexity makes it harder to do business in the resources sector and does not improve environmental outcomes.

90 ARC Centre for Mine Site Restoration (2018), submission to the Resources 2030 Taskforce
91 Ibid.
92 Deloitte (2017), *Decommissioning: the next wave of opportunity in Australian oil and gas*, p. 5; State of Queensland (2017), *Better mine rehabilitation for Queensland*, discussion paper, https://s3.treasury.qld.gov.au/files/better-mine-rehabilitation-in-qld-discussion-paper.pdf
93 Deloitte (2017), *Decommissioning: the next wave of opportunity in Australian oil and gas*.
94 Ibid.
95 ARC Centre for Mine Site Restoration (2018), submission to the Resources 2030 Taskforce.
96 Environment and Communications Senate References Committee (2014), *Environmental Offsets*, Commonwealth of Australia.

The taskforce believes that the Australian Government should work with the states and territories to streamline environmental regulations. A consistent framework between jurisdictions will provide greater certainty for long-term planning and encourage investment in high standards of environmental management. Although it is clear that consistent regulations will benefit the sector, previous attempts to harmonise environmental processes have stalled.[97] Governments should renew their focus and attempts to achieve consistent environmental frameworks and processes between states and territories.

Federal oversight of environmental matters

In addition to state-based assessment, the Australian Government oversees environmental matters through the *Environment Protection Biodiversity Conservation Act 1999* (EPBC Act). Federal oversight of these issues means many projects are considered by both state and federal governments.[98] This has created a duplicative and at times unclear system that can delay and increase the cost of resources projects. Submissions to the taskforce identified a number of reforms to the EPBC Act that would improve how it is administered with respect to resources projects, while upholding robust, positive environmental goals and outcomes.

One is that governments should review and clarify the definitions of key reference terms. Throughout the EPBC Act, the phrase 'significant impact' is used as a reference for assessments by the federal Minister for the Environment and Energy. However, this term is not defined within the Act, so it's not clear whether a project needs to be assessed under it or not. A definition of 'significant impact' would provide clarity for project proponents and help them better determine when a detailed assessment is required.

The taskforce also believes action is needed to avoid the Act duplicating state-based environmental assessments. Currently, it requires the Australian Government to duplicate assessments conducted by the relevant state or territory. This duplication extends the project's assessment timeframe, increasing costs, uncertainty and risks without necessarily improving environmental outcomes.

A key example of this is the water trigger. The water trigger assesses how coal seam gas and large coal mining developments may affect water resources.[99] This federal review uses data provided to, and assessed by, the state or territory government to ensure the project has no adverse impacts on groundwater and aquifers. Given that it uses data from the state approval process, the water trigger review offers limited additional environmental protection.[100]

Also, some new resources projects cannot avoid certain environmental impacts. In this situation the project team is required to provide an environmental or biodiversity offset to compensate for adverse environmental impacts that cannot be reduced through avoidance or mitigation.[101] Currently, the team must implement a number of direct offsets—actions that provide a measurable improvement for the habitat or species impacted by the project development.[102]

The taskforce believes there should be greater opportunity and flexibility to adopt such compensatory measures, creating a more flexible policy that promotes positive environmental outcomes. For example, resources projects can promote new habitats instead of competing for a diminishing pool of protected habitats.

In 2019, the Australian Government will review the EPBC Act.[103] This review presents an opportunity for a fair and impartial review of key components of the EPBC Act, including its

97 Institute of Public Affairs (2018), submission to the Resources 2030 Taskforce.
98 Ibid.
99 Department of Environment and Energy (2018), 'Water resources – 2013 EPBC Act amendment – Water trigger', Commonwealth of Australia, http://www.environment.gov.au/epbc/what-is-protected/water-resources
100 Queensland Resources Council (2018), submission to the Resources 2030 Taskforce.
101 https://www.claytonutz.com/knowledge/2012/october/new-commonwealth-environmental-offsets-policy-has-greater-emphasis-on-direct-offsets
102 Environment and Communications Senate References Committee (2014), *Environmental Offsets*, Commonwealth of Australia
103 Section 522A of the EPBC Act requires it to be reviewed every 10 years from its commencement.

contents, efficacy and decision-making processes. The taskforce recommends that this review considers the efficacy of the water trigger, its full delegation, defining 'significant impact' (and adding other definitions) and providing greater flexibility for biodiversity offsets. These actions would ensure the Act is flexible, does not duplicate existing regulatory processes, and encourages positive environmental outcomes.

Consistent national approach

In addition to reforms to the EPBC Act, governments should work to streamline regulatory frameworks, reduce complexity and minimise duplication between state and federal approvals processes.

The taskforce recommends governments further streamline regulatory arrangements, including by implementing more one-stop-shop approaches. This would provide a single environmental assessment and approvals process for new projects. For this to be achieved, the Australian Government will need to develop bilateral agreements with each state or territory government, allowing the state to conduct an assessment that satisfies both state and federal requirements. Bilateral agreements and a one-stop-shop approach will streamline the approvals process and reduce the assessment timeframe while maintaining the high environmental standards demanded by the EPBC Act.

Agreements can also help to facilitate a consistent, national approach to environmental regulation. The taskforce believes that each agreement should include high-level principles on a range of key issues, such as environmental offsets, cumulative impact assessment, modelling, project closure and decommissioning. Agreements should also encourage consistency in monitoring, reporting, closure and decommissioning, to better facilitate holistic project planning. If effectively developed and implemented, these agreements will go a long way to reducing duplication, minimising assessment timeframes and providing greater confidence to project teams and potential investors.

The taskforce also supports work to make the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) a one-stop shop for offshore resources development. To achieve this, the Australian Government should work with state and territory governments to confer relevant legislative powers to allow all environmental approvals in state waters to be conducted by NOPSEMA. This will allow the authority to assess all offshore projects, regardless of location, as a strategic assessment under the EPBC Act, as is currently the case for all projects in Commonwealth waters.[104] Doing so will provide a consistent framework for offshore development and reduce duplicative regulatory processes. It will cement NOPSEMA as an effective, centralised authority for assessing and approving offshore oil and gas development.

NOPSEMA is also using reference information as a tool to streamline approvals processes and better navigate the environmental assessment process. NOPSEMA employs this for common environment plan content and typical environmental management practices.[105] This method allows companies to use standard reference cases to help prepare an environmental plan for proposed activities. Using these plans can reduce the size and complexity of environmental plans, decrease the consultation burden and improve transparency and public access to relevant information. It is hoped that this will allow companies to focus more on key environmental issues and improve overall environmental outcomes.

Maximising the value of environmental, biodiversity and heritage data

Environmental impact assessments (EIAs) are a key component of Australia's environmental assessment and approval processes. EIAs require the extensive collection and collation of environmental and biodiversity data. This includes data on the

104 Department of the Environment and Energy (2018), 'Strategic assessment of the environmental management authorisation process for offshore petroleum and greenhouse gas storage activities under the *Offshore Petroleum and Greenhouse Gas Storage Act 2006*', Commonwealth of Australia, http://www.environment.gov.au/protection/assessments/strategic/offshore-petroleum-greenhouse-gas

105 National Energy Resources Australia (2017), 'NOPSEMA Reference Case Published', https://www.nera.org.au/Story?Action=View&Story_id=45

composition of ecosystems as well as population surveys and the distribution, abundance and diversity of species. As well as EIAs, project teams are also required to collect heritage data in specific regions associated with new projects.

Australia's resources sector has one of the largest collections in the world, yet despite this, the data is often under-used after a resources project has been assessed. In many cases this is due to poor digital collection standards, practices, storage and management.

If collected, collated, stored and managed properly, this data could be a highly valuable resource. It could assist governments and industry to make more informed decisions, conduct more meaningful and useful research and build more community trust. Properly addressing this issue could also unlock the new opportunities offered by pooling environmental and biodiversity data.

To harness the potential of environmental, biodiversity and heritage data, governments and industry need to address how resources-aligned data is reported, stored, managed and made available. State governments should require project teams to submit data from an EIA to be incorporated into a new repository. This repository could be directly accessed by companies or research institutions and incorporated into existing data aggregators, such as the Atlas of Living Australia.

Only Western Australia requires data to be submitted and stored after a project's assessment. This requirement should be expanded to all states, territories and relevant regulatory bodies. To support this proposed expansion of data collection and storage, data should be submitted to the government in a consistent format across all jurisdictions. This format must be one that can be used by governments, industry and academics, and support consistent storage and management across Australia.

How this data is stored, managed and made available will be fundamental to unlocking its potential contributions to the sector and wider economy. Building on the Resources Data Strategy discussed in Chapter 6: Finding and developing new resources, governments need to create a national repository for the central storage and management of environmental, biodiversity and heritage data in Australia.

This repository will recognise and value the importance of this data and provide a mechanism for it to be used more effectively. However, it must be supported by adequate funding and physical storage to ensure its sustainable, long-term use and management. If properly supported, it will facilitate better decision making by governments and industry, a factor that will be reinforced by access to vast amounts of historical non-digital data.

Holistic approaches to resources basin planning

The consistent collection, storage and management of environmental data can help when undertaking EIAs. Pooling new and historical data provides greater information to resources companies, researchers and regulators. When combined with project-specific data, the fuller mass of data allows for a more accurate and meaningful assessment of project impacts by comparing it to the impacts of other projects in the same region.

This approach will allow regulators to assess the project's broad scale and cumulative impacts. It will also allow companies and academics to monitor and demonstrate the positive outcomes associated with environmental offsets and rehabilitation practices.

These innovative uses of data will enable more integrated planning of shared resources and recognition of shared benefits, and minimise common and cumulative impacts. This application of data will then allow new projects to be considered in the context of the wider resources region, even nationally, rather than as purely local and stand-alone operations.

The taskforce recognises that taking a holistic approach to environmental planning requires the support of new approvals processes. This approach would allow cumulative assessment of environmental impacts and further support whole-of-life planning for a resources project, including post-mine land use.

The availability of critical environmental data

It is well known that Western Australia is rich in mineral, oil and gas resources. Less well known is that the state is also home to eight of 15 declared national biodiversity hotspots and has one of the highest rates of new species discovery in the world.

This wealth in resources and biodiversity creates a challenge: how to develop resources and protect the environment? The fact that the state is so big and so diverse adds to the challenge. Quite often there just isn't enough research material available to inform decisions. As is often the case nationally, good research may have been done but it is not easy to find and access.

This is where the Western Australian Biodiversity Science Institute (WABSI) is playing a critical role. It acts as a broker by identifying gaps in the state's biodiversity data and supporting collaborative research projects to fill them and make more data more accessible.

"Knowing what industry needs to make informed, environmentally appropriate decisions helps us support relevant, timely and coordinated research," says WABSI CEO Peter Zurzolo.

"There is a gap in knowledge about many species and ecosystems, and by bringing industry, government, community and researchers together we are helping to create and share critical collective knowledge and scientific data."

In 2017, WABSI enabled a project that developed site-specific completion criteria for mine site rehabilitation based on an independent science review and framework, and an analysis of state, national and international rehabilitation research.

In another initiative, the institute is focusing on the protection of particularly diverse subterranean fauna whose habitats overlap with two important Western Australian mining areas.

WABSI is also helping to develop the new Cooperative Research Centre (CRC) for Resource Sector Environmental Management, which will help the resources sector meet regulator and community expectations for better environmental management. The CRC will focus on mine site closures, rehabilitation and relinquishment, and WABSI is identifying end-user needs and research priorities.

www.wabsi.org.au

Recommendations

20. Governments should develop an environmental management economy to further bolster Australia's competitive advantage in this area. This should include developing nationally consistent approaches and methodologies for continuous life-of-mine rehabilitation, offshore operations decommissioning, early closure planning and legacy site management.
21. Governments should streamline regulatory frameworks, including by developing bilateral agreements to create one-stop shops for onshore and offshore environmental assessments and approvals.
22. As part of the 2019 review of the *Environment Protection and Biodiversity Conservation Act 1999*, the federal government should consider:
    a. a definition of 'significant impact'
    b. the efficacy of the water trigger
    c. the biodiversity offsets framework.
23. Governments and industry should establish a national repository for the storage, management and distribution of environmental, biodiversity and heritage data.
24. Governments, industry and other stakeholders should develop holistic approaches to basin and landscape planning and project approvals, to consider cumulative impacts and promote mutually beneficial outcomes on shared resources such as water and land.

9.

A workforce and skills for the future

Image source: RioTinto

Investing in the skills of the future is pivotal if the resources sector is to remain at the forefront of global innovation and competitiveness. Having access to a diverse, skilled and experienced workforce is critical to Australia's ability to attract investment, compete internationally and deliver products and services on the ground.

The workforce of 2030 will look very different to that of today. Australia needs to ensure its educational institutions and workplaces are producing the right people with the right skills for the future needs of the sector. This will help to position the sector as an employer of choice with career potential.

During the taskforce's consultations, the need to address skills and future workforce issues was clearly a critical issue.

A diverse, sophisticated workforce in a cyclical sector

A skilled and dedicated workforce undoubtedly contributes to the success of Australia's resources sector. The sector employs a large number of people in a wide variety of jobs, and this workforce is expected to grow.[106] They include engineers, earth and environmental scientists, financial professionals, information and communication technology (ICT) professionals, electricians, drillers and shot firers, machinery operators and labourers. They are skilled (with 70 per cent holding a Certificate III or above)[107] and well paid, with some of the highest weekly earnings in the country.[108]

The resources sector is the main employer in regional Australia, with the regions contributing around 56 per cent of total mining and oil and gas employment.[109] The resources sector is a notably strong employer of Aboriginal and Torres Strait Islander people, with employment levels increasing 22.4 per cent between 2011 and 2016.[110] However, the sector faces an ongoing challenge to attract and retain the substantial number of additional women required to boost diversity and take advantage of a significant untapped workforce, particularly for trades-based and managerial employment. The female share of employment in the mining sector has not changed in 10 years, remaining around 16 per cent of the total workforce.[111]

Resources sector employment is inherently difficult to manage due to the cyclical nature of the work. Different skills are required at various stages of a project, and there may be skills shortages as markets rise and fall. Many resources jobs are highly skilled, and these workers are often sought after by a number of competing industries, including construction and ICT.

This primarily creates a lag in responding to skills demands when markets recover. The result on the ground is that companies struggle to find in-demand skilled workers, and they have to pay more when they do.

Although the acute skills shortages experienced during the recent large investments in coal, iron ore and LNG construction have subsided, the taskforce is aware of renewed tightening. Demand for mining engineers and geologists has risen over the past year[112] and there is further anecdotal evidence of shortages in the number of drillers and shot firers in Western Australia and Queensland. This is compounded by low university enrolments in sector-specific courses, which often follow the cycle of the sector—high enrolment at 'boom' times; low enrolment during a so-called 'bust'. The University of New South Wales (UNSW), a leading establishment for mining engineering studies, had just eight enrolments in 2018.[113] That marks a decrease from 120 enrolments in 2014[114], and is its lowest enrolment in 40 years.[115] UNSW is not the only Australian university to suffer a dramatic reduction in such enrolments.

The current approach to managing the troughs of the cycle will affect the availability of skilled workers when needed at the next peak. Australia needs to better plan for these cycles if it is to grow and nurture its own talent for resources projects now and in the future. Supporting and developing a steady pipeline of skills for the next boom will be essential.

106 In May 2018, 234,300 people were employed in the mining, oil and gas industries (ABS, Labour Force). The METS industry directly and indirectly employs around 503,000 people (METSIgnited). ABS estimates employment in the mining industry will grow by around 2.4% over the next five years (Labour Market Information Portal, Employment Projections, 2017 Industry Employment Projections – five years to May 2022).
107 Labour Market Information Portal (2018), interactive data file, 'Educational attainment by industry sector'.
108 Mining industry employees earn $2,580.70 on average compared with the average of $1,567.90 across industries. (Source: Australian Bureau of Statistics (2017), *Average Weekly Earnings, Australia*, cat. no. 6302.0.)
109 Department of Jobs and Small Business (2018), *Australian Jobs 2018, Mining*.
110 The mining sector is a top-10 employer of Aboriginal and Torres Strait Islander people. (Source: Australian Bureau of Statistics (2017), '*Aboriginal and Torres Strait Islander Census: Industry*', media release, http://www.abs.gov.au/ausstats/abs@.nsf/MediaRealesesByCatalogue/142C08A784A1B5C0CA2581BF001EE22C)
111 Australian Bureau of Statistics (2017), *Labour Force Data*, cat. no. 6202.0.
112 Department of Jobs and Small Business (2018), *Draft Resources Cluster Report*.
113 Australian Mining (2018), *Interest in mining careers hits alarming low point*, 22 June 2018.
114 ABC (2018), 'Skills shortage: Australia facing critical decline of new mining engineers', 10 June 2018, www.abc.net.au
115 Australian Mining (2018), *Attracting the next generation to mining*, 6 February 2018.

Understanding what skills the sector needs

The advance towards automation, robotics and artificial intelligence is highlighting the threat of skills gaps. There is an increasing mismatch between industry needs and the skills being taught at universities and by vocational education providers. This means employers are finding it tough to secure the skills they need to build the resources sector of the future. The gap is most prevalent in science, technology, engineering and mathematics (STEM).

Understanding the future skills needs of the resources sector's entire supply chain[116] is the first step towards education institutions delivering appropriate training.[117] This will require an understanding of the impact of new innovations and technologies, and their application to the resources sector.

This is a real and long-term challenge, and Industry Growth Centres are already mapping skills needs for the sector. Nevertheless there is an opportunity for a more coordinated approach across the whole resources sector. Steps to determine the skills requirements of the future should be taken in collaboration with governments and industry, and should be informed by knowledge of tomorrow's commodities, such as battery and critical minerals, that will form the foundation of Australia's future resources economy.

The taskforce recommends governments and industry should map the skills needs of the resources sector for 2030 and beyond.

An industry-driven workforce

How the resources sector skills, re-skills and upskills its workforce through continuous learning is key to its future success and global competitiveness. Opportunities also exist to position Australia as the premier exporter of education for the global resources sector, further cementing its reputation as an industry world leader.

While Australia has many globally renowned tertiary education institutions, and previous efforts have been made to integrate industry skills into curriculums, the taskforce is concerned that courses are not keeping pace with the skills and knowledge needed for the future. This is one contributor to the skills mismatch discussed earlier.

The taskforce heard that the tertiary education sector must overcome several challenges to put in place a pipeline of the skills the sector needs for the future. These include the high cost of delivering courses, especially when student enrolments are low[118], and the accessibility and delivery of new courses to a geographically dispersed population. This will require new and flexible ways of delivering courses that integrate workplace skills into curriculums.[119]

Making this work will rely on ongoing, structured and strategic collaboration between industry and education institutions to design course content and delivery. To help achieve this, the taskforce recommends better coordinated earth sciences, technology and other resources-focused curricula at university and VET levels. They must target the longer-term needs of the sector, as informed by the skills map.

The taskforce also heard that the resources sector needs to provide more support to foster continued learning among its workers.[120] Although many companies and industry bodies support individuals at the training stage, the taskforce has established that only a limited amount of support is provided to workers to keep them interested and keep their skills current and in step with rapid technological change. There is a need for continuous training and learning to upskill the current workforce in emerging skills and capabilities.

Actions need to be led by industry, and could include the development of microcredential[121] courses, more work experience placements, a clearer and established pathway for graduate-entry jobs and leadership programs for early-career professionals in the regions.

In addition, the taskforce recommends industry should re-skill, upskill and better support current and prospective resources workers, promoting a culture of continuous learning. This should include initiatives aimed at increasing the attractiveness of the sector for all workers and increasing female participation in the resources workforce.

116 Government of South Australia (2018), submission to the Resources 2030 Taskforce, p. 6; Minerals Council of Australia (2018), submission to the Resources 2030 Taskforce, p. 45.
117 Queensland Resources Council (2018), submission to the Resources 2030 Taskforce, p. 5.
118 Minerals Council of Australia (2018), submission to the Resources 2030 Taskforce, p. 45.
119 Rio Tinto (2018), submission to the Resources 2030 Taskforce, p. 9.
120 Rio Tinto (2018), submission to the Resources 2030 Taskforce, p. 8.
121 Australian Geoscience Council (2018), submission to the Resources 2030 Taskforce.

Promoting resources careers

Attracting and retaining students and education-leavers is essential to develop a suitably skilled resources workforce for the future. The sector is embracing one of the most exciting and disruptive technological changes in history. It can provide the next generation of workers with greater opportunities to be a part of this revolution.

While students and education-leavers in resources-rich regions are more familiar with the opportunities available, there is strong evidence that those in cities are largely unaware of them.[122]

One of the sector's major selling points is its technological sophistication, and it would do well to better promote this to potential workers. One good example it could showcase is Australian company Dingo, which is a world leader in predictive maintenance for heavy asset–intensive industries using apps and cloud-based solutions.

By promoting opportunities such as this, the sector can position itself as a dynamic industry of the future. Industry and governments will need to work together to carefully construct and convey this message. The taskforce heard of three areas in which changes can be made, including:

- attracting students from primary and secondary school into vocational or universitybased education that can provide them with pathways to careers in the resources sector
- retaining students when they are undertaking post-school qualifications
- providing the necessary information and support to teachers, careers advisers and parents to help children make an informed decision about the opportunities available.

Among previous efforts was the Queensland Minerals and Energy Academy, which targeted secondary school students for pathways into the resources sector and other STEM industries. The collaborative education initiative Oresome Resources provides educational material including classroom exercises for students of all ages. Additionally, workshops for teachers and careers advisers have anecdotally successfully transferred the skills and knowledge needed to provide relevant advice to students on the resources labour market. They have also raised awareness of the detail and value of professional and trade qualifications.

The taskforce recommends strategies be developed to improve the perception and realities of careers in the resources sector (mining, oil and gas, and resources equipment, technology and services sectors) and the regions where it predominantly operates. This is likely to require collaboration between governments, industry, professional associations, and secondary and tertiary education providers.

The challenges in attracting and retaining workers

Regional communities are the lifeblood of the industry. Building stronger communities equipped with the appropriate skills to accommodate entire resources project life cycles requires developing and managing local community employment initiatives that prioritise local talent. Through its consultations, the taskforce heard that this requires improving how talented youth are targeted and how local opportunities are highlighted and explained to them. These opportunities may be in resources projects, or in the communities and industries that support them.

It is also necessary to train and accredit the workforce to ensure that their skills are transferable to other sectors in a local economy. This not only helps to retain employees in regional communities but also to diversify local economies. Investing in such strategies will be beneficial to the future of the sector.

Aboriginal and Torres Strait Islander people are particularly strong participants in the resources sector. Employment empowers these individuals, supports their families and local businesses, and provides a pathway to an improved quality of life. The resources sector will continue to be a major employer in Indigenous communities, so it is critical to have appropriate skills development strategies and meaningful education programs[123] that address cultural needs.

The Myuma Group is a model case study for now and the future, highlighting the success of programs targeted at Aboriginal and Torres Strait Islander communities.

122 AusIMM (2018), submission to the Resources 2030 Taskforce, p. 3; METSIgnited, Minerals Council of Australia, AusIMM, Industry Growth Centres (2018), *Australian mining sector must work harder to promote industry careers*, joint media release, 17 May 2018.
123 Rio Tinto (2018), submission to the Resources 2030 Taskforce, p. 9.

Respect at the heart of an Indigenous training program

Based in Camooweal in north-west Queensland, the Myuma Group has a great track record in supporting Indigenous job seekers entering the workforce, especially in construction jobs. Mining is the mainstay of the local economy.

Four times a year, the Indigenous-run organisation holds a 13-week training program at its Dugalunji Camp. It provides a respectful, Aboriginal owned and controlled environment where trainees learn the new skills and habits needed to take up and maintain employment.

Professor Colin Saltmere, an Indjalandji–Dhidhanu traditional owner who is managing director of Myuma, says the training program is successful because it is based on respect for the trainees—as whole people—and run in a culturally appropriate environment.

"The training is delivered through a structured program that suits our people and their cultural and learning needs. It's what they want, it's a level playing field and the goal posts don't move," Professor Saltmere says.

"Some of our mob get discouraged about finding work but Myumu surrounds them in an environment that produces good workers. We focus on the needs of each individual rather than a broad-brush approach—we learn from our trainees and they learn from us."

Myuma has partnered with the Queensland Department of Transport and Main Roads, which provides opportunities for trainees to get on-the-job experience and training on real infrastructure projects.

In 2017, about 30 Myuma trainees prepared to work on construction projects on the Northern Gas Pipeline, which will transport gas from the Northern Territory to the east coast. Myuma has also partnered with private industry, and academic, service delivery and community organisations.

Professor Saltmere states: "Come to a place where we're doing it right—you can do anything when you've got it right."

To increase Aboriginal and Torres Strait Islander participation and retention in the resources sector labour force, the taskforce recommends developing education, employment and training strategies for Aboriginal and Torres Strait Islander communities that better target their unique cultures and learning styles to maximise participation and retention in the workforce, including the resources sector. This will maximise the chances of them participating and remaining in the local economy and the broader Australian resources sector labour force.

Australia can and should aspire to be the world's leading educator of resources workers and developer of resources skills. It can progress to this position by promoting and attracting students into education fields that are aligned with the sector's needs. This will require collaboration between industry, governments and Australia's world-class educational institutions to secure the long-term supply of earth sciences and other resources-focused technical skills required for the sector to thrive.

Recommendations

25. Governments and industry should map the skills needs of the resources sector for 2030 and beyond.
26. Governments should better coordinate earth sciences and other resources-focused curricula at university and VET levels that target the longer-term needs of the sector, as informed by the skills map.
27. Industry should re-skill, upskill and better support current and prospective resources workers, promoting a culture of continuous learning. This should include initiatives aimed at increasing the attractiveness of the sector for all workers and increasing female participation in the resources workforce.
28. The resources sector should develop strategies to improve the perception and realities of careers in the resources sector (mining, oil and gas, and resources equipment, technology and services sectors) and the regions where it predominantly operates.
29. Governments and industry should develop education and training strategies for Aboriginal and Torres Strait Islander communities that better target their unique cultures and learning styles to maximise participation and retention in the workforce, including the resources sector.

10.

Conclusion

Image source: BHP

The taskforce hopes this reform agenda will help governments prepare a National Resources Statement and serve as a longer-term bi-partisan guide for the Australian resources sector as it seeks a more ambitious path for itself and the nation.

The last national policy statement for the Australian resources sector was 20 years ago. In the intervening time, technology and the knowledge economy has progressed faster than at any time in the history of the industry. This review of the resources sector is therefore timely. There is a risk of complacency due to the success of the sector, which needs to be overcome to ensure we keep ahead of competitors.

In preparing the recommendations in this report, the taskforce repeatedly heard from many experts that Australia's resources sector has the potential to achieve greater success if it plans appropriately for the decades ahead. It identified focus areas that will require step-change improvements if the sector is to prosper—including community and environmental management, workforce skills, technology and the need to replenish the resources base.

While a number of the recommendations are more immediate—such as reducing red tape to improve the attractiveness of the sector—the taskforce's view is mainly to the medium and long term needs of the industry.

The taskforce was particularly struck by the lack of a long-term strategy to deliver sustained benefits for the economy and for the wider community, especially as resources is such a large and important wealth creator for Australia and makes up more than half its current exports.

More effective collaboration across the entire sector is vital to ensure a more strategic approach. Australia will be a more attractive investment destination and have an even stronger resources sector if industry, governments at all levels and the wider community plan effectively—together. Present siloed efforts are a barrier to further success and future prosperity.

Better promotion of the sector's achievements and reputation globally must also be addressed, as the ongoing benefits of the sector's world-leading innovation and technological skills are not widely appreciated or understood.

Improvements and priorities must be constantly realigned and re-evaluated, particularly in light of global geopolitical shifts, new digital technologies and the adoption of social media applications that are changing the way people work and communicate. The resources sector's growing reliance on energy, advanced materials, and data collection and analysis must also be continually reappraised to ensure a contemporary approach.

The taskforce is grateful to the expert stakeholders who contributed views to inform its work through direct meetings, roundtable consultations and submissions.

11.

Appendices

Appendix A. Resources 2030 Taskforce terms of reference

1. Overview

The Australian Government is committed to supporting a world class resources sector. To achieve this, the government seeks to create a policy framework that will increase the international competitiveness of the resources sector, improve the sustainability of resources activities and strengthen community support for the sector.

To inform its current and future activities, the Department of Industry, Innovation and Science (the department) is establishing the Resources 2030 Taskforce (the Taskforce). The Taskforce is expected to identify and bring forward bold, attainable reforms to the Australian resources sector. Each reform will ensure the sector's competitiveness and sustainability to 2030 and beyond.

The Taskforce will operate in 2018 and provide a report to the Minister for Resources and Northern Australia by August 2018. This report will outline the Taskforce's recommendations to government and proposed reforms to the resources sector.

2. Membership

The Taskforce will consist of at least eight members.

Each member will be appointed by the department. They will be a key stakeholder with knowledge of and broad experience across the resources sector.

Membership of the Taskforce is restricted to the individual appointed by the department. Members cannot appoint delegates to attend the meeting on their behalf.

The department may appoint new members to the Taskforce if required.

3. Responsibilities

The Taskforce will identify bold, attainable reforms that will ensure the sector's competitiveness and sustainability to 2030 and beyond. To do this, the Taskforce will consider the operation of the Australian resources sector, the nature of Australian Government policies and support, and ongoing risks and opportunities.

The Taskforce will consider potential reforms in line with the following policy areas:

- **Investment:** business simplification and competitive investment settings
- **Communities:** regional development and bolstering community support
- **Exploration and business development:** new basins, markets, minerals and geological sciences
- **Innovation and technology:** improving productivity, developing METS and supply chains
- **Environment:** improving environmental performance.

The Taskforce will meet four times between March and August 2018. Where necessary the Taskforce may agree to meet at additional times.

The Taskforce will report its findings to the Minister for Resources and Northern Australia. This report will be made by August 2018. The department will consider applicable actions recommended in the Taskforce's report for inclusion in a Resources Statement.

4. Consultation

The department will conduct stakeholder consultation on behalf of the Taskforce. Where relevant, Taskforce members will be invited to attend consultation meetings. Feedback and input received during this consultation will be made available to the Taskforce. It is expected that this information will be considered for the Taskforce's final report and associated recommendations.

5. Duties of members

Members of the Taskforce must comply with the *Public Governance, Performance and Accountability Act 2013* and act in accordance with the Australian Public Service Code of Conduct.

Members are also expected to comply with all relevant legislation of the Commonwealth or of any state, territory or local authority. This includes the *Crimes Act 1914, Privacy Act 1988, Racial Discrimination Act 1975, Sex Discrimination Act 1984*, and *Disability Discrimination Act 1992*.

6. Confidentiality

The Taskforce's considerations and discussions will remain confidential until the release of the final report to the Minister. This will ensure that a robust, critical examination of the sector can occur.

Stakeholder consultation conducted by the Taskforce will be public. Information obtained during this consultation will not be considered to be confidential and will be made available to participating stakeholders once the consultation process has concluded.

6. Conduct of business

A quorum will be four members and shall include the chair.

Decisions, endorsements and requests for action will be determined by a consensus of those members participating in the meeting. If a consensus cannot be reached, majority vote will be used.

7. Secretariat

The department will provide secretarial support to the Taskforce. This support may include but is not limited to:

- arranging meetings and meeting agendas
- developing policy papers and research required by the Taskforce
- preparing and circulating relevant papers to support the operation of the Taskforce
- organising logistical arrangements.

8. Sunset

The Taskforce has been created to provide a report and recommendations to the Minster to advise on significant reforms for the Australian resources sector. Membership of the Taskforce will remain in place until the provision of the relevant report to the Minister.

Appendix B. Taskforce consultation

To support its work, the taskforce undertook consultation across the Australian resources sector. As part of this consultation, the taskforce Chair held individual meetings with the relevant resources minister in each state and in the Northern Territory. The Chair also met with the Shadow Minister for Resources and Northern Australia, Jason Clare MP. The state and territory resources ministers consulted were:

- Don Harwin, Minister for Resources (New South Wales)
- Anthony Lynham, Minister for Natural Resources, Mines and Energy (Queensland)
- Dan van Holst Pellekaan, Minister for Energy and Mining (South Australia)
- Ken Vowles, Minister for Primary Industry and Resources (Northern Territory)
- Tim Pallas, Minister for Resources (Victoria)
- Guy Barnett, Minister for Resources (Tasmania)
- Bill Johnston, Minister for Mines and Petroleum (Western Australia).

The taskforce also undertook meetings with relevant industry bodies and representative organisations within the resources sector, including:

- Brisbane Energy Club
- Association of Mining and Exploration Companies
- Australian Petroleum Production and Exploration Association (APPEA)
- Queensland Resources Council
- NSW Minerals Council
- Minerals Council of Australia
- National Energy Resources Australia
- South Australian Chamber of Mines and Energy
- Queensland Local Content Leaders Network
- Australasian Institute of Mining and Metallurgy
- Australian Mines and Metals Association
- Tasmanian Minerals and Energy Council
- Chamber of Minerals and Energy of Western Australia
- Cement Industry Federation
- Cement, Concrete and Aggregates Australia
- Energy Policy Institute of Australia
- Austmine.

The taskforce held targeted roundtables covering the policy areas outlined in its terms of reference. The taskforce also held a roundtable on oil and gas in conjunction with the 2018 APPEA Conference. Participants were invited to attend each roundtable in a personal capacity. They did not attend as a representative of their employer or any organisation.

The APPEA roundtable was held on 15 May 2018 in Adelaide. The following people attended this roundtable:

- Zoe Yujnovich, Shell Australia Pty Ltd
- Michael Abbott, Woodside Energy Limited
- Frank Calabria, Origin Energy Limited
- Brett Darley, Quadrant Energy Pty Ltd
- Ian Davies, Senex Energy Limited
- Ernie Delfos, Eni Australia Limited
- Peter Fairclough, Chevron Australia Pty Ltd
- Wendy King, ConocoPhillips Australia Pty Ltd
- Bruce Lake, Vermilion Oil & Gas Australia Pty Ltd
- Richard Owen, ExxonMobil Australia Pty Ltd
- Graham Salmond, BHP Billiton Petroleum Pty Ltd
- Eric Streitberg, Buru Energy Limited
- Emmanuelle Tutenuit, Total E&P Australia Pty Ltd
- David Maxwell, Cooper Energy Limited
- Kevin Gallagher, Santos Limited
- Matthew Kay, Beach Energy Limited
- Bill Townsend, INPEX Ichthys Pty Ltd.

The community roundtable was held on 21 May 2018 in Mount Isa. The following people attended this roundtable:

- Marion Browne, Broken Hill City Council
- Fiona McKenzie, Centre for Regional Development (University of Western Australia)
- Ben Hughes, EconomX
- Steve Fordham, Blackrock Industries
- Rachel Daniels, Aboriginal Enterprises in Mining, Energy and Exploration
- Jillian D'Urso, Minerals Council of Australia
- Eric Lawford Benning, MG Corporation
- Sean Armistead, Australian Mines and Metals Association
- Professor Peta Ashworth, Chair in Sustainable Energy Futures (University of Queensland)
- Allan Ruming, Barkly Engineering
- Associate Professor Colin Saltmere, Aboriginal Environments Research Centre (University of Queensland)
- Tracey Cuttriss-Smith, C-Res.

The innovation and technology roundtable was held on 30 May 2018 in Mackay. The following people attended this roundtable:

- Brendan Refalo, Consolidated Plastics & Epoxy
- Sandra Hobbs, Central Highlands Development Corporation
- Andrew Jessett, MineWare
- Tim Magoffin, Techserve
- Andrew Hegerty, TEAM Group
- Ric Gros, METS Ignited
- Amanda Walker, BHP
- Paul Dowd, CSIRO

- Phil de Courcey, Resources and Engineering Skills Alliance
- Derek O'Connel, Diacon
- Carli Homann, Gladstone Engineering Alliance
- Jason Sharam, Linked Group Services
- Jason Kelly, Mackay Conveyor Equipment
- Ryan Norris, Vayeron.

The environment roundtable was held on 5 June 2018 in Melbourne. The following people attended this roundtable:

- Kristy Sell, MBS Environmental
- Jarrod Pittson, Woodside
- Jonathan Law, CSIRO Mineral Resources
- Chris Gentle, Western Australian Biodiversity Science Institute
- Paul Bertsch, CSIRO
- Brenton Chatfield, ConocoPhillips
- Rob Longey, GHD
- Darren Walsh, Strategen Environmental
- Neville Plint, Sustainable Minerals Institute
- Mike Erickson, AngloGold Ashanti
- Renee Young, Curtin University
- Andrew Barrett, Geoscience Australia
- Craig Simmons, National Centre for Groundwater Research and Training
- Richard Blewett, Geoscience Australia
- Sue Vink, Centre for Water in the Minerals Industry
- Toby Whincup, ERM
- Gary Humphreys, Department of Water (Western Australia)
- David Griffin, Herbert Smith Freehills
- Anne Dekker, BHP.

The investment roundtable was held on 6 June 2018 in Melbourne. The following people attended this roundtable:

- David Byers, Minerals Council of Australia
- David Grabau, Austrade
- John Mollard, Baker McKenzie
- Luke Smith, AustralianSuper
- Noboru Katsu, Mitsui & Co Australia
- Robin Chambers, Chambers Lawyers
- Stephen Durkin, Australian Institute of Mining and Metallurgy
- Troy Hey, MMG
- Ian Smith, EMR Capital
- Noel Mullen, APPEA
- Sunil Salhotra, Pangaea Resources
- Tom Weaver, Fortescue Metals Group
- Takeo Okubo, Mitsui.

The exploration and business development roundtable was held on 15 June 2018 in Perth. The following people attended this roundtable:

- Neville Plint, Sustainable Minerals Institute
- Chris Yeats, CoAG Energy Council Geoscience Working Group
- Robert Rowe, NextGen Geological
- Denise Goldsworthy, ATSE
- Cam McCuaig, BHP
- Mark Woffenden, Minerals Research Institute of Western Australia
- Steve Harvey, CSIRO
- Rick Berg, Gold Road Resources Ltd
- Keld Knudsen, APPEA
- David Moffat, Chevron
- Paul Carroll, Murphy Australia Oil
- Jon Hronsky, Western Mining Services
- Andrew Heap, Geoscience Australia
- Jeffrey Schrull, Beach Energy
- Gary Snow, Gold Fields
- Andrew Bailey, Mineral Exploration Cooperative Research Centre
- David Giles, Future Industries Institute (University of South Australia)
- Andrew Faragher, Rio Tinto.

Feedback and stakeholder views from this consultation process have been incorporated into the taskforce report.

Appendix C. Submissions to the taskforce

The following submissions were received by the taskforce secretariat.

Submission author	Submission number
Peter Coleman, CEO of Woodside	1
Kalbar Resources	2
Western Gas	3
Confidential	4
Transform Exploration	5
Barry Murphy CSci, FIChemE, FTSE, FAICD	6
Energy Policy Institute	7
Australian Geoscience Council	8
ConocoPhillips	9
Minerals Council of Australia	10
Sydney Marine Sand Pty Ltd	11
Institute of Public Affairs	12
Queensland Resources Council	13
Australian Research Council Centre for Mine Site Restoration, (Curtin University)	14
Confidential	15
CSIRO and Geoscience Australia	16
Australian Petroleum Production and Exploration Association	17
Deep Exploration Technologies Cooperative Research Centre	18
Gold Road Resources	19
Association of Mining and Exploration Companies	20
Cement Industry Federation	21
Australian Institute of Mining and Metallurgy	22
Australian Coal Association Low Emissions Technology Limited	23
Minister for Resources, Victorian Government	24
Government of South Australia	25
Australian Nuclear Association	26
Minerals Council of Australia – Coal	27
Rio Tinto	28
Australian National Low Emissions Coal Research and Development	29
Minerals Research Institute of Western Australia	30
South Australian Chamber of Mines & Energy	31
Australian Mining Cities Alliance	32

Appendix D. Members of the secretariat

Principal Advisor

Mr Bruce Wilson

Head of Secretariat

Dr Gino Grassia

Taskforce Secretariat

Dr Adam Bialowas

Mr Kade Denton

Ms Tricia Fitzgerald

Ms Sadaya Marathe

Mr Thomas O'Harte

Ms Kate Penney

Ms Lauren Sewell

Ms Hayley Svenson

Dr My Yung Truong

Dr Kim van Netten

Mr Gary Walker

Mr Geoff Whelan