



Australian Government

Australian Trade and Investment Commission

Australian Green Economy Prospectus



AUSTRALIA

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Acknowledgement of country

In the spirit of reconciliation we acknowledge the Traditional Custodians of country throughout Australia and their connections to land, sea and community. We pay our respect to their elders past and present and extend that respect to all Aboriginal and Torres Strait Islander peoples today.

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Ministerial foreword

GO GREEN WITH AUSTRALIA

Global efforts to reduce greenhouse gas emissions and live more sustainably are transforming international trade and Australia is well positioned to take advantage of these new economic opportunities.

We are already known the world-over for our quality goods and services. Looking forward, our abundance of natural resources, combined with world-class research and technology and sustainable business practices position us as an important partner in the transformation to a more sustainable and resilient global economy.

Australian businesses are creating solutions that drive positive environmental and social outcomes across industries. Globally, our critical minerals can be found in a broad range of electronics, our solar technologies are powering cities, and our sustainable farming practices are transforming food production.

The *Green Economy Prospectus* provides a snapshot of Australian expertise and capabilities that are transforming our nation. It highlights the industries where Australian exports of goods and services can help our partners succeed in achieving net zero and a green economy.

The Australian Government's strong action on climate change has put us back in lockstep with leading nations around the world. We have legislated our emission reductions target at 43 per cent by 2030 and net zero by 2050.

Australia is taking action to become a renewable energy superpower, and wants to be an energy partner of choice as the world decarbonises. We are the world's largest solar energy producer per capita, our offshore wind resource offers more potential than the combined capacity of the world's existing coal-fired power stations, and our growing pipeline of hydrogen projects will enable us to export renewable energy and low-emissions products to the world.



Australian businesses are creating solutions that drive positive environmental and social outcomes across industries.

Australian Governments at the federal, state and territory level are committed to supporting a thriving green economy. We are implementing policies to transform industries, attract investment and drive green trade opportunities. These policies are creating new jobs, new industries, new technologies and new opportunities for international collaboration.

Australia is a trusted, reliable trading partner. As an export-driven economy, we have formed free trade agreements and international partnerships to encourage investment and seize global opportunities. We are working hard in multilateral fora, including the World Trade Organization, to make sure trade is a facilitator of this economic transformation and part of the solution to climate change.

I am pleased to present the *Green Economy Prospectus* that shows how Australian capability positions us as a partner of choice for a low carbon, resource efficient, and socially responsible economy that works for both our people and our planet.

Senator The Hon Don Farrell
Minister for Trade and Tourism



A global transformation towards a green economy

The world is changing, and with change comes opportunity.

Globally, societies are increasingly acting to address the environmental challenges of climate change, biodiversity loss, resource scarcity, waste, and pollution.

Together, our actions are driving profound changes in our economies and reshaping the dynamics of world trade.

- The transformation to net zero is impacting emissions intensive exports as many countries, including Australia's major trading partners, seek to lower their emissions and deliver on their commitments.
- The demand for sustainable and nature-positive practices and outcomes in our economies is increasing.
- Countries are demanding more ethical trade, with a growing emphasis on the need for the transformation to not be at the expense of high environmental, social and governance (ESG) standards and requirements.

In today's dynamic economic and geopolitical landscape, governments and businesses are embracing new growth opportunities through decisive policies and actions. As companies manage the complexity and risks that come with change, they are actively seeking like minded partners, who are ethical, principled and reliable; and diversifying their activities across multiple markets.

As a trusted, export-oriented economy, Australia has a lot to offer in this transformation; a skilled

and diverse workforce, top-tier educational institutions, robust ESG standards, and expertise in the vital net zero sectors of energy, mining, and agriculture.

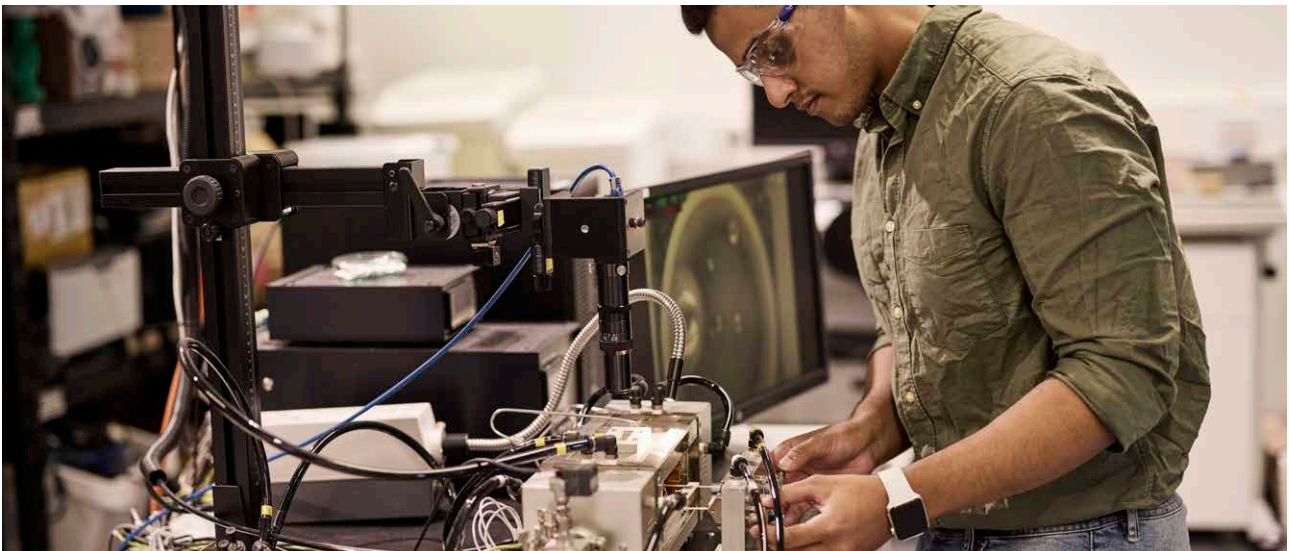
We have multiple free trade agreements and international partnerships. We are also working in the World Trade Organization, the Organisation for Economic Cooperation and Development, and other multilateral fora to ensure that trade enables green economic transformation and climate change solutions. We encourage foreign direct investment, recognising this brings technology, capability and talent to Australian firms and industries.

We work to connect Australian businesses with the global opportunities that will help to drive the growth of the green economy, both at home and internationally.

The Australian Government has set an ambitious policy agenda to drive the transition to net zero, fostering growth, capability uplift and job opportunities within the global green economy.

We are working with local, state and territory governments, overseas partners, industry groups, our First Nations people, and our community as we strive to achieve our renewable energy superpower ambitions. By transforming our economy and building new clean industries, we will help our partners to decarbonise, and contribute to more diverse and resilient global supply chains.

This *Green Economy Prospectus* is a showcase of Australian organisations with goods and services that can help our partners succeed in achieving net zero and a green economy.



“Our government is seeking to build on the tremendous competitive advantage Australia has in resources and critical minerals and convert that to a world-leading position in renewable energy, technology and advanced manufacturing”

Prime Minister of Australia, Anthony Albanese¹



Australia: a partner for global solutions

The challenges ahead transcend borders and industries. A coordinated, global effort is required – where governments, corporations, communities, and individuals collaborate to develop, share, and implement green economy solutions.

Australia as a Renewable Energy Superpower

Australia's biggest opportunity for growth and prosperity is the global shift to clean energy. Australia is exceptionally well-placed to capitalise on net zero transformation opportunities, with abundant and high-quality renewable energy potential, a highly skilled and innovative workforce, excellent trading relationships, and plentiful mineral resources.

The Australian Government wants to leverage these natural advantages to make Australia a renewable energy superpower and is investing to realise these opportunities. We will continue to back this ambition to ensure new clean industries can compete, thrive and drive the global net zero transformation.

Improving our environment - taking a Nature Positive approach

The Australian Government's Nature Positive Plan strives to enhance environmental protection, restoration, and management while fostering a green economic shift.

This initiative involves comprehensive reforms to national environmental laws, ensuring better safeguarding of natural heritage, expediting clear environmental approval decisions, and promoting sustainable economic growth. Pioneering a world-first nature repair market, the government incentivises landholders for nature restoration, offering business investment opportunities.

Australia is committed to sustainable water resource management, exemplified by initiatives like the Murray-Darling Basin Plan⁶ and water market reforms.

State and territory governments contribute to environmental improvement and economic growth, supported by innovative solutions from Australian companies that prioritise economic prosperity alongside environmental and social sustainability.

Australia:

- **Aligned with** global partners with legislated emissions reduction targets of 43% by 2030 and net zero by 2050²
- **Investing** in capability to refine and process critical minerals and materials needed for the net zero transition.
- **Investing** in new clean energy industries, such as the \$2 billion Hydrogen Headstart program to support new flagship hydrogen projects.³
- **Generating** 82% of our electricity from renewable sources by the end of this decade.

Australia:

- **Delivering** a Nature Positive Plan and reforming environmental laws to benefit nature⁴
- **Creating** a nature repair market to reward landholders who restore and protect nature⁵
- **Supporting** sustainable management of Australia's water supply for industry, the environment and communities.



A trusted, export driven economy

Australia is a trusted trading partner. We have an export-driven economy, with nearly 25% of our GDP being generated by exports. We have multiple free trade agreements and international partnerships. We encourage foreign direct investment and foster international partnerships and collaboration. We also have a strong and robust regulatory environment, meaning we are global leaders in delivering projects that meet high ESG standards.

Circular everything

The circular economy is fast becoming the new standard for business. Circular supply chains and business models are on the ascent, promoting waste reduction, the use of recycled inputs, and sustainable packaging. Australia is supporting research and innovation in the circular economy to deliver a \$30 billion economic boost.⁷

Social license to operate and rising consumer expectations

Meeting the high expectations of communities is crucial, as is sharing the benefits of the transformation that is underway. Australian governments are working in close partnership with businesses, communities and partner countries to ensure community safety, confidence and trust, and that projects deliver benefits to all Australians. This includes projects that include Indigenous co-ownership and other forms of economic or benefits-sharing. By fulfilling social and community expectations, businesses can foster greater satisfaction and the long-term sustainability of projects.

Australia:

- A **trusted trade partner** with trusted institutions.
- **Strong** environmental, social, and governance (ESG) standards

Australia:

- **Australia's governments are working with international partners** to promote a global circular economy and preserve our environment.⁸
- **Australia's governments and the private sector are working together** to design out waste and pollution, keep materials in use and foster markets to achieve a circular economy by 2030.

Australia:

- **Building** trust-based relationships with community stakeholders for renewable energy infrastructure development.⁹
- **Improving** the social performance and operation of key industries including mining.¹⁰

Australia – a trusted partner for the global green economy

The Australian Government is taking a leading role in capturing new green economic opportunities.

We are building new industries and forging deep partnerships to create world leading solutions for a green economy.

Our targets for net zero are backed by billions of dollars in investments, world-leading expertise in critical minerals, and an innate capacity for solar, wind, and hydrogen.

With Australian companies across all industries having developed world-leading, innovative solutions that are driving more sustainable and environmentally friendly business practices, now is the time to partner with Australia to deliver on your green economy ambitions.



Australia is collaborating with its regional partners on programs to grow the global green economy.

The transition to a green economy is a priority under *Invested: Southeast Asia Economic Strategy to 2040*, a new trade and investment strategy launched in September 2023.¹¹ There is great potential for Australia to support Southeast Asia's energy transition, to position clean and cheap energy as Australia's competitive advantage, via the export of renewables, clean energy expertise and technology.¹²

New partnerships are also providing models for driving economic growth while reducing emissions. One example is the **Singapore-Australia Green Economy Agreement (GEA)**.¹³ Signed in 2022, it is a new partnership model for driving economic growth while reducing emissions.

Together Australia and Singapore are implementing 17 initiatives to facilitate economic cooperation, boost trade, create new business opportunities and decarbonise key industries. The GEA includes initiatives to decarbonise the shipping and maritime industry, foster collaboration between Australian and Singaporean businesses on green innovations, promote sustainable finance and green investment, and share insights into policies and programs that can build skills for a new green economy workforce.

A proven track record in trade and innovation

Through strong economic fundamentals and stable institutions, Australia has become a reliable trading partner to the world across key industries.

We supply energy and resources to the world, ranking in the top 5 producers of 18 different minerals and metals.¹⁴

Our talented workforce and world-class research institutions have led to Australian inventions like the cochlear implant, the black-box flight recorder, and Wi-Fi technology.

These technologies, coupled with our deep trade partnerships and longstanding reputation, are testament to our ability to develop unique solutions used by the world over.



6 educational institutions in the top 100 **4th in the world¹⁷** 

 **17** Free Trade agreements¹⁹

Nearly 25% 
of Australia's GDP comes through exports¹⁵

 **Top 6 for attracting**
investment for renewable energy¹⁶

 **12th**
largest economy in the world¹⁸

Very high governance measures:

- **Transparent** and **fair** legal system
- **Sound** regulatory quality²⁰



Australia is ready to accelerate the transition to a green economy

Building on this strong reputation, Australian governments at all levels and across all states and territories are working in close partnership with businesses, communities and partner economies to accelerate the transition to a green economy.

Australian governments are taking action to leverage and build on our comparative advantages – abundant solar, wind, agricultural, and mineral resources, as well as world leading research institutions and a skilled workforce.

This will see us develop new export and manufacturing opportunities in areas such as:

- Refining and processing of critical minerals
- Manufacturing of generation and storage technologies, including batteries
- Producing renewable hydrogen and its derivatives like ammonia
- Forging green metals, such as green iron, green steel and green alumina

To accelerate our own transition to a green economy, the Australian Government is investing over \$40 billion to decarbonise our economy, including \$23 billion to upgrade, expand and

modernise Australia's energy system to unlock greater penetration of renewable energy and accelerate the decarbonisation of our electricity grids. This is backed by further substantial support from state and territory governments.

The Australian Government is committed to supporting and driving the development of industries of the future.

We are **diversifying and transforming our economy** through the \$15 billion National Reconstruction Fund.²¹

We are ensuring **clean dispatchable power** is available as our energy market transforms with \$10 billion investment in capacity.²²

We are prioritising key investments in **critical minerals** through a \$4 billion critical minerals financing facility, to solidify Australia's position as a world leading provider and value-adding economy.²³

By building and leveraging our relationships, we will continue to tap into our potential in industry, exports and innovation, to green our economy domestically and globally.

Largest producer of solar energy per capita²⁴



Among highest ratios of renewable energy patents in the world

(on par with the USA and Germany)²⁶



Over 30% of the planet's resources of iron ore²⁵



Largest producer of lithium in the world²⁷

262,000 square kilometres

of land that is highly suitable for hydrogen production using renewable electricity²⁸





Australia's green economy capabilities

Clean energy industries

Clean energy industries are essential to the green economy.

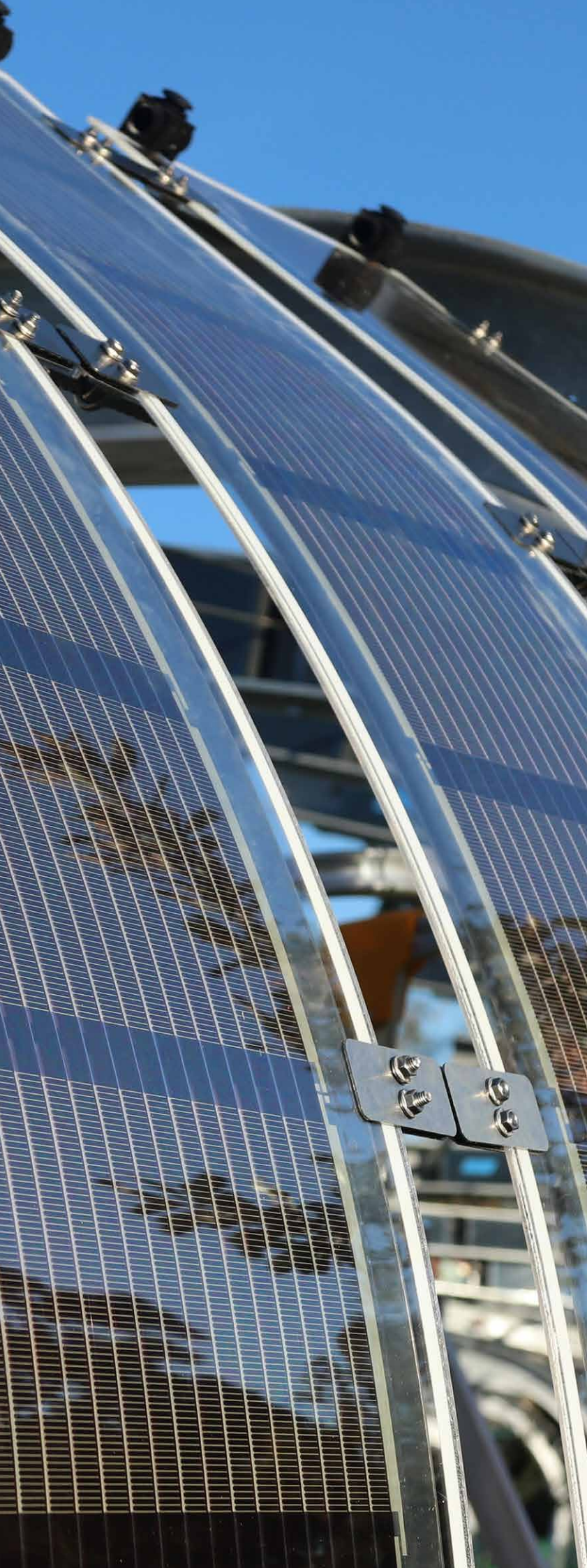
Australian governments and industry are working in partnership to accelerate the development of renewable electricity generation and storage, and products made using renewable energy such as hydrogen. Australia is leveraging its natural advantages to power future clean energy industries. Australian solar projects are building renewable capacity rapidly, with over 70 large scale renewable projects under construction, representing \$21 billion in investment.²⁹

A global green economy requires new developments in **energy management and distribution** and Australia is at the cutting-edge. Aiming to become the world's first intercontinental power solution, **Suncable** is planning to distribute renewable electricity from Australia to Singapore.³⁰

Through harnessing our natural resources and skilled workforce, Australia's clean energy industries are becoming leaders in the transition to a green economy.

The **Western Green Energy Hub (WGEH)**, one of the largest phased clean energy projects in the world, is a partnership between the Mirning Traditional Owners and global leaders in ultra-scale renewable energy – InterContinental Energy and CWP Global. Located in the far southeast of Western Australia's Goldfields region, WGEH will generate around 50GW of electricity via upstream combined solar and wind, sufficient to produce more than 3.5 million tonnes of green hydrogen per year for use in power generation, shipping fuel, minerals processing and manufacturing. The project is setting new benchmarks, including for technical solutions, the approach to community and families, environmental assessment measures, respect for indigenous culture, and inclusion and participation of First Nations peoples.³¹

Image supplied by Kardinia Energy



‘**Clean energy industries**’ refers to the production, distribution, storage, and direct applications of renewable energy. This includes solar, wind, hydrogen, bio energy and CCUS processes, example applications include ammonia and biofuels.

Australia’s future focus

Producing **renewable hydrogen** and derivatives including ammonia, and leveraging renewable energy to create low emissions products.

Build energy security as Australia realises its ambition to become a renewable energy superpower

Support decarbonisation of partners throughout the Indo-Pacific region.

Highest innate potential for solar and wind power **in the world**



Demand for solar and wind is expected to increase by

9

times by **2050**³²

\$200-300 billion

hydrogen project pipeline³³



Case studies

Shining bright – Australia’s solar success story

Kardinia Energy

<https://kardiniaenergy.com>

Today’s solar cells were invented in Australia and are used in more than 90% of solar panels worldwide. With the highest capacity for solar energy generation in the world, Australian innovation is solving global challenges.

Energy consumers are eagerly awaiting the launch of Kardinia Energy’s Printed Solar organic photovoltaic (OPV) thin-film solar modules that will democratise renewable energy generation globally. The technology is low-cost, lightweight, flexible, recyclable and easy to install. International demand is broad; from low weight-bearing industrial roofing, to remote installations supporting leading global aid agencies to deliver humanitarian projects for displaced communities. Low cost of production is pivotal in delivering a low cost of energy; the first generation (1G) product is expected to have a levelised cost of energy (LCOE) of USD5c per kWh, inclusive of installation and recycling costs.

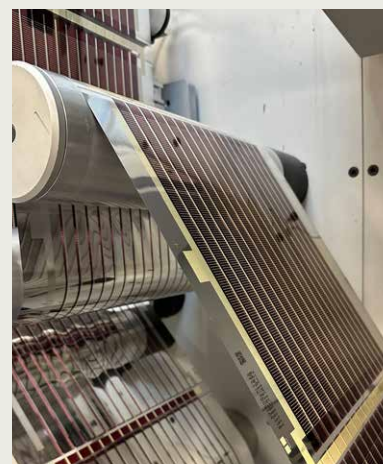


Image supplied by Kardinia Energy

Sunrise CSP

<https://sunrisecsp.com>

India is aiming to achieve net zero emissions by 2070. The country also aims to generate 50% of its electricity requirements from renewable energy sources by 2030. To achieve those targets, organisations across India will need to adopt innovative power solutions – and science will need to help them.

Sunrise CSP is an Australian renewable energy company. Its thermal energy technology was developed in partnership with the Australian National University. The company’s flagship product is the ‘Big Dish’. Resembling a huge satellite dish, its 500m² mirrored surface concentrates solar energy (equivalent to over 2000 suns) onto a receiver. Today, this receiver generates steam at temperatures ranging from 100°C to 600°C. The steam is then used for industrial-scale heating, cooling and power generation. Sunrise CSP is also looking to the future by developing systems to make clean fuels like hydrogen using the dish’s ability to generate temperatures approaching 2000°C.

The Big Dish’s efficiency and low build cost delivers energy that is competitive with alternatives like burning gas or oil. In 2022, Sunrise CSP deployed the Big Dish at the Kailash Cancer Hospital in Gujarat, India. The Big Dish delivers heat for the hospital’s laundry, kitchen and sterilisation operations. It will also be used to run a special type of thermal chiller to provide cooling for the entire hospital complex. Whether using 8 dishes for cooling a major hospital or 3,000 dishes for on-demand grid-scale power generation, the Big Dish delivers the competitive zero emission energy India needs to meet its targets.

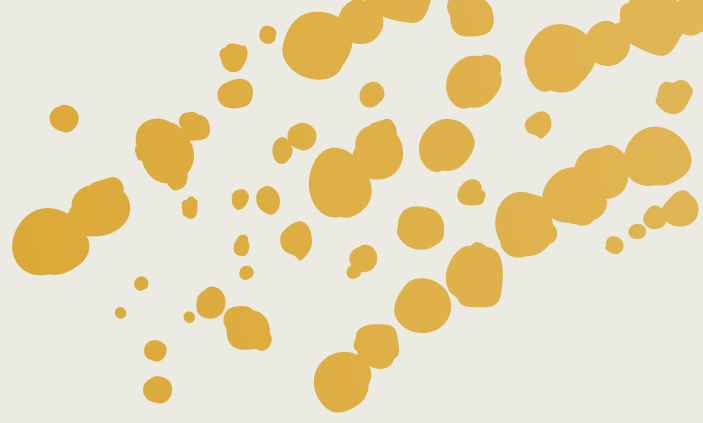
Allume Energy

<https://allumeenergy.com/au>

Due in part to the challenges of distributing generated power among residents, solar installation for apartments and multi-dwelling buildings have faced unique challenges.

A world-first, award-winning technology by Allume Energy is revolutionising the way solar power is being delivered by allowing multiple apartments in the same building to share a single rooftop solar PV system. Its SolShare technology is easy and affordable to install and manage and reduces carbon emissions by up to 28 tonnes a year for a typical apartment block. Best of all, SolShare can cut energy bills by up to 40%, generating long overdue savings for households living in apartment blocks, and is especially impactful to those living in social housing. SolShare is installed in Australia, Germany, the US and the UK. Globally, the company has sold over 350 SolShare units and has another 10,000 units in the pipeline. In February 2023, it completed the first installation of SolShare for the UK’s social housing sector in Wales. The company is on a mission to make rooftop solar accessible for everyone. More than 2 million Australians, 15 million Americans and 300 million Europeans live in apartments. Unlocking rooftop solar is a feasible and cost-effective renewable energy option which can make an important contribution towards decarbonisation and achieving a net zero future.

Harnessing the power of the wind



MMA Offshore

<https://www.mmaoffshore.com>

Offshore wind power is one of the fastest growing sectors in renewable energy. As turbines grow in size, developers are installing them in ever deeper waters, including coastal waters up to 60 metres deep. Constructing and maintaining these windfarms is now a major maritime challenge. MMA Offshore is a leading global provider of marine and subsea services. Based in Perth, Western Australia, the company supports energy and offshore wind farm projects around the world. MMA's strength is in its ability to develop bespoke engineering solutions to solve unique maritime challenges. The company's fleet comprises 19 vessels ranging from smaller, 50-metre anchor handling tugs to 90-metre multi-purpose support vessels (MPSVs). These MPSVs can accommodate 100 personnel and are fitted with 100-150 tonne capacity cranes providing installation and construction support at windfarm construction sites. The vessels can also support the installation of turbine foundations and subsea inner array and export power cabling that connect each turbine to a transmission network. Vessels are mobilised with marine geophysical and geotechnical equipment to undertake geophysical survey and site investigations to support front-end engineering design (FEED) of offshore wind farms.

MMA also designs, manufactures and installs integrated artificial reefs and habitat enhancement to enhance declining fisheries and build resilient coastlines. MMA works closely with regulators, offshore energy developers, local councils and community stakeholders to design and plan integrated reef projects that deliver for the environment and their local communities. The company's 1,100-plus workforce has delivered marine services in many of the world's most challenging and remote environments. Today, the MMA Offshore fleet operates globally from its local offices in Singapore, Taiwan, Malaysia, Dubai and the United Kingdom.

Ping Services

<https://www.eologix-ping.com>

Ping Services' 'Ping Monitor' technology is a continuous monitoring system which uses the sound created by damaged wind turbine blades to report the presence of damage, identifying damage quickly allowing for more cost-effective repair. Data collected by Ping Monitor is sent to the Ping Cloud where operators and stakeholders are notified as soon as damage is detected. Ping is currently exporting to 29 countries, monitoring 100 wind turbines working with leading wind farm operators.



Case Studies

Fuelling the future – Australia’s burgeoning hydrogen industry

H2X Global

<https://h2xglobal.com>

Australia is playing a leading role in the emerging global hydrogen energy market. Australian expertise can be found across all stages of the value chain: production, storage, distribution and utilisation.

H2X Global is an Australian automotive company that uses hydrogen fuel cell technology to deliver zero-emission vehicles.

Their fuel-cell technology, “back to base” logistic vehicle fleets and partnerships with KTM and Advik have enabled H2X Global to export their product to the Netherlands, the US and Kenya.

Carbon280

<https://carbon280.com>

Hydrilyte®, from Carbon280, is a low cost, safe, scalable, hydrogen carrier that is non-toxic and easy to handle, maximising the benefits of hydrogen for long duration storage and export.

Using a metal that is widely available, Hydrilyte® offers a scalable and stable hydrogen storage solution with applications in industrial hydrogen, energy export, refuellers and renewable firming.

Australia is playing a leading role in the emerging global hydrogen energy market. Australian expertise can be found across all stages of the value chain: production, storage, distribution and utilisation.





Synergen Met

<https://www.synergenmet.com>

Synergen Met uses its proprietary thermal plasma technology to decarbonise industrial processes and create sustainable solutions. One of these solutions focuses on the production of hydrogen and graphitic carbon from a hydrocarbon feedstock, allowing hard-to-abate sectors to produce/use clean hydrogen.

High purity carbon has an important role to play in the transition towards renewable energy. Another application is the destruction of PFAS – a forever chemical unable to break down in the environment on its own.

Synergen Met’s proprietary technology removes and destroys PFAS through an extremely hot plasma torch to ionise PFAS chemicals to break them down into a gaseous base molecule, which are more easily managed. Synergen Met’s modular technology allows it to facilitate in-situ on any site internationally.

Synergen Met uses its proprietary thermal plasma technology to decarbonise industrial processes and create sustainable solutions.



Case studies

Powering possibilities – Australian innovation in clean energy storage and management

Redflow

<https://redflow.com>

Renewable energy generation needs to be complemented by innovative storage and management solutions to be successful in the long term. Fortunately, Australia's burgeoning solar, wind and hydrogen industries are supported by a wide range of specialised technologies.

Battery storage is an essential enabler of the energy transition, helping energy systems match green energy generation to demand.

Redflow's zinc-bromine flow battery is one of the world's smallest, safest, scalable and most sustainable energy storage solutions. The battery offers a long-life design and a chemistry that makes use of cost effective, abundant, fire-safe, and low toxicity materials. They are ideal for extended duration energy storage applications in a wide range of scenarios, from small commercial installations to multi-megawatt hour storage applications.

Redflow has over 250 active deployments globally, with a particular focus on Australia, the US and South Africa.

Powerledger

<https://www.powerledger.io>

Powerledger's blockchain-enabled software adds granularity to clean energy management and storage. Real-time data and hourly tracking of clean energy allow consumers to trace the exact source of their clean energy. Consumers can choose their preferred energy mix based on the type, source, location, and amount of energy they consume.

With over 30 projects in 10+ countries, Powerledger operates in Europe, the US, India, Southeast Asia, and Japan, shaping a more sustainable and efficient energy landscape.

Powerledger's blockchain-enabled software adds granularity to clean energy management and storage.



Village Energy

<https://www.village.energy>

Village Energy has created a smart energy management system that supports energy utilities to integrate and manage energy assets. This enables households to control their energy usage and maximise their returns from domestic assets like solar panels. With operations in South and South East Asia, Village Energy helps networks coordinate decentralised assets to deliver better performance and reduce emissions.

With operations in South and Southeast Asia, Village Energy helps networks coordinate decentralised assets to deliver better performance and reduce emissions.



More information about Australia's clean energy and hydrogen capabilities can be found at this link <https://www.globalaustralia.gov.au/green-economy>

Australia's green economy capabilities

Net zero materials & construction

The technologies and energy systems that will support us in a net zero future significantly differ from what we have in place today. Massive quantities of steel, cement and aluminium will be needed to enable the energy transformation and other changes needed to achieve net zero.

Australia is endowed with the minerals and metals the world will need for this transformation. Our vast renewable energy resources also mean we can competitively produce these net zero materials using low emissions processes.

This means we see a future for Australia's resources sector that continues to grow national prosperity, supports jobs and opportunities, and drives the global transformation to net zero.

Building a green economy

Building and construction was responsible for around 37 per cent of energy and process-related carbon emissions in 2021.³⁴ Reducing emissions in the processes, materials and practices involved in construction and development is a key focus for governments and industries worldwide.

Australia's construction sector is making use of low-emissions materials and practices at all stages of the development lifecycle, fostering a sustainable infrastructure environment for future generations.

Australia's standards and regulations are first-class, enabling developers, building managers and tenants to increase their efficiency and work towards reaching net zero.

The numbers speak for themselves: buildings certified by the Green Building Council of Australia produce 62% fewer greenhouse gas emissions, consume 66% less electricity, and utilise 51% less potable water than the Australian average.³⁵

The materials themselves are a crucial focus. Australian iron and steel businesses are collaborating with the CSIRO – the Australian Government agency responsible for scientific research, to create sustainable processes for construction material production. This ecosystem is leading to Australian innovations in green materials, including repurposing waste into cement and removing coal from metal production.^{36 37}



‘Net zero materials and construction’ refers to the materials needed for the global transformation to net zero. It also includes the processes, devices, and materials that improve the sustainability of construction processes. This includes green iron and steel and other low emissions materials as well as devices to improve worker safety and improve construction efficiency.

Future focus

Support green steel-making in Australia through \$3 billion investment in low-emissions technologies through the National Reconstruction Fund ³⁸

Leverage our abundant minerals to become a leading producer of green iron, steel and alumina³⁹



10%
\$155

of Australia’s workforce and billion value-add in the construction industry⁴⁰

The construction industry is built on steel which produces

8% of global emissions



Buildings certified by the Green Building Council of Australia produce **62%** fewer emissions

Case studies

Net Zero materials & construction

Transforming hazardous waste into valuable resources

Regain Materials

<http://www.regainmaterials.com>

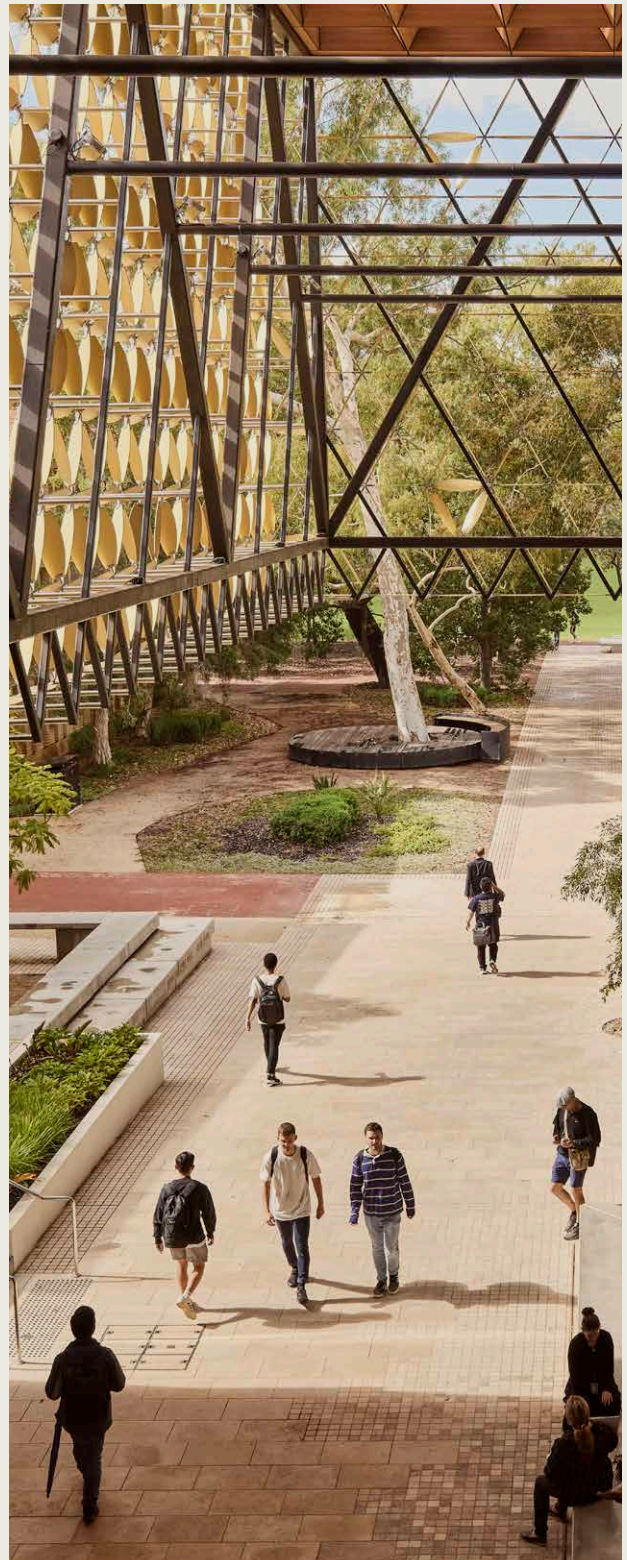
The aluminium smelting industry generates significant amounts of hazardous waste materials, which pose environmental and health risks. The disposal of these materials contributes to pollution and resource wastage, reflecting a pressing challenge for the broader mining industry.

Regain Materials recovers and reprocesses these waste materials, transforming them into valuable by-products and contributing to a greener economy by promoting the efficient use of resources. Regain Materials' innovative approach utilises advanced technologies to eliminate cyanide and dangerous gas hazards from waste materials. The extracted materials have traditionally gone to landfill but, as valuable mineral resources, can now be safely used in various energy-intensive industries, including cement manufacture.

Regain Materials' high quality products achieve significant benefits in production, energy savings and emissions reduction, benefiting the community and the environment by reducing hundreds of thousands of tonnes of hazardous waste.

Collaboration with partners across the supply chain ensures the maximum utilisation of their innovative solution, creating a sustainable and resource-efficient future for the industry.

Regain Materials recovers and reprocesses these waste materials, transforming them into valuable by-products and contributing to a greener economy by promoting the efficient use of resources.



Pioneering a green cement industry

FCT Combustion

<https://fctcombustion.com>

The cement industry is a major contributor to global carbon emissions, accounting for approximately 8% of total greenhouse gas emissions.

Fossil fuels and the calcination of limestone used in clinker production release significant amounts of carbon dioxide, exacerbating climate change and environmental degradation.

FCT Combustion is a world-leader in reducing carbon emissions in the cement industry through advanced combustion equipment and clay calcination technology, servicing the largest companies in all regions of the globe.

Their state-of-the-art burners optimise alternative fuel use in cement kilns, reducing traditional fossil fuel use that contributes heavily to global carbon emissions. Their flash and rotary kiln technology for clay calcination significantly reduces the clinker content in cement, reducing the carbon emission related to limestone calcination.

FCT's solutions not only benefit the environment but also enable cement producers to reduce fuel costs, meet regulatory requirements and achieve sustainability targets.

The reduction in carbon emissions in a traditionally energy-intensive industry is a significant step towards a more sustainable future that benefits the industry as well as the environment and the community.

FCT's solutions not only benefit the environment but also enable cement producers to reduce fuel costs, meet regulatory requirements and achieve sustainability targets.

Decarbonising industrial processes for building materials

Calix

<https://calix.global>

The processing of minerals is one of the world's largest and hardest-to-abate sources of emissions. Cement, lime, iron, and steel collectively account for around 15% of global CO₂ emissions, while lithium and other critical minerals require sustainable processing solutions.

Compatible with electricity and alternative fuels, Calix's indirectly heated platform technology can drastically reduce emissions and waste from mineral processing, rationalise supply chains and create higher value export products. Applications of the same core technology platform include the sustainable processing of:

- **Limestone to cement and lime** – Unavoidable CO₂ emissions released from limestone can be efficiently captured for use or storage, with no additional chemicals or processes.
- **Iron ore to green iron** – Electrification and indirect heating can enable heating with renewable energy and the most efficient use of hydrogen as a reductant.
- **Spodumene to lithium** – Renewably powered electric calcination at the mine site can convert low-value ore fines into high-value products, capture more value from mineral resources, reduce emissions and shipping of waste material, and help to ensure secure and stable supplies of critical minerals.

With partnerships across the globe, Calix is an Australian environmental technology company providing decarbonisation solutions for the world's largest hard-to-abate industries.

Australia's green economy capabilities

Critical minerals

A new global green economy depends on a reliable supply of critical minerals. These resources are essential to the delivery of electric vehicles, as well as greener buildings and construction, medical devices, and space technologies.

Australia's abundant mineral resources, combined with our commitment to innovation and to environmental sustainability are pivotal to delivering the net zero transition.

Our nation holds some of the most substantial recoverable deposits of critical minerals globally.

These resources encompass lithium, cobalt, manganese, rare earth elements, tungsten, and vanadium.

Australia is the world's largest exporter of lithium, a key component in batteries, mobile devices, power tools, and electric vehicles.

We are taking a coherent, national approach through the **Critical Minerals Strategy**⁴¹, **National Electric Vehicle Strategy**⁴² and the forthcoming **National Battery Strategy**.⁴³

We are boosting renewable manufacturing capabilities by implementing the **Powering Australia Industry Growth Centre** to support businesses commercialise local ideas and partnering with the Queensland Government to establish the **Australian Made Battery Precinct**.^{44 45}

The Australian Government's investment in diverse and competitive battery minerals supply chains will help to further leverage our deep natural resources and skilled workforce expertise.



The Australian Government identifies **critical minerals** as those metals, non-metals and minerals that are considered vital for the economic well-being of the world's major and emerging economies, but whose supply may be at risk due to geological scarcity, supply chain concentration, or other factors. A list of 26 critical minerals features in the latest Critical Minerals Strategy.

Future focus

Building capacity for **refinement and processing** of critical minerals

Developing manufacturing capability for **batteries and battery components**



Australia ranks in the **top 5** producers for 18 different metals and minerals⁴⁶



The Australian Government has recently **doubled its support** for critical minerals projects through a **A\$4 billion finance facility**⁴⁷



Australia provided **50%** of global lithium supply in 2022⁴⁸



Industry profile

Building an end-to-end critical minerals supply chain

Australia is building a reliable, secure and sustainable critical minerals supply chain.

Extraction

Australian mining companies are tapping into our abundant, diverse minerals, backed by government financing and a government-industry innovation ecosystem.

Geoscience Australia is Australia's pre-eminent public sector geoscience organisation. Their \$225 million **Exploring for the Future** program underpins critical minerals extraction through new exploration technologies and investment.

Decarbonising mining operations is helping Australian companies benefit from operational efficiencies and low-cost energy solutions. By decarbonising the Pilgangoora Project⁴⁹, Pilbara Minerals reduced approximately 3.8 million litres of diesel fuel annually and added value back into their ecosystem.

Government financing is driving sustainable mining operations. The Clean Energy Finance Corporation is helping the mining sector capitalise on our resources and capture the benefits of the green economy. Their commitment of up to \$21 million is supporting the innovation ecosystem of Australia to tap into our abundant resources.

Refining and processing

Refining and processing critical minerals are key priorities of the Australian Government.

By establishing critical minerals processing precincts, the Critical Minerals Office is unlocking regulatory and infrastructure support, enabling investment and unlocking downstream opportunities.

The \$50.5 million Australian Critical Minerals Research and Development Hub is drawing together the minerals expertise in the CSIRO, ANSTO, and Geoscience Australia. The Hub will help build Australian intellectual property in critical minerals processing, progress international R&D collaboration, and connect critical minerals projects with technical and research expertise.

Refining and processing critical minerals are central to net zero transition materials, and the government is working with industry to develop strategically important projects for the green economy.

Distribution and utilisation

Australian companies are leveraging our rich resources and mining expertise to distribute and use critical minerals for clean technologies and renewables.

The Department of Foreign Affairs and Trade, and Australia's diplomatic missions overseas, are deepening international partnerships to enable a global response to the global challenge of the green economy. These partnerships facilitate knowledge sharing and capacity building for the global green transition.

The Australian Trade and Investment Commission (Austrade) plays a vital role in promoting investment opportunities and facilitating commercial partnerships with trade partners in target markets. Austrade uses its global network to support companies looking for offtake and investment in Australian critical minerals projects, downstream processing and value chain creation.

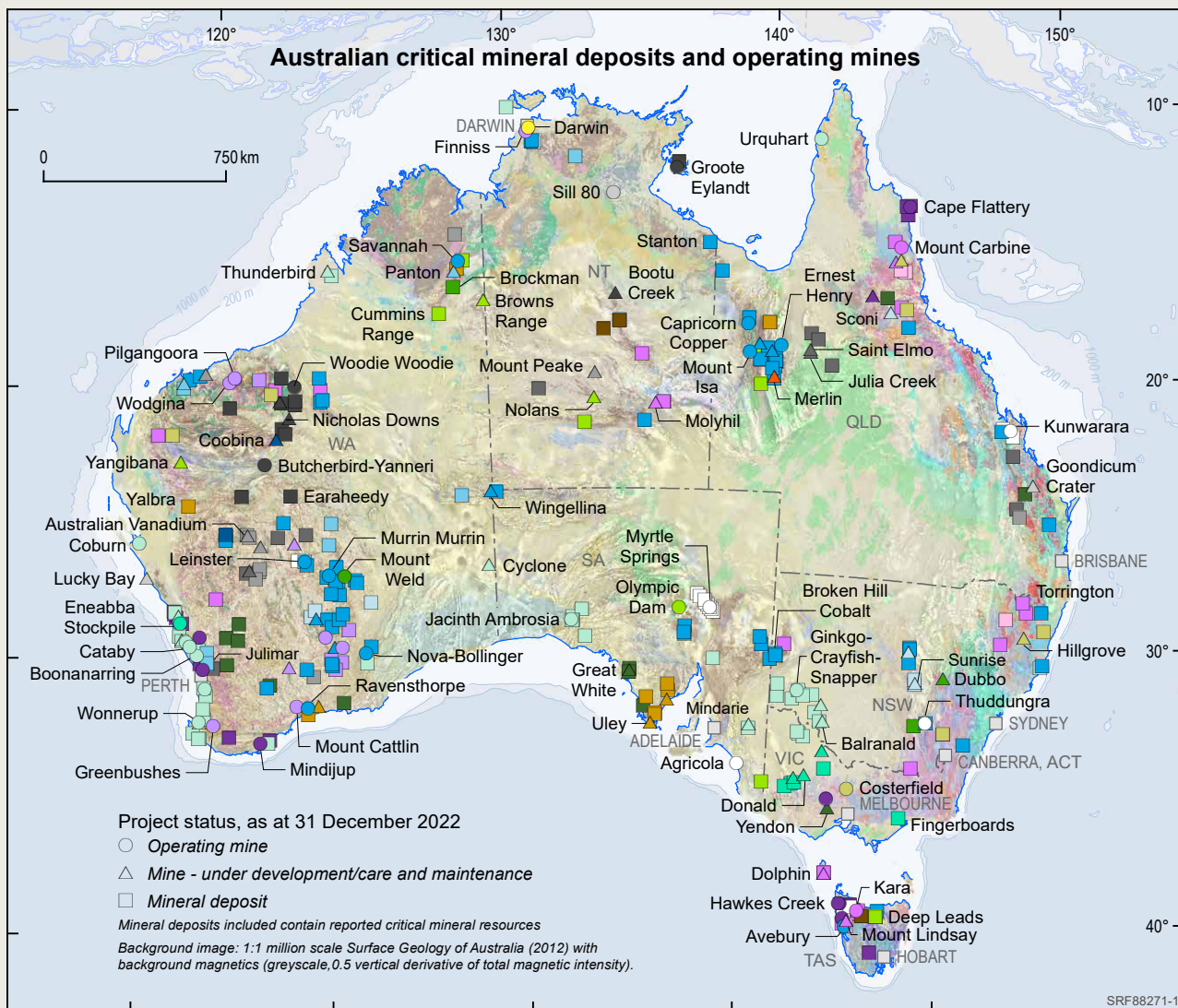
Export Finance Australia is supporting the critical minerals export supply chain. Their \$4 billion Critical Minerals Facility is providing commercial finance for exporting businesses, enabling Australian companies to capitalise on the global opportunities of critical minerals.

The Future Battery Industries Cooperative Research Centre (FBI-CRC) is expanding Australia's capacity to produce the critical minerals needed for batteries. The FBI-CRC is just one of many Australian initiatives targeting the battery value chain, unlocking the potential of critical minerals.

The Australian Government's Critical Minerals Prospectus showcases the opportunities on offer.

“The new Critical Minerals Strategy outlines the enormous opportunity to develop the sector and new downstream industries which will support Australia's economy and global efforts to lower emissions for decades to come.”

Minister for Resources and Minister for Northern Australia, Madeleine King on the Critical Minerals Strategy 2023-2030, 20 June 2023



Graphic supplied by Geoscience Australia

Commodity type

- Aluminium (HPA)
- Antimony
- Bismuth, +/- Cobalt, +/- Indium
- Chromium, +/- Cobalt, +/- PGE
- Cobalt
- Platinum Group Elements (PGE), +/- Cobalt
- Scandium, +/- Cobalt, +/- PGE
- Graphite
- Helium
- Indium
- Lithium, +/- Tantalum, +/- Niobium
- Magnesium
- Manganese ore
- Heavy Mineral Sands (HMS) - Titanium, Zirconium
- HMS - Titanium, Zirconium, REE
- Rare Earth Elements (REE)
- REE, Zirconium, Niobium, +/- Hafnium, Lithium, Tantalum, Gallium
- Rhenium
- Silicon
- Tungsten
- Titanium
- Titanium, Vanadium
- Vanadium

Australia's green economy capabilities

Sustainable mining

Australian mining, equipment, technology and services (METS) companies are at the forefront of promoting more sustainable mining operations around the world.

Our companies are renowned for their ability to solve the most difficult industry challenges in the harshest of global mining environments.

This includes protecting precious water resources, reducing carbon emissions, and delivering projects which minimise environmental impacts and use circular economy methodologies to minimise waste and maximise recycling at mine sites. Australian governments are also working with the mining industry to address the challenges of environmental sustainability.

The NSW Government's Soil Conservation Service has a strong track record in mine remediation, including by supporting land rehabilitation, erosion control and decontamination.⁵⁰ Their team has converted the Urunga Wetlands in northern NSW, a once degraded area that was contaminated by an antimony processing plant, into a beautiful parkland for the community to enjoy.⁵¹

Learn more about Australian companies with the track record, technical capability and practical solutions to ensure the future of mining is safe, efficient, and smart in the **Accelerating Sustainable Mining publication**.

Pursuing net zero solutions for mining

Major Australian resources companies can play a role in helping move the world closer to net zero by providing materials essential for the energy transition. Materials like aluminium for lightweight cars; copper for the electrical wiring in homes and renewables; iron ore for the steel in our energy infrastructure; and lithium for electric vehicles. Cross-industry partnerships are critical to developing solutions to decarbonise the manufacture and transport of these materials, with resources companies working with peers, customers and suppliers to move towards the use of solar, wind, battery storage, green hydrogen and ammonia along the supply chain.

Global mining group, **Rio Tinto** is finding ways to reduce its Scope 1 and 2 emissions and is investing to develop solutions to decarbonise its refineries and smelters. The company is establishing solar, wind, and battery storage infrastructure to replace fossil fuel electricity generation; and exploring biofuels and other emerging technologies such as battery electric haulage to reduce consumption of diesel fuel. The company is also collaborating on low-carbon steelmaking research, exploring new methods to reduce carbon emissions across the steel value chain.

BHP, one of the world's leading resource companies, is working with partners and customers to make its business more sustainable. The company's operational greenhouse gas emission reduction strategy continues to prioritise structural abatement in areas that are technically and commercially feasible. BHP is also working with partners to accelerate the development of other decarbonisation technologies. For example, as one of the largest dry bulk charterers in the world, BHP is aiming to use its chartering size and scale to increase the speed of the shipping industry's progress towards decarbonisation. BHP is trialling the use of wind power for maritime transportation between its mines in Chile and Pan Pacific Copper's smelters in Japan, by retrofitting wind-assisted propulsion Rotor Sails from Finland's Norsepower on Nippon Marine's combination carrier M/V Koryu. Once completed, the project is expected to make M/V Koryu the best performing vessel in its category in greenhouse gas emissions intensity.

Fortescue, a global green technology, energy, and metals company and one of the world's largest producers of iron ore, is working to lead efforts to decarbonise hard-to-abate sectors and is developing the technology and energy supply to decarbonise its Australian iron ore operations by 2030 (Scope 1 and 2 terrestrial emissions). This includes through the use of green ammonia for its iron ore shipping. Early steps include the modification of a four-stroke diesel ship engine to have the capacity to be dual-fuel powered by green ammonia. Sea trials will occur aboard the 75-metre Green Pioneer.



‘Sustainable mining’ refers to the practices, equipment, and technology associated with sustainable mining, mine management and closure. Examples include less destructive extraction technologies, more efficient management technologies, and site remediation technologies.

Future focus

De-risk investment in strategically significant projects⁵⁵

Promoting Australia as a world leader in environmental and social governance (ESG) standards⁵⁶

Improve equity and investment opportunities for First Nations interests⁵⁷

 The Australian mining industry has invested **\$30 billion** in research and development since 2005⁵²

Employment in the Australian mining industry increased by **11,000 people** (5.8%) in 2021-22⁵³



 Australia **spent \$3.9 billion** on mineral exploration in 2021-22⁵⁴

Case studies

Reducing the wider costs of mining

Phibion

<https://www.phibion.com>

Tailings, the stream of unwanted residuals of mined ore deposited in operation-adjacent storage dams, are part of almost every mining process. If not managed correctly they can become unsafe, high-risk structures that affect communities and the environment. Phibion is an Australian company formed with the belief that this impact can, and should, be minimised – that mining does not need to leave a permanent footprint.

Phibion's early research identified that more could be gained by harnessing the properties of tailings than working against them, as is common in conventional technology. This led to the development of Accelerated Mechanical Consolidation (AMC®), a systematic and low energy approach that can reduce tailings volumes and deliver enhanced water recovery with the associated benefits of increased tailings density and strength. Phibion's technology works with

a miner's existing processes, tailings delivery systems and deposition process, developing a bespoke and sustainable operation that is both predictable and cost-effective. In addition to this, the technology's performance is constantly cloud-monitored to ensure operational excellence. As expectations of sustainability become ingrained in the resources sector, technology that can minimise the environmental impacts of extraction, management and remediation practices will be increasingly necessary.

Phibion's technology works with a miner's existing processes, tailings delivery systems and deposition process, developing a bespoke and sustainable operation that is both predictable and cost-effective.



Enabling better decision in mining

Maptek

<https://www.maptek.com>

In the resources sector, every decision carries significant consequences. Choices surrounding the establishment, operation, and closure of mining operations can profoundly impact communities and the environment.

Maptek, a pioneer in innovative mining technology for more than 40 years, offers solutions from 3D geological modelling and mine design software to cutting-edge machine learning and cloud processing technologies, alongside spatial survey equipment.

These technological advancements empower miners to make more informed, timely decisions, enhance operational safety, and reduce environmental repercussions. The company is actively engaged in various projects aimed at incorporating energy and water consumption variables into the evaluation of strategic mine scheduling scenarios. This includes optimising haul road design, truck allocation, and scheduling to minimise downtime during battery swaps or recharging, especially pertinent in the age of electric mining fleets where there's potential to offset energy usage due to gravitational recharge while moving mass downhill.

Maptek recognises the growing demand for material tracking and operations management software systems to model energy consumption and explore alternative route optimisation, presenting a wealth of opportunities for miners to realise value. Maptek continues to be at the forefront of technological advancements, shaping the future of responsible and efficient mining practices.



Maptek continues to be at the forefront of technological advancements, shaping the future of responsible and efficient mining practices.

More information about Australia's sustainable mining capabilities can be found at this link <https://www.globalaustralia.gov.au/green-economy>.





Australia's green economy capabilities

Circular economy

Australian companies offer a range of solutions to support businesses to reduce waste and improve resource management.

Australia is a source of insights and technologies for the circular economy, including innovative strategies in upcycling and remanufacturing.

These practices involve transforming waste materials into higher-value products, extending their lifecycle, and reducing environmental impact.

A prime example of this transition is the Bega Circular Valley initiative.⁵⁸ This program is dedicated to transforming the Bega Valley region in Australia into a circular economy exemplar, emphasising practices, expertise, and technology. It adopts a comprehensive approach encompassing water management, soil health, biodiversity, emissions, animal care, logistics, and waste management, acknowledging the interconnectedness of circular economy elements.

Australia's environment ministers have also set ambitious national targets to help the transformation to a circular, green economy.

These targets will help to both protect nature and keep businesses profitable.

This includes:

- **Adopting** national packaging laws with the aim of improving package design.
- **Establishing** a national recycling traceability framework to support increased use of recycled materials.
- **Improving** waste management for products such as electronics, textiles and plastics.
- **Contributing** to global efforts to protect nature through the UN Global Biodiversity Framework.

Australia is open for business in the circular economy.



‘Circular economy’ refers to the processes and devices that enable waste reduction, recycling and repurposing.

Future focus

Building a circular economy with trusted markets, policies, and measurement systems⁵⁹

Support innovation and guide investment to improve resource recovery and increase use of recycled products⁶⁰



By 2030, Australia aims to recover an extra **15 tonnes** of material from waste every year⁶¹

A circular economy could generate **\$A1860 billion** over **20 years** and save **165 million** tonnes of CO₂ a year by 2040⁶²



E-waste transformation represents an important area for growth. Only **17.5%** of e-waste is collected and recycled each year.⁶³

Case studies

Circular economy

An international end-to-end solution for recycled packaging

Visy

<https://www.visy.com.au>

Visy is a global leader in packaging and resource recovery and has been a pioneer in sustainability since its inception.

Their innovation, manufacturing and logistics capabilities are organised around an integrated closed loop, which gives life to tailored end-to-end solutions for their customers' needs across paper, primary packaging, fibre packaging, packaging supplies and consumables, as well as point of sale displays, automation, materials handling, global logistics and recycling.

Visy's ability to transform waste into new packaging products made with recycled content at significant scale has generated an international presence with more than 120 sites across Australia, New Zealand and Southeast Asia.

Visy has trading, procurement, sales and logistics operations across Singapore, Thailand, Vietnam, the Philippines, China, North America and Europe.

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Turning waste into stone

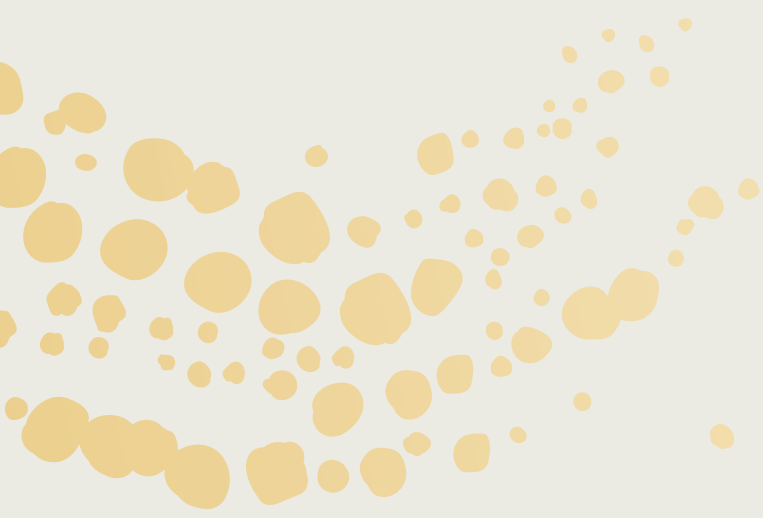
Nu-Rock

<https://nu-rock.com>

Waste, a growing issue associated with modernisation, poses significant environmental and economic challenges. The disposal of industrial, mining, and domestic waste streams, often relegated to landfills, burdens the planet with mounting sustainability challenges. These problems include land degradation, contamination of groundwater, and the release of harmful gases, ultimately contributing to climate change and habitat destruction. The depletion of natural resources through traditional manufacturing methods exacerbates these challenges. Traditional cement production, for instance, is a major contributor to carbon emissions, and reliance on such materials perpetuates environmental harm.

Nu-Rock is an innovative leader in addressing this challenge. Its innovative technology not only diverts waste from landfills but also transforms it into 'engineered rock', a sustainable building product that can be used to manufacture superior performing green products such as blocks, bricks, pavers, high speed railway sleepers, traffic barriers, seawalls, retaining walls, soil conditioners, aggregates, pipes and roof tiles. Nu-Rock is expanding through licensed projects and joint venture projects to grow its emissions-free manufacturing capabilities in new jurisdictions and facilitate the global transition to a circular economy.





Diverting and re-using landfill

ResourceCo

<https://resourceco.com.au>

Believing there is no such thing as waste and maximising the potential in all material it handles, ResourceCo is a leader in resource recovery.

ResourceCo is a pioneer in the advanced manufacturing of primary resources from material that would otherwise be destined for landfill. By adapting advanced manufacturing production methodologies ResourceCo processes construction and demolition waste into high quality civil construction material that displaces the use of quarried/mined products. Commercial and industrial waste streams are manufactured into a process engineered fuel that displaces the use of fossil fuels within high energy consuming industries, such as cement manufacturing.

ResourceCo's tyre recycling business, Tyrecycle, is Australia's largest recycler of end-of-life tyres. Each year Tyrecycle re-manufactures 17 million tyres, giving tyres a new life in roads, pavement and sporting fields or even as an alternate fuel source. ResourceCo's capability also extends to its soil reuse and recycling business which ensures the potential of every tonne of material ResourceCo handles is maximised. ResourceCo's strongest export commodity is its process engineered fuel, an alternative to fossil fuels for heavy energy consuming industries.

Believing there is no such thing as waste and maximising the potential in all material it handles, ResourceCo is a leader in resource recovery.

Tackling food waste head on

Green Eco Technologies

<https://www.greenecotec.com>

According to the United Nations, one third of all food produced for human consumption is wasted each year. This generates an estimated 14% of greenhouse gas emissions – including from methane gas at landfill sites.

Green Eco Technologies is tackling the challenge of food waste head on. Its WasteMaster systems process waste food and reduce volumes by up to four fifths. The residue material is compost-like and easy to transport. It can be used as an additive for fertiliser and in the future a feedstock in aquaculture. It can also be used to generate power through anaerobic digestion.

Green Eco Technologies estimates that for every one tonne of food waste it recycles, the company prevents around 2.1 tonnes of landfill CO₂-equivalent gas from escaping into the atmosphere. The company manufactures its WasteMaster units in Albury, New South Wales. Its primary customers are hospitals, hotels, shopping centres and restaurants, as well as big industrial sites, such as mining operations.

The company was an Australian Export Awards Small Business winner in 2022. Export markets include the UK and the US, as well as the Gulf region, Spain, Chile and Singapore.

Green Eco Technologies estimates that for every one tonne of food waste it recycles, the company prevents around 2.1 tonnes of landfill CO₂-equivalent gas from escaping into the atmosphere.

Australia's green economy capabilities

Agriculture and biodiversity

Agriculture has been a pillar of Australian exports for generations, and we have developed broad expertise and capability along the value-chain. As one of 17 countries that hold more than 70% of the world's species,⁶⁴ Australia recognises the importance of biodiversity and the value of sustainable agriculture.

This, combined with our exposure to severe and frequent droughts, floods, fires and other extreme weather events, compels Australia's agriculture industry to redefine traditional practices and place innovation and sustainability at the centre of their operations.

Australian companies are leading the way and responding to these challenges by embedding research and innovation into agricultural practices, including through stubble retention, tillage minimisation, pesticide and fertiliser optimisation, and soil and grazing management.

Built on innovative technology, such as precision agriculture and bioengineering, Australia is leading the way with resource management solutions and innovative production processes.



‘Agriculture and biodiversity’ refer to the processes and devices that enable sustainable management and improved performance of land, water and agricultural resources. This includes agtech devices and precision agriculture.

Future focus

Continue to build on record exports of \$75 billion in 2022-23

Boost high value AgTech through \$500 million of investment through the National Reconstruction Fund⁶⁶

 **55%** of land in Australia is used for agriculture⁶⁵

Agricultural production has **grown by 59%** in the past 20 years in real terms⁶⁷



 **72%** of agricultural production is exported⁶⁸

Case studies

Agriculture and biodiversity

Combining conservation and precision agriculture

Meredith Dairy

<https://meredithdairy.com>

Intensive dairy farming can quickly degrade soils, water quality and native biodiversity. Manufacturing dairy products can also consume large amounts of energy. At the same time, global demand for premium dairy products is soaring.

Meredith Dairy makes premium chevres and marinated goat's cheese. The company has grown rapidly over the last 30 years without compromising stewardship of the family farm's 2,200 hectares in western Victoria. The owners have taken important steps to encourage conservation.

Approximately 220 hectares is set aside for biodiversity plantations and 30 hectares for the management of critically endangered grassy eucalypt woodlands. Minimum-till techniques are used to reduce soil disturbance and maintain soil cover. The owners also plant 5,000 to 6,000 trees per year. In terms of manufacturing, Meredith Dairy relies on clean energy generated on-site. Facilities include an array of 99kW-capacity solar panels, solar-evacuated tubes for hot water and a biofuel boiler. A wood-gas generator converts waste timber into gas which then fuels a generator. This produces 70% of the company's energy needs.

Meredith Dairy is now one of the largest farms of its kind in Australia and an international brand. Sales in the United States doubled in 2021–22. The company also exports to Southeast Asia and the Middle East.

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Naturally farmed plastic from the ocean

ULUU

<https://www.uluu.com.au/>

Plastic pollution is a pressing environmental issue, with detrimental effects on both terrestrial and marine ecosystems. Derived from non-renewable fossil fuels, traditional plastic materials are non-biodegradable and contribute significantly to the environmental impact of plastic pollution.

ULUU is paving the way for a future where plastic can be part of the solution using seaweed to create futuristic biodegradable plastic. ULUU uses sustainably farmed seaweed to feed saltwater microbes, turning seaweed ingredients into polyhydroxyalkanoates, or PHAs for short. ULUU's seaweed-based plastic not only reduces the demand for fossil fuel-derived plastics but also biodegrades naturally, minimising the environmental impact and potential harm to ecosystems. ULUU bioprocess also produces vegan protein, with trials to develop a fishmeal replacement ongoing.

Through partnerships with Australia's leading science and academic institutions, ULUU aims to transform the plastic industry, restoring ocean health and mitigating climate change, while promoting sustainable manufacturing and consumption practises. ULUU is currently operating a test plant in Western Australia, producing about 1kg per week of PHA and 1kg per week of processed, protein-rich, seaweed biomass for both product development and customer trials purposes. From there, they plan to build their first commercial plant, most likely in Indonesia – the world's second largest seaweed producer.



PHA powder produced from (and set in between) our farmed seaweed feedstock, *Gracilaria*.

Australia's first organic beef exporter leading the way

OBE Organic

<https://www.obeorganic.com>

Agriculture has a role to play in decarbonising food supply chains. Sustainable procurement presents a huge opportunity for agriculture exporters. It integrates environmental, social and governance factors into sourcing. This reduces environmental and social impacts.

OBE Organic is a trailblazer in sustainable farming in Australia. In 2014, the company was the first Australian beef company to adopt the 6 United Nations Global Compact's Food and Agriculture Business (FAB) principles. Today, the company's initiatives are helping to improve sustainability in four areas: animals, people, products and the environment. OBE Organic livestock is sourced from certified organic farms in the pristine heart of Australia.

The company's success is helping to make Australia a leader in sustainable organic farming. Australia is home to the largest acreage of organic farming in Oceania, with over 35 million hectares in 2021. The certified organic producers that supply OBE Organic are required to set aside 5% of their land for conservation or habitat protection. Natural foraging on organic pasture enhances animal welfare and the company monitors carbon emissions from freight movements.

After 30 years of continuous improvement, OBE Organic is also an international success. The company exports beef to markets in North America, Asia and the Middle East.

Australia is home to the largest acreage of organic farming in Oceania, with over 35 million hectares in 2021.

Case studies

Carbon neutral wine

Tahbilk Winery

<https://www.tahbilk.com.au>

Australian agriculture is finding fresh ways to protect habitats and develop sustainable farming practices. Australian viticulture is also proactive. Wine growers are ensuring that their industry preserves the natural environment and offsets emissions in export-led supply chains.

The Tahbilk vineyard was established in Victoria in the 1860s. This makes it one of Australia's oldest wineries. The company has harvested over 2,000 prestigious wine awards and is internationally famous for its marsanne and shiraz vintages. Today, Tahbilk is one of only a small number of wine brands in the world to be certified carbon

neutral. Transforming its vineyards into carbon neutral land is an ongoing challenge. Tahbilk has revegetated over 160 hectares of land and reduced emissions by 45% through carbon sequestration. Tahbilk showcases sustainable farming through wildlife corridors and native vegetation zones. Workers integrate biodiversity conservation measures into their operations. Tahbilk is currently pursuing markets in the UAE, Korea and India with their promise of iconic wines and commitment to sustainability.





Australia's green economy capabilities

Sustainable cities

Cities – vital ecosystems for society, the sustenance of human life, and social connectivity – are in the midst of a green transformation. Cities worldwide are grappling with the challenges of climate adaptation and increasing density and energy use.

Sustainable urban planning, transport solutions, and infrastructure development are all integral to a thriving green city. Australia is leading the way with three of the top five sustainable cities in Asia: Sydney (2), Perth (4), and Melbourne (5).⁶⁹

Australia leads the world when it comes to regulation of the built environment.

With standards including the National Australian Built Environment Rating System (NABERS), Green Star and the Global Real Estate Sustainability Benchmark (GRESB), Australia is promoting sustainable building practices through compliance, which is reducing energy usage by 66%, emissions by 62% and potable water usage by 51%.⁷⁰

Through the Regional Precincts and Partnerships Program and the Urban

Precincts and Partnerships Program, the Australian Government is offering \$550 million in grants to support the delivery of construction-ready precinct projects which improve liveability and inclusion in urban, regional, rural and remote Australian communities.^{71 72}

This regulation and support is driving Australian business capability and experience. From sustainable development to next-generation transport solutions and smart infrastructure to space optimisation – Australian businesses have solutions to accelerate the transformation towards greener cities.

For example, in New South Wales the construction of the new Western Sydney International Airport is providing an opportunity to build a green city. The Bradfield City Centre on the doorstep of this airport, is one of the many ambitious urban development projects in Australia. It will be a green and sustainable city, connected to world-class transport, with future-looking industries that will foster innovation, education, and skills development.⁷³



‘Sustainable cities’ refers to urban planning that enables sustainable ‘green cities’, as well as transport and mobility solutions. This includes personal transport (such as electric vehicles) as well as public and commercial infrastructure such as travel and freight rail.

Future focus

Increase the supply of affordable and accessible EVs ⁷⁴

Establish the resources, systems and infrastructure to enable rapid EV uptake⁷⁵

 Australia’s capital cities are increasing their urban canopy cover by **25-40%** ⁷⁶

60% of greenhouse gas emissions are caused by cities



 Powering our cities with **cleaner, cheaper** and **more reliable** energy through a new National Energy Performance Strategy

Case studies

Sustainable cities

Green cities start from the ground up

GoZero

<https://nexport.com.au>

Traditional transportation systems are a significant cause of greenhouse gas emissions. This situation poses a substantial threat to public health and exacerbates climate change.

GoZero Group is addressing these challenges by providing commercial and government clients with end-to-end zero emission transport, energy and technology solutions through an integrated ecosystem of partners and assets.

GoZero provides commercial and government clients with a holistic solution to decarbonise public, mining, school, commercial fleet, logistics and charter transport. Products and services are supplied through its portfolio companies including:

- **Nexport** – Australia’s market leading supplier of electric buses for public, school and private charter transport.
- **GAZE** – Movement of freight and pallets at airports and seaports through electric yard tractors.
- **Foton Mobility** – Supplier of hydrogen buses for public transport and electric trucks first/last mile logistics.

Recognising the global scale of the issue, GoZero Group is strategically collaborating with internationally leading vehicle manufacturers providers, such as Gaussin (France), Alexander Dennis Ltd (United Kingdom), JBM (India), Go Ahead Group (UK) and Engie (France).

By leveraging these partnerships, GoZero Group is enabling Australian cities to transition towards greener and more sustainable transportation systems.



Space-optimising modular infrastructure

Spacecube

<https://spacecube.com>

Conventional construction methods are resource-intensive and can pose environmental risks which are often extremified in temporary buildings. Spacecube has developed an innovative, highly versatile modular building system with the principles of sustainability, re-usability and longevity central to its design.

Spacecube uses over 90% locally-sourced materials, energy-efficient designs and easily assembled and relocated structures allowing it to significantly reduce waste and energy consumption. Its aluminium trims and plywood sheets are made to fit, with less than 3% wastage, which is then recycled for alternative use.

Intended for temporary or semi-permanent infrastructure, it offers sustainable solutions for events, accommodation, healthcare and businesses. Some of Spacecube’s recent projects include a temporary hospital, hospitality structures, a vaccination clinic, and inner city brand activation.

Spacecube has developed an innovative, highly versatile modular building system with the principles of sustainability, re-usability and longevity central to its design.

Bold thinking, smart cities

Lendlease

<https://www.lendlease.com/au>

Outdated infrastructure and inefficient land use are among many factors increasing the need for sustainable development and regeneration of cities. These issues often lead to inefficient land use, social inequality, and environmental degradation.

Lendlease is a global integrated real estate group tackling these complex urban challenges by working with governments, communities, and investors to transform underutilised spaces into thriving, sustainable mixed-use precincts.

Their approach combines best practice urban design principles with sustainable design and building materials, to create vibrant places where communities thrive. From green roofs and rainwater harvesting at Stratford Cross, to energy-efficient and autonomous buildings at Barangaroo South, Lendlease's international projects contribute to creating resilient and progressive cities that showcase the future of sustainable development.

Lendlease's international projects contribute to creating resilient and progressive cities that showcase the future of sustainable development.



Smart systems, green cities

Bueno

<https://www.buenosystems.com.au>

Green cities need smart systems to adapt to the daily changes in climate with the least amount of energy usage.

Bueno's Smart Building Analytics solutions optimises cooling and predictive maintenance through its network by identifying and collecting large quantities of data from building systems. Bueno enables companies to reduce energy consumption by over 20% and adopt a data-driven maintenance approach.

Bueno provides rich insights to over 1,700 buildings globally and whose client list includes blue chip REITs found across the UK, India and the US, including Hudson Yards in New York.

Bueno is helping accelerate the path to net zero for building operations on a global scale, saving their clients over 2.5 million tonnes of carbon so far.

Bueno, with one of its clients, a large grocery retailer with over 1,000 sites, has created a world first use case in energy optimisation at scale.

Bueno's Smart Building Analytics solutions optimises cooling and predictive maintenance through its network by identifying and collecting large quantities of data from building systems.

Australia's green economy capabilities

Enabling services

Transitioning to a green economy requires an ecosystem of enabling services and expertise that can support companies along the journey. Australia's deep expertise across a range of enabling services sector is accelerating our transformation.

Our world-class research and development sector, underpinned by leading public and private institutions including the nation's Cooperative Research Centres (CRCs) and Commonwealth Scientific and Industrial Research Organisation (CSIRO) – are working with industry to develop solutions that can help address the global challenges of climate change mitigation and adaptation, and energy transition to net zero.

Australia's education and training providers are world-class, driving the development of workforce skills that are critical for the future and the transition to a green economy.

Australian governments and industry are working in partnership to support the measurement, monitoring and management of greenhouse gas emissions.

We have the expertise in establishing markets for trading carbon and nature capital, and we are building joint capacity with our strategic partners overseas.

Sustainability consulting companies are helping energy projects deliver, while government financing facilities are providing significant capital to build and export critical industries.

Our expertise is deep, and service industries are well-established.



‘Enabling services’ refers to the services that support a transition towards a ‘green economy’. While some aspects of enabling services are described through other capabilities, there are specific services that represent a capability in themselves. These include research and development, skills and workforce development, carbon and natural capital accounting, the establishment of carbon / nature / renewable energy markets, climate finance, and sustainability consulting.

Future focus

Growing a skilled workforce⁷⁷

Commercialising renewable energy research and technology⁷⁸

Investing in and improving the carbon credit market⁷⁹

Australian universities rank in the **top 1%** across 15 different fields⁸⁰

The energy transition is estimated to create over **10** million jobs in the next 6 years⁸¹



Australia has established systems for regulating carbon accounting, finance, and trading

Enabling services profile

Research and development

Expertise and innovation in the green economy

Public research institutions are at the forefront of pioneering research in renewable energy, climate science, conservation, and sustainable agriculture. One example is the **Newcastle Institute for Energy and Resources (NIER)**, working with industry to find sustainable solutions to global challenges across the vital sectors of energy, resources, food and water. NIER's research capability spans the theme areas of resource productivity and efficiency, energy technologies and utilisation, advanced materials for industrial innovation, and sustainability and security for regional resilience.

<https://www.newcastle.edu.au/research/centre/nier>

Driving innovation through industry collaboration is the **CSIRO**, a government agency commercialising a range of projects that stimulate the economy, preserve the environment and enhance quality of life - including in areas such as industrial decarbonisation, low emissions steel, sustainable agriculture, hydrogen energy systems and sustainable aviation fuel.

<https://research.csiro.au/tnz/category/projects/>
<https://www.csiro.au/>

Private research institutions such as **entX** are using their world-class team of scientists and leading-edge technologies to identify, develop and commercialise clean energy solutions. Their CarbonX Process - a ground-breaking patented technology has the potential to profitably convert CO₂ into methanol and other commercial products.

<https://www.entx.com.au/>

Public research institutions are at the forefront of pioneering research in renewable energy, climate science, conservation, and sustainable agriculture.

Climate-adapted urban planning is vital to meet weather-related challenges in our major cities. The City of Darwin in Australia's Northern Territory is exploring new ideas to meet these challenges. It is a fast-growing, culturally diverse city with a wet-dry tropical climate and high temperatures year-round. Heat extremes are worsened during monsoonal wet seasons.

A 10-year partnership between the City of Darwin, the Northern Territory and Australian governments, and the CSIRO is looking at ways to help its citizens adapt to a changing climate.

The CSIRO-led Darwin Living Lab is testing tropical urban design measures to mitigate heat, and improve thermal comfort in public places (outdoor and indoor) and in private dwellings. The Lab is delivering projects and developing communication materials that are culturally relevant and co-designed to ensure adoption.

The goal of the Darwin Living Lab is to find ways of improving liveability in tropical cities through urban planning, design, and technology.

<https://research.csiro.au/darwinlivinglab/>



Skills and workforce

Staffing a green economy

The clean energy transition is estimated to add 10 million jobs globally over the next 6 years. Through local and international partnerships with government and industry, Australia's education institutions are developing practical programs that address critical capabilities required across industries. New training courses are being developed in areas such as biomanufacturing, electric vehicle mechanics, and carbon accounting to meet current and future workforce needs to support the growth of a green economy.

When BHP Mitsubishi Australia (BMA) were transitioning to autonomous operations at their mine sites they needed their staff to be upskilled in a workplace that was highly focused on the use of new technologies. **TAFE Queensland** in partnership with **CQUniversity** worked with BMA to design a skills and workforce development strategy to attract new staff for new and emerging roles, as well as to upskill and reskill existing and transitioning workers. The strategy combined an accredited qualification with a suite of micro-credentials.

<https://tafeqld.edu.au/>
<https://www.cqu.edu.au/>

The **Outsource Institute** has developed training programs for several Indian and Indonesian mining companies who recognise the importance of a well-rounded, skilled workforce. The training needs for front-line supervisors have included technical risk and compliance skills related to mechanised underground hard-rock mining; and non-technical or 'soft skills' to complement core mining competencies. The programs have spanned the full spectrum of skills required to work safely and effectively in the mining sector.

<https://outsourceinstitute.edu.au/>

Through local and international partnerships with government and industry, Australia's education institutions are developing practical programs that address critical capabilities required across industries.



Enabling services profile

Carbon and natural capital accounting

Measuring what matters

Global changes in community expectations and government legislation are driving companies to better understand and manage the natural resources and services in their ecosystem.

Natural capital accounting has emerged as a modern solution as it quantifies and monitors the value of these resources, enabling companies to make informed investment, policy, and management decisions related to their business.

Australian companies have strong capabilities in greenhouse gas emissions accounting through complying with government measures such as the National Greenhouse and Energy Reporting Scheme.

Through these frameworks, Australian companies have developed expertise in carbon and natural capital that will be increasingly valuable as global standards, such as the Carbon Border Adjustment Mechanism (CBAM), emerge.

The **IDEAA Group** helps companies to use natural capital accounting to improve their clients' business and inform stakeholders about the benefits of nature being created for the community and the environment.

<https://ideeagroup.com/>

Accounting for Nature have developed a trademarked environmental accounting framework leveraging their knowledge to support companies integrate natural capital accounting into their sustainability strategies.

Six billion tonnes of CO₂ would have to be removed per year by 2050 globally to achieve net zero.⁸² Emissions cuts and growth in carbon sequestration are necessary to achieve this target.

Accurate quantification and monitoring are critical to validate progress and ensure integrity in the self-compliance and reporting process.

LatConnect60 is playing an important role in the Asia Pacific region to provide innovative Earth Observation (EO) satellite-based solutions at scale that supports the measurement, verification and reporting on activities, carbon sequestration and emissions, that aligns with The Oil & Gas Methane Partnership 2.0 (OGMP 2.0) and UN methodologies and standards. For Carbon Emissions Monitoring, LatConnect60 uses high-resolution Shortwave-Infrared satellites and on-site measurement analytics to precisely detect and quantify emissions sub 50kg/h and higher.

LatConnect60 uses multispectral and radar imagery which enables measurement and management of carbon sequestration projects accurately.

LatConnect60 integrates the Earth Observation value chain to create seamless pathways for data and insights to be created and shared to help governments and private stakeholders to offset emissions, access quantify and monetise certified carbon credits and drive decisions for a greener, more sustainable future.

<https://latconnect60.com/>

Australian companies have strong capabilities in greenhouse gas emissions accounting through complying with government measures such as the National Greenhouse and Energy Reporting Scheme.

Enabling services profile

Energy, carbon and nature markets

Trading what matters

The increased adoption of renewable energy and establishment of carbon and nature markets are critical to a well-functioning green economy. Central to these markets is a system that enables and regulates the trading of carbon.

When a company overachieves its emissions reduction targets, it acquires carbon units that can be traded to underachieving companies. As carbon trading is fundamentally reliant upon carbon accounting, the establishment of renewable energy markets requires a system that can define it, measure it, and work out how to trade and interact with the market to achieve objectives.

Australia's expertise in defining and tracking carbon units positions the country as a reliable source in the establishment of renewable energy, carbon, and nature markets.

The Australian Government's **National Greenhouse and Energy Reporting Scheme (NGER)** is a single national framework for reporting company information about greenhouse gas emissions, energy production and energy consumption. The scheme is administered by the Clean Energy Regulator.

This data collection provides vital information about greenhouse gas emissions, energy production and energy consumption across key industries in Australia.

<https://www.cleanenergyregulator.gov.au/>
<https://www.cleanenergyregulator.gov.au/NGER/>

The establishment of renewable energy, carbon and nature markets are critical to a well-functioning green economy.



Enabling services profile

Sustainability consulting and project delivery

Industry expertise

Sustainability consulting is a crucial sector that plays a key role in addressing contemporary environmental challenges. Firms in this sector offer expertise in addressing a range of issues, from pollution control to project feasibility and design to supply chain impact reduction. As our world faces growing ecological concerns, sustainability consulting will be a critical service to prepare and transform organisations for a low-carbon future. Environmental consultants work

hand in hand with businesses and governments to develop sustainable practices and comply with environmental regulations. Their insights and strategies are pivotal in mitigating environmental risks and optimising operations.

There are a number of Australian firms at the forefront of environmental innovation, offering cutting-edge solutions to address complex environmental problems, including Worley and Entura.

Sustainability consulting is a crucial sector that plays a key role in addressing contemporary environmental challenges.



Worley, a global engineering company, headquartered in Australia, is shaping the energy transition around the world. The company's purpose is delivering a more sustainable world - and since 2020, has diversified its business to provide sustainability solutions at scale to the energy, chemicals and resources sectors.

Worley has a track record for delivering complex, integrated projects and new sustainable technologies that enable the energy transition including decarbonising conventional energy assets, battery materials, hydrogen, carbon capture, critical minerals, sustainable fuels and renewable energy. It has delivered over 4,000 energy transition projects globally, from the first stages of engineering to the last stages of installation and commissioning, gaining unrivalled experience in helping businesses, governments and partners navigate the transition.

Worley invests heavily in research and development to create new solutions and technologies as well as strategic partnerships that catalyse breakthrough thinking across governments, academia, organisations and its peers including the CSIRO, Mission Innovation, Princeton University's Center for Energy and the Environment and the Climate Leaders Coalition.

Worley is bridging two worlds as the world accelerates to more sustainable energy sources, whilst providing the energy, chemicals and resources that society needs now.

<https://worley.com>

Worley, a global engineering company, headquartered in Australia, is shaping the energy transition around the world.

Around the world, governments are encouraging greater investments in clean energy projects including in wind, solar and hydro. These projects require professional expertise to deliver — from planning and design to operations and risk management.

As part of Hydro Tasmania, **Entura** draws on over 100 years of expertise in hydropower to consult on clean energy and water projects throughout the Indo-Pacific region.

Since 1914, Hydro Tasmania has designed, built, operated and maintained Tasmania's remarkable hydro-generation system, which includes 54 major dams and 30 hydropower stations. Its portfolio also includes wind farms and off-grid hybrid renewables solutions for remote island communities. Many of these projects were world firsts.

Entura draws on this unique asset-owner expertise to deliver practical solutions that cover the lifecycle of clean energy projects, including hydropower, wind, solar, battery energy storage systems, pumped hydro, power systems, grid connection and transmission.

Entura's registered training organisation, the Entura Clean Energy and Water Institute (ECEWI), builds capacity and skills throughout the power and water sector, with a strong focus on dam safety.

Entura also advises on how to gain and sustain local support for major projects and to be responsible custodians of the environment for a more sustainable future.

The company's clients include governments, funding agencies and developers across Australia, the Pacific, South Asia and Southeast Asia.

<https://www.entura.com.au/>

Around the world, governments are encouraging greater investments in clean energy projects including in wind, solar and hydro.

Enabling services profile

Climate finance

Funding the green economy

The funding and investment mechanisms that support sustainable projects and initiatives are a key driver of meaningful progress. Effective climate finance can contribute to reducing emissions, enhancing resilience and accelerating the transition to a net-zero economy.

There are a number of Australian organisations that are at the forefront of creating innovative sustainable financial products. Besides the Clean Energy Finance Corporation, which has nurtured the development of large-scale renewable energy projects across Australia, commitments such as the Australian Climate Finance Partnership demonstrate our commitment to ensuring climate finance capabilities within the wider Indo-Pacific region.

<https://www.adb.org/what-we-do/funds/australian-climate-finance-partnership>

This facility is managed by the Asian Development Bank and funded by the Australian Government, and it is designed to catalyse financing for private sector climate adaptation and mitigation projects in eligible countries in the Pacific and Southeast Asia.

Export Finance Australia and the Northern Australia Infrastructure Facility are two other government funding organisations providing \$4 billion for exporting businesses and \$7 billion for infrastructure projects, respectively, to further develop Australia's ability to be an energy superpower and support other countries to green their economies.

<https://www.exportfinance.gov.au>
<https://naif.gov.au>

Effective climate finance can contribute to reducing emissions, enhancing resilience and accelerating the transition to a net-zero economy.





Now is the time to work with Australia to achieve your green economy ambitions

Australia can be the engine room of the global green economy.

Australian companies are driving this transformation, harnessing our diverse natural resources and innovative expertise.

Our mining companies are transforming their operations to be more environmentally sustainable.

Our agricultural producers are working to protect our environment while continuing to provide some of the best produce in the world.

Australian companies are accelerating green economy industry transitions both domestically and overseas.

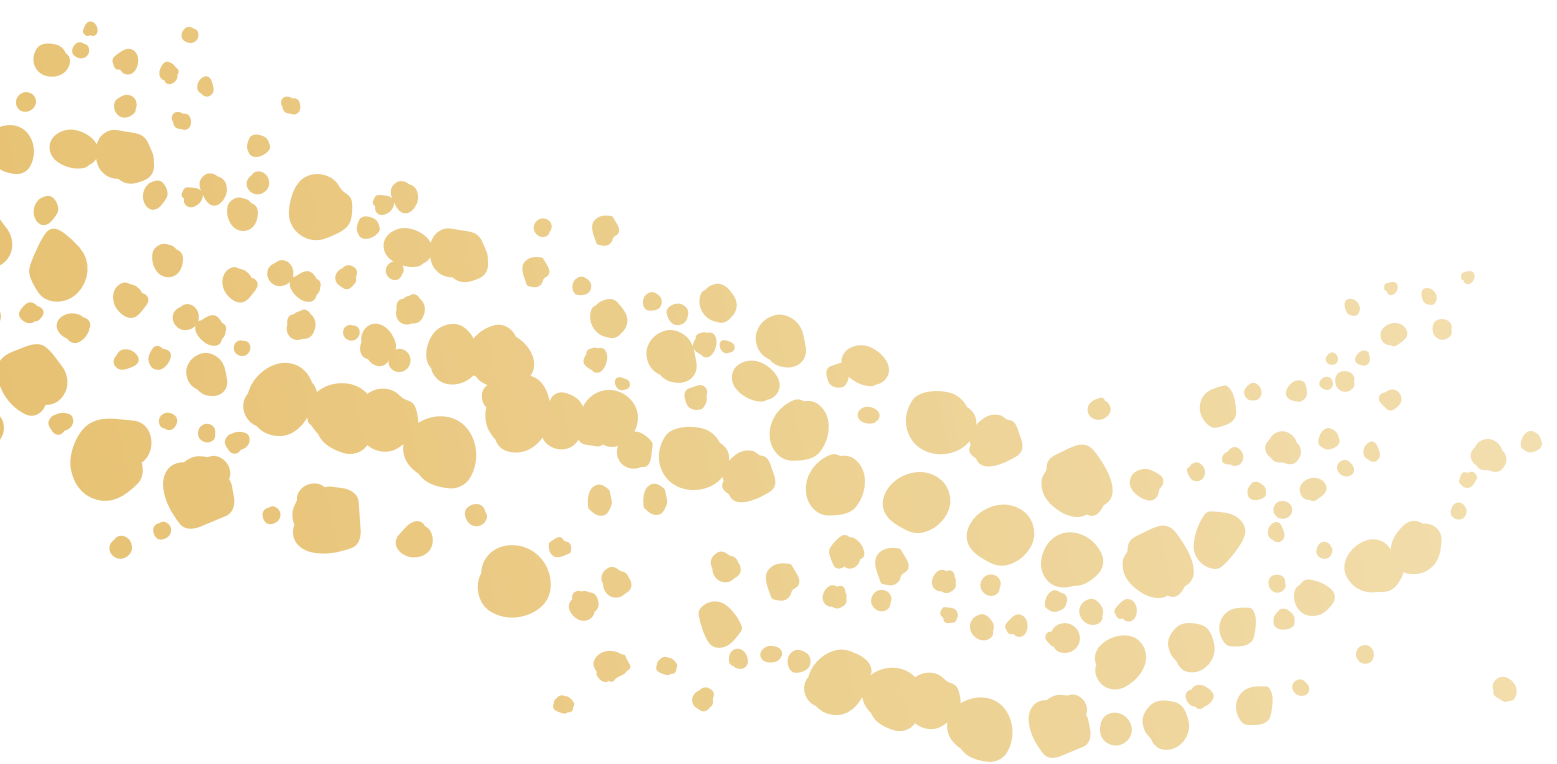
Our companies are exporting circularity solutions and supporting the development of green cities.

Our research institutions are delivering critical skills for our future.

Australian governments, industries and enabling services are transforming traditionally energy-intensive sectors into new energy efficient industries, by fostering ground-breaking solutions.

Join forces with Australian businesses to shape the green economy, achieve net zero, and advance your ESG goals.

Go green with Australia.

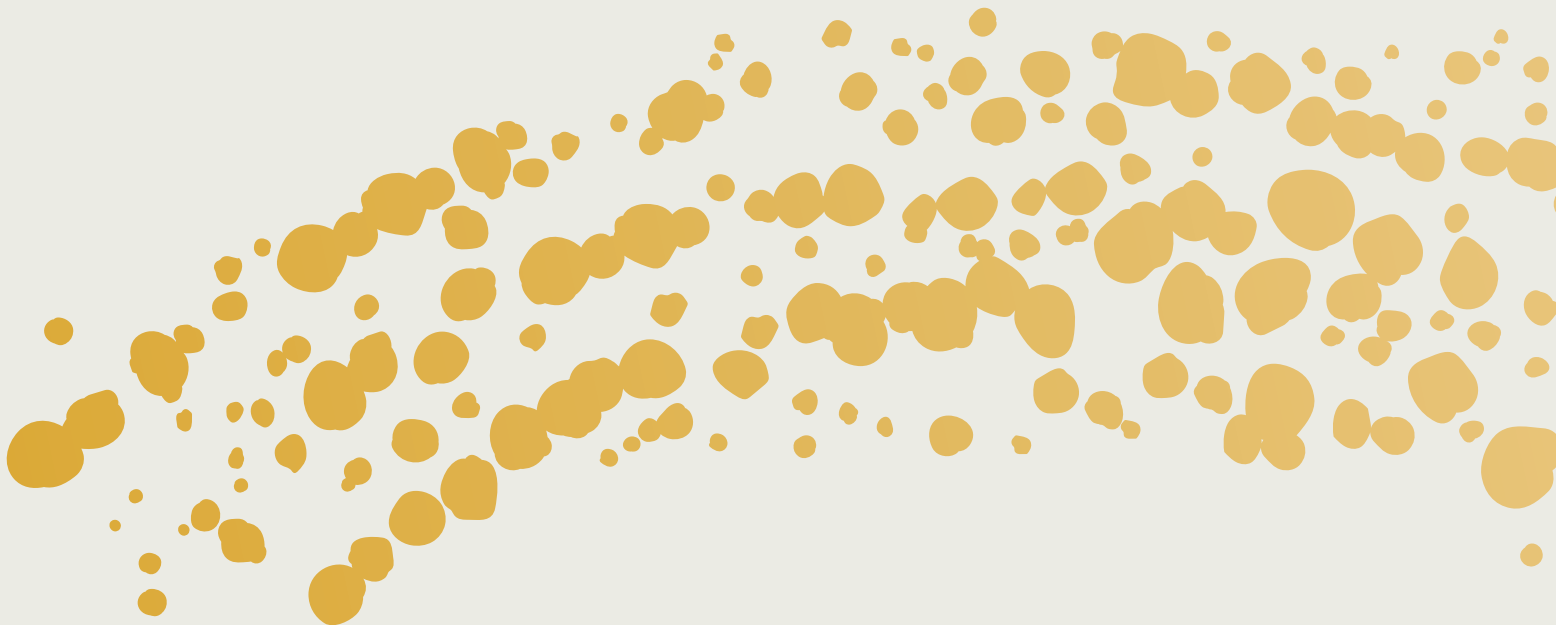




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Australian Government

Australian Trade and Investment Commission



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