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澳大利亚华人能源与资源协会

Energy Transition and Natural Gas Role

December 2024



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PART ONE
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Energy Transitions

Development | Trend | Challenge



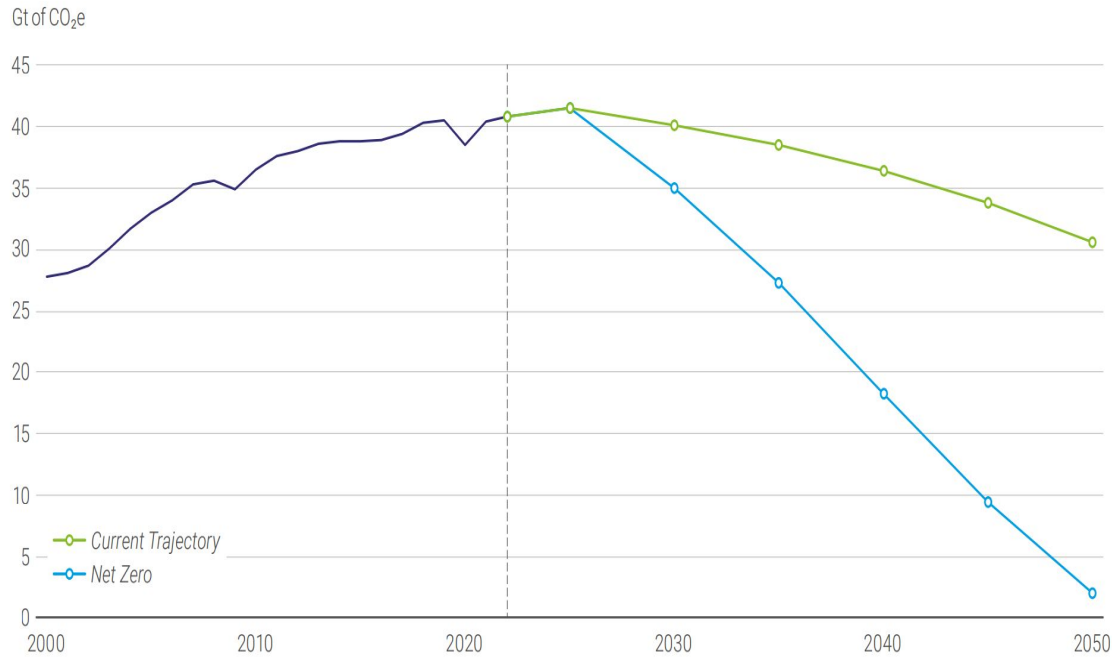
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Recent Developments

Two scenarios to explore the speed and shape of the energy transition out to 2050



Carbon emissions

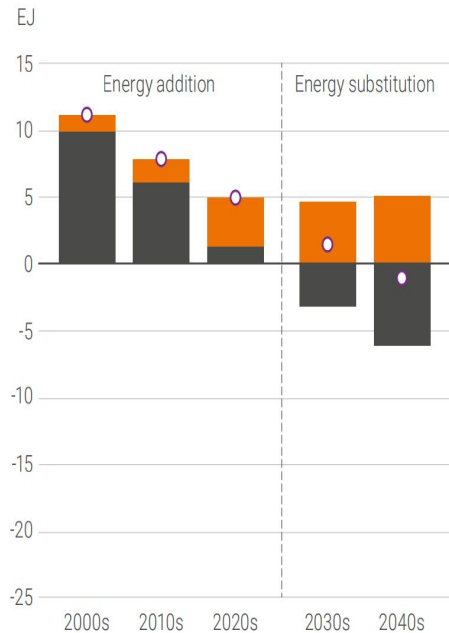


Carbon emissions include CO₂ emissions from energy use, industrial processes, natural gas flaring and methane emissions from energy production.

- Carbon emissions have continued to increase at an average rate of 0.8% per year over the past four years (2019-23).
- The war in Ukraine increased the attention on ensuring energy security and affordability as well as achieving the Paris climate goals.
- The increased focus on energy security could support greater emphasis on improving energy efficiency and growing domestic energy production.
- Global energy demand has continued to grow, averaging around 1% per year between 2019 and 2023.
- Investment in low carbon energy is estimated to have grown very rapidly in recent years, up around 50% since 2019 at approximately \$1.9 trillion in 2023, has been deployed in renewable power, with wind and solar power generation almost doubling between 2019 and 2023.
- supported by continuing falls in cost – the costs of solar modules have fallen by around 60% over the past four years.
- Strong growth in natural gas demand in emerging Asian economies, combined with disruptions to Russian pipeline exports to Europe, has increased the importance of liquefied natural gas (LNG) within global gas markets.
- Growth in less mature, higher cost, low carbon energy vectors and technologies – including low carbon hydrogen, synthetic biofuels, and carbon capture and storage – remains at a very early stage.

Progressing the energy transition: from energy addition to energy substitution

Average annual change in primary energy
in **Current Trajectory**



Average annual change in primary energy
in **Net Zero**



Calculation does not include 2020 due to impact of Covid-19.

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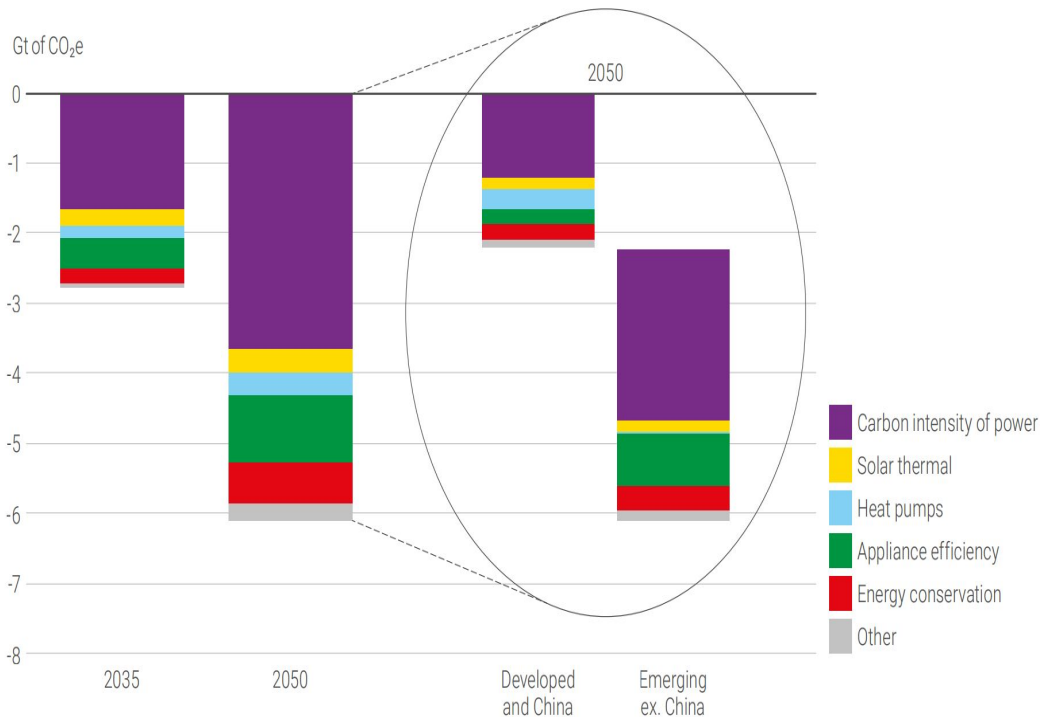
Trends

- The disruptions to global energy supplies associated with the war in Ukraine have increased the importance attached to ensuring secure and affordable energy while also achieving the Paris climate goals.
- Energy demand grows more strongly in emerging economies, driven by rising prosperity and living standards.
- The structure of energy demand changes, with the importance of fossil fuels declining, replaced by a growing share of low carbon energy, led by wind and solar power. The world moves from the 'energy addition' phase of the transition, in which more of both low carbon energy and fossil fuels are consumed, to an 'energy substitution' phase, with declining consumption of fossil fuels.
- Oil demand declines over the time but continues to play a significant role in the global energy system for the next 10-15 years.
- Growth in global gas demand is also boosted by increasing consumption in China, again driven largely by increasing use within the industrial and power sectors.
- Natural gas demand in emerging economies continues to rise over the time.
- LNG demand depends on gas consumption in Europe and Asia, which are reliant on LNG imports for supplies of gas.
- Low carbon hydrogen helps to decarbonize the energy system through its use in industry and transport for activities that are hard to electrify.
- CCUS plays a critical role in enabling the transition to a low carbon energy system.

the energy transition?

Buildings decarbonize more rapidly in *Net Zero* than in *Current Trajectory*, supported by lower carbon electricity and accelerating energy efficiency and conservation

Buildings sector: factors accounting for differences in emissions by region (NZ vs CT)



Other refers to electrification measures (excluding heat pumps) and access to clean cooking fuels. Carbon intensity of power is the reduction in emissions in the power sector due to decarbonization of the generation mix. CT: Current Trajectory. NZ: Net Zero

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Challenge

- The faster transition in Net Zero is driven largely by greater decarbonization in the power and industrial sectors.
- The faster decarbonization of power markets in Net Zero is driven by emerging economies.
- Industry decarbonizes more quickly in Net Zero is helped by lower carbon electricity and greater improvements in efficiency.
- The greater electrification of road transport largely accounts for the faster pace of transport decarbonization in Net Zero.
- Buildings decarbonize more rapidly in Net is supported by lower carbon electricity and accelerating energy efficiency and conservation.

Energy trilemma:

- **Secure**
- **Affordable**
- **Sustainable**

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Pathways to Industrial Decarbonization

Australian Industry Energy Transitions Initiative

PART TWO
2



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Australian Industry Energy Transitions Initiative

- Set a strong, clear, enduring framework with a net zero goal to align industry, finance and government efforts on the transition of Australia's industry
- Transition to the large-scale, cost-competitive, renewable energy system of the future
- Accelerate development and demonstration of the emerging technologies needed for Australia to be a net zero emissions superpower
- Drive deployment of low carbon solutions across the economy, reduce barriers and support investment towards the transition to compete in a decarbonising global economy
- Develop integrated net zero regions, supply chains and energy network solution

FIGURE A: Priority objectives for action

Set a strong, clear, enduring framework with a net zero goal to align industry, finance and government efforts on the transition of Australia's industry

Transition to the large-scale, cost-competitive, renewable energy system of the future

Accelerate development and demonstration of the emerging technologies needed for Australia to be a net zero emissions superpower

Drive deployment of low carbon solutions across the economy, reduce barriers and support investment towards the transition to compete in a decarbonising global economy

Develop integrated regions, supply chains and energy network solutions

FIGURE C: Supply chain snapshot

The Australian Industry ETI has identified the potential for heavy industry in Australia to decarbonise while aiming to limit warming to 1.5°C. This transition will only be achieved if strong, effective and coordinated action is taken across the economy. The emissions reductions found for each supply chain in the 'Coordinated action scenario' are enabled by significant investment, renewable energy and hydrogen deployment, as shown below.



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PART THREE
3

Australia Future Gas Strategy

Australian Government's plan for how gas will support the transition to net zero

Australia's LNG Industry

- Australia is among the world leaders in LNG production capacity.
- First exports of LNG in 1989.
- Australia is now one of the world's largest LNG exporters.
- Australia exported 81 million tonnes of LNG in 2022-23.
 - 80% of this volume was sold to China, Japan and Korea.



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Future Gas Strategy

- ▶ The Future Gas Strategy is the Australian Government's plan for how gas will support the transition to net zero.
- ▶ It outlines a medium (to 2035) and long-term (to 2050 and beyond) plan for gas production and consumption in Australia.
- ▶ The Strategy aims to:
 - ▶ support decarbonisation of the Australian economy.
 - ▶ safeguard energy security and affordability.
 - ▶ reinforce Australia's reputation as an attractive and reliable trade and investment partner.
 - ▶ help our trade partners achieve net zero by becoming a renewable energy superpower by developing new, low emissions energy exports.

Principles

The Strategy is based on broad stakeholder consultation and quantitative analysis.

Principles and actions to shape future gas policy:

1. Australia is committed to supporting global emissions reductions to reduce the impacts of climate change and will reach net zero emissions by 2050.
2. Gas must remain affordable for Australian users throughout the transition to net zero.
3. New sources of gas supply are needed to meet demand during the economy-wide transition.
4. Reliable gas supply will gradually and inevitably support a shift towards higher value and non-substitutable gas uses. Households will continue to have a choice over how their energy needs are met.
5. Gas and electricity markets must adapt to remain fit for purpose throughout the energy transformation.
6. Australia is, and will remain, a reliable trading partner for energy, including Liquefied Natural Gas (LNG) and low emission gases.

Purpose of the Future Gas Strategy

- ▶ Australian gas is an important resource for the domestic and global energy transition.
- ▶ In 2021-2022, natural gas provided 27% of Australia's energy needs, and gas production and usage accounted for 24% of our total emissions.
- ▶ Gas-related emissions *must* decline to meet our national commitments under the Paris Agreement, including our legislated Net Zero targets and global temperature goals.
- ▶ The supply-demand balance for gas in both the west and east coast markets is forecast to remain tight through to 2030 and beyond.
- ▶ Net zero scenarios indicate Australia and the world will need gas at lower levels through to 2050 and beyond. Australian gas will play an important role in an orderly global and domestic energy transformation.
- ▶ Adopting a consistent and long-term policy approach will be essential to Australia's energy security, lowering our emissions, and protecting living standards and national wellbeing.

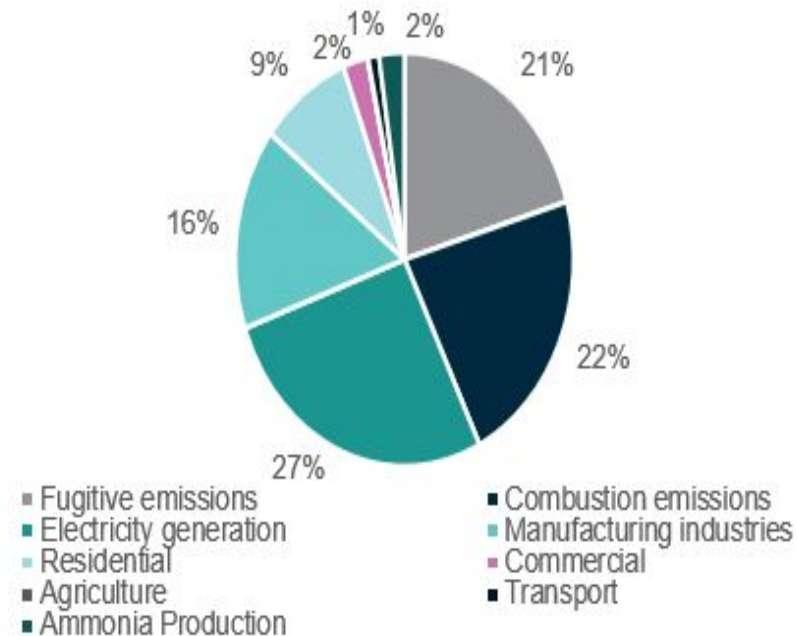
Stakeholder consultation: Feedback from foreign governments and companies

- ▶ LNG is needed to meet decarbonisation goals towards and beyond 2050.
 - ▶ IEA forecasts are lower than industry forecasts on LNG and gas outlooks.
- ▶ Policy and regulatory certainty needed to support investment decisions.
- ▶ Emission reductions in the LNG supply chain are a key focus
 - ▶ Australia can support regional decarbonisation by continuing to export LNG and delivering emissions reduction along the natural gas supply chain.
- ▶ CCS is important to reduce emissions and requires a clear regulatory path with continued release of acreage.

Analysis: Emissions Reduction

- Australia has legislated strong emissions reduction targets and is developing new sources of renewable energy.
- Six sectoral decarbonisation plans.
- Australia's gas industry can assist our trade partners to decarbonise.
- Australia aims to become a regional leader in the permanent, safe geological storage of CO₂.
- Australia is reviewing its offshore regulatory regime to realise opportunities associated with the geological storage of CO₂.

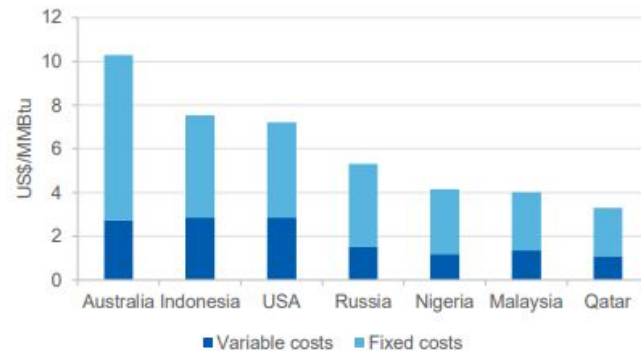
Gas emissions by sector and use



Source: DISR (unpublished b) analysis of DCCEEW data (Australia's emissions projections dataset)

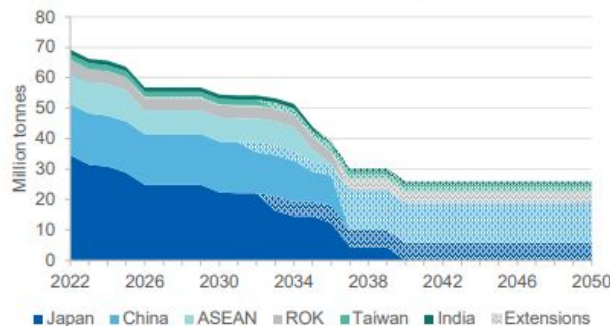
Analysis: International demand

Figure 4.15: Production cost curve of select LNG exporters



Notes: Full lifecycle costs including upstream production and liquefaction cost. Variable costs represent the priced-in short run marginal cost of production.
Source: NexantECA (2023)

Figure 4.6: Australian LNG medium and long-term contract volumes in force, with assumed contract extensions, by buyer, 2022 to 2050



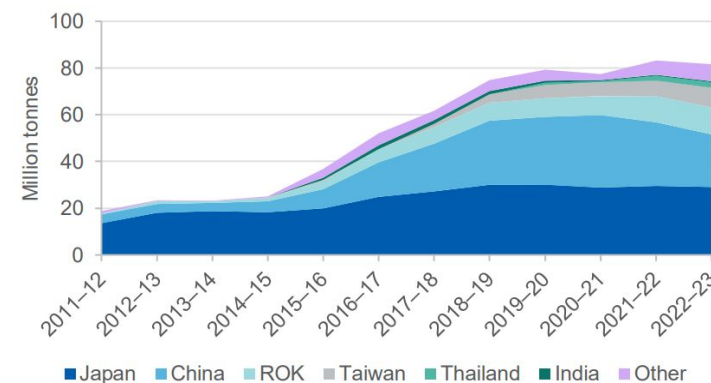
Notes: Contract extensions are modelled on the following basis: that Australia maintains a gas trading relationship with Japan, China, ROK, Taiwan, and India, subject to remaining reserves in key fields, with field and contract choice informed by future gas consultation processes.
Source: GIIGNL (2023)

- Australia’s average production cost is higher than other major producers, reflecting higher capital costs.
- High average per-unit costs of Australian production can coexist with large volumes of exports.
 - geopolitical and national relationship motivations to trade.
 - fragmented gas markets - relatively low competition between regions.
 - long-established facilities can price in terms of the short run marginal cost of production rather than the total average cost of production.
- Australian LNG exports are underpinned by medium- to long-term contracts . The volumes of gas exported under these contracts will decline out to 2040 as contracts expire.
- The extent of decline will be less if contracts are extended to take advantage of existing infrastructure.

Analysis: International Demand Outlook

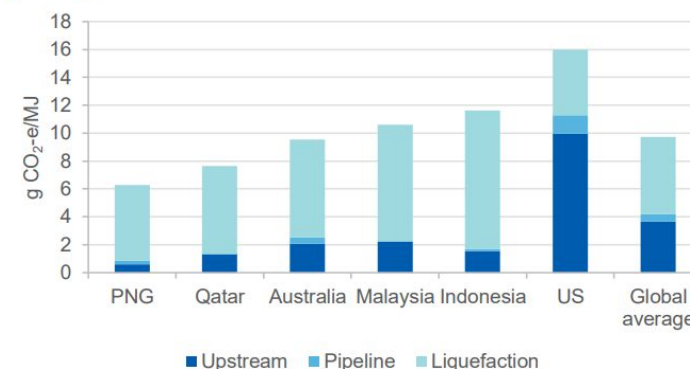
- Australia exports to the Asia-Pacific region, building on its long trading and investment relationship.
- Regional demand for Australian gas is expected to be sustained throughout the transition, albeit with declines from current levels.
- With Asian trading partners looking for abatement through CCUS, demand may increasingly shift to gas exporters who offer lifecycle emissions management.

Figure 4.3: Australian LNG exports, by destination, 2012 to 2023



Notes: Export figures cannot be disaggregated prior to 2011-12 and were omitted.
Source: EnergyQuest (2023c)

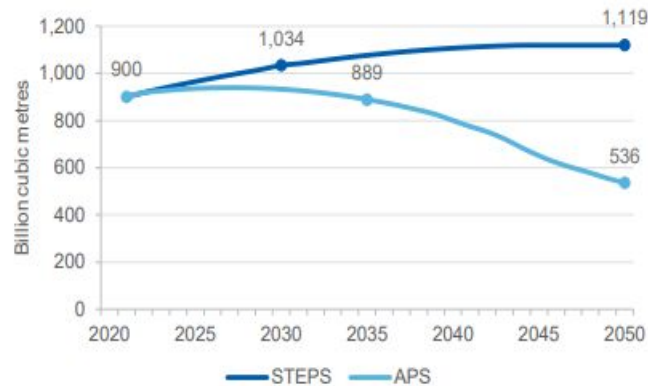
Figure 2.6: LNG export emissions intensity across the world, normal operating conditions



Notes: Shown as the emissions under normal operating conditions. Measured for LNG loaded onto vessels. Includes operational and under construction projects.
Source: Wood Mackenzie (2024)

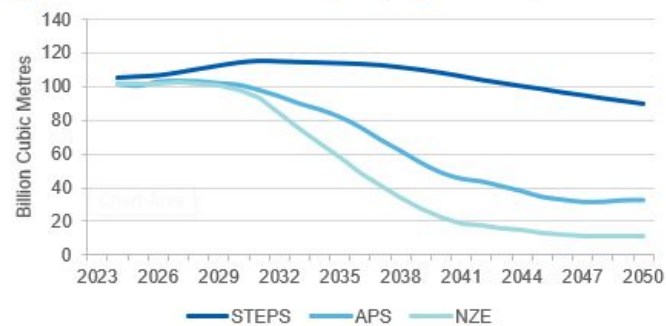
Analysis: International demand outlook - continued

Figure 4.11: Asia Pacific gas demand by scenario, 2020 to 2050



Notes: IEA does not publish disaggregated forecasts of NZE gas demand.
Source: IEA (2023f)

Figure 4.14: Australian LNG exports, by scenario, 2023 to 2050



Note: This is an aggregation of exports to Southeast Asia and East Asia.
Source: NexantECA (2023)

- There is a high degree of uncertainty around future demand for gas in our region.
- With varying domestic energy transition pathways among our trading partners, existing barriers need to be addressed to achieve emissions targets.
- Asia-Pacific demand for gas is likely to hold up relative to other regions.
- East Asia's demand for Australia LNG is projected to steadily decline.
- For South-east Asia, while regional gas production has been substantial, declining reserves and rapid energy demand associated with strong economic growth means demand for LNG is growing.

Implementing the Future Gas Strategy

In implementing the Future Gas Strategy, the Government aims to:

- ▶ Prevent Gas Shortfalls
- ▶ Reduce Gas Related Emissions
- ▶ Support Households & Businesses through the transition to Net Zero
- ▶ Empower First Nations people to benefit from the transition to Net Zero
- ▶ Promote Geological Storage of CO₂ and support regions transition to Net Zero
- ▶ Continue to update the Future Gas Strategy

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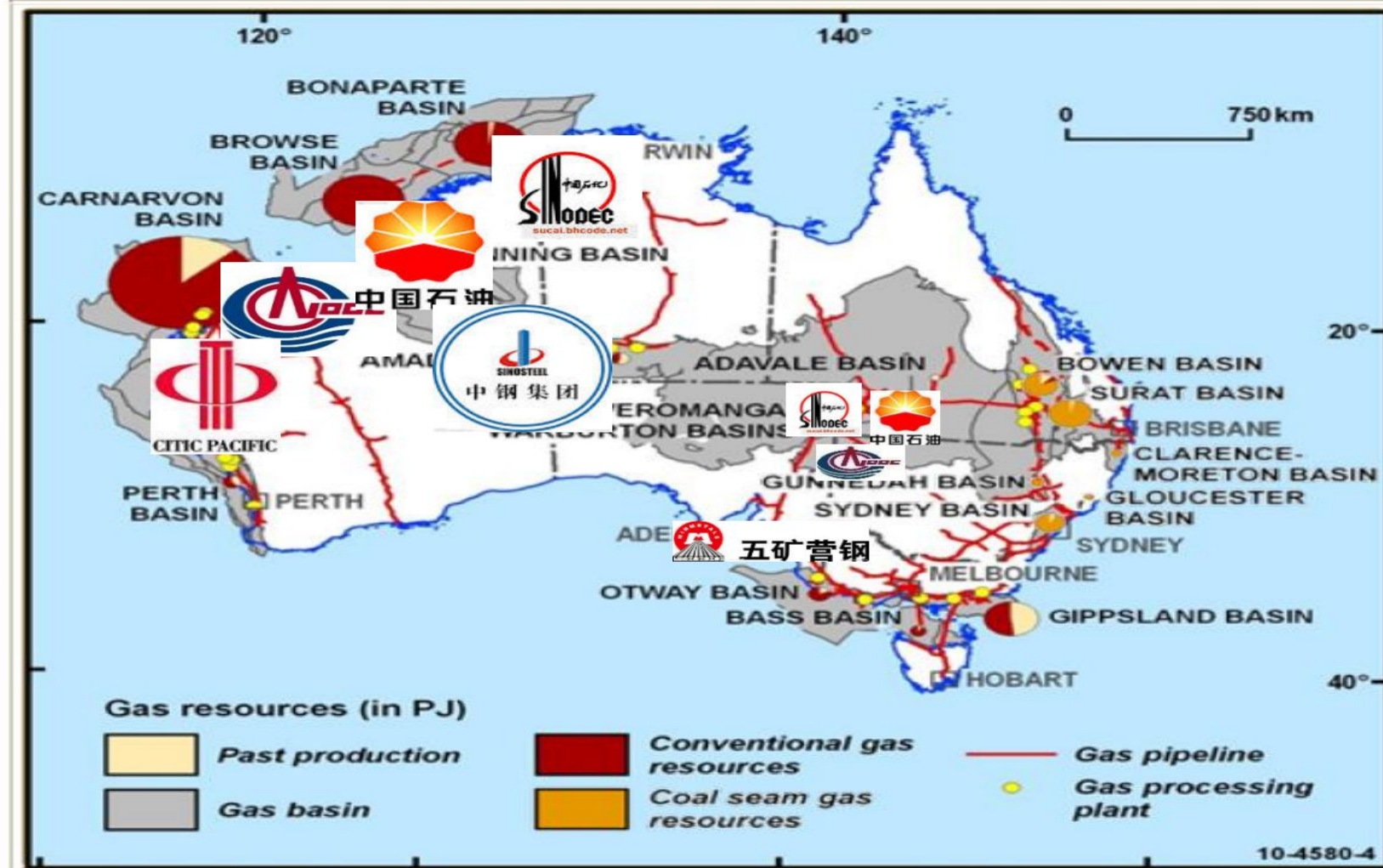
Cooperation in Energy between Australia and China

To enhance and expand cooperation in Energy Transition
to renewable and hydrogen

PART FOUR

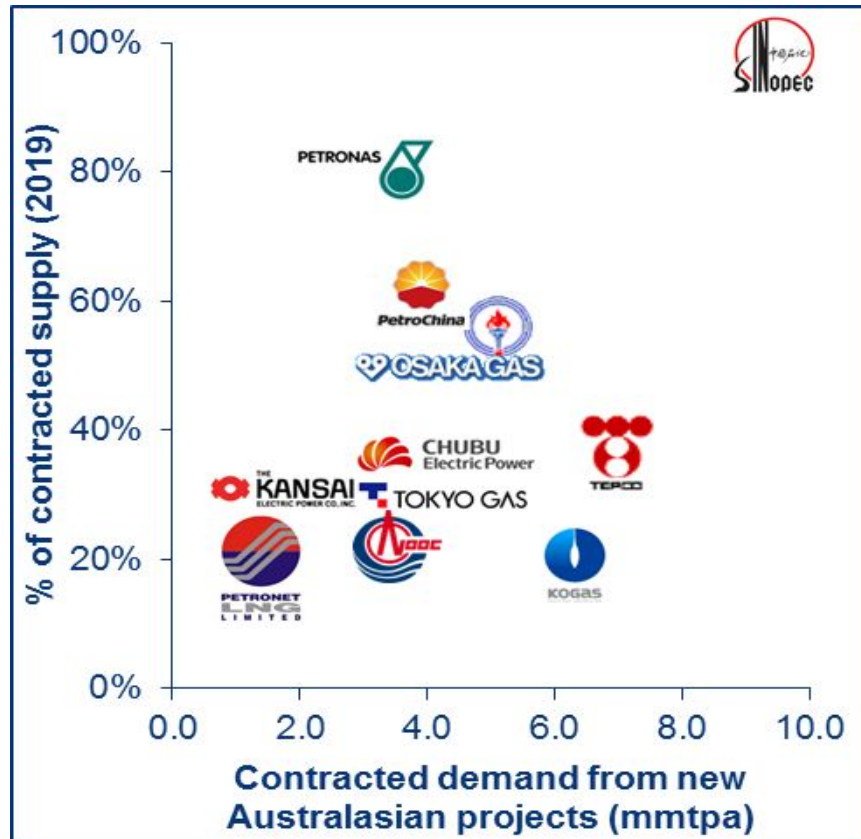
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Snapshot of Chinese Company's presence in Australia



Source: based on Australian Energy Resource Assessment, 2012

Cooperation in Energy Sector



	Contracted demand from new Australian projects (mmtpa)	% of contracted supply in 2019
Sinopec Group	7.2	13
TEPCO	7.0	12
KOGAS	6.8	12
CPC	4.9	9
Osaka Gas	4.7	8
PetroChina	4.3	8
Chubu Electric	4.0	7
CNOOC	7.4	13
PETRONAS	3.5	6
Tokyo Gas	3.5	6
Kansai Electric	1.8	3
Petronet LNG	1.5	3

- The total upstream participation investment of Chinese oil and gas companies in Australia have exceeded USD 9 billion
- Chinese energy companies signed agreements for an annual LNG supply volume in Australia that reached 18.9 million tons in 2019

Maintaining the stable development of existing cooperation to promote and enhance collaboration in the clean energy

Taking advantage of China's Build-up in renewable and hydrogen to assist in creating a **“Future Made in Australia”**

to assist in creating a **“Future Made in Australia”**



13 & 14 October 2020
Central Perth Venue
Western Australia
www.wacpa.com.au/forum



Professional development opportunities
for individual and corporate



Network Building



Knowledge Exchange



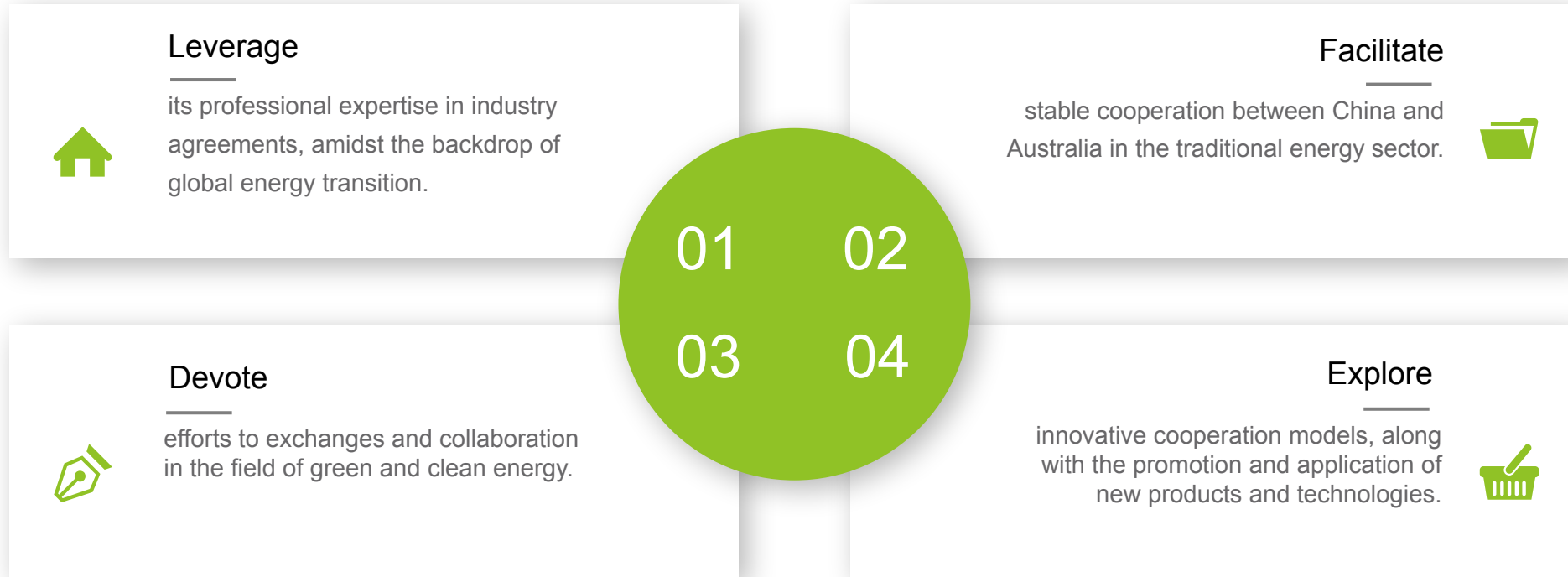
Technical Training



Cooperation Projects

New Start, New Ambitions

Efforts should be made to

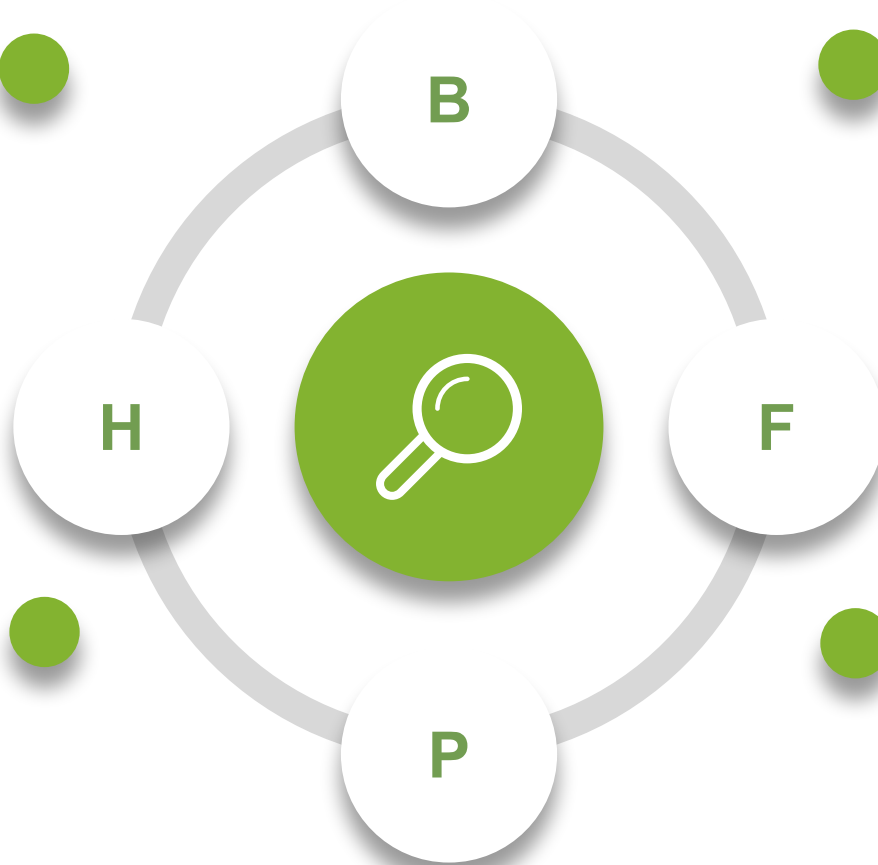


This endeavor aims to expedite the realization of the **clean, green, low-carbon, and zero-carbon goals** of both countries' industries.

ACERA's Vision

A home

to welcome
and grow



A bridge

to connect
people and cultures



A platform

to exchange and share
success stories



A forum

to promote
opportunities and ideas





Together we can do more!



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