



LNG

National and global  
benefits



LNG brings the environmental and energy security benefits of natural gas to the world.

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Australian LNG is growing rapidly and is now a mainstay of the nation's economy.

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LNG projects have long operating phases that will deliver decades of economic benefits.

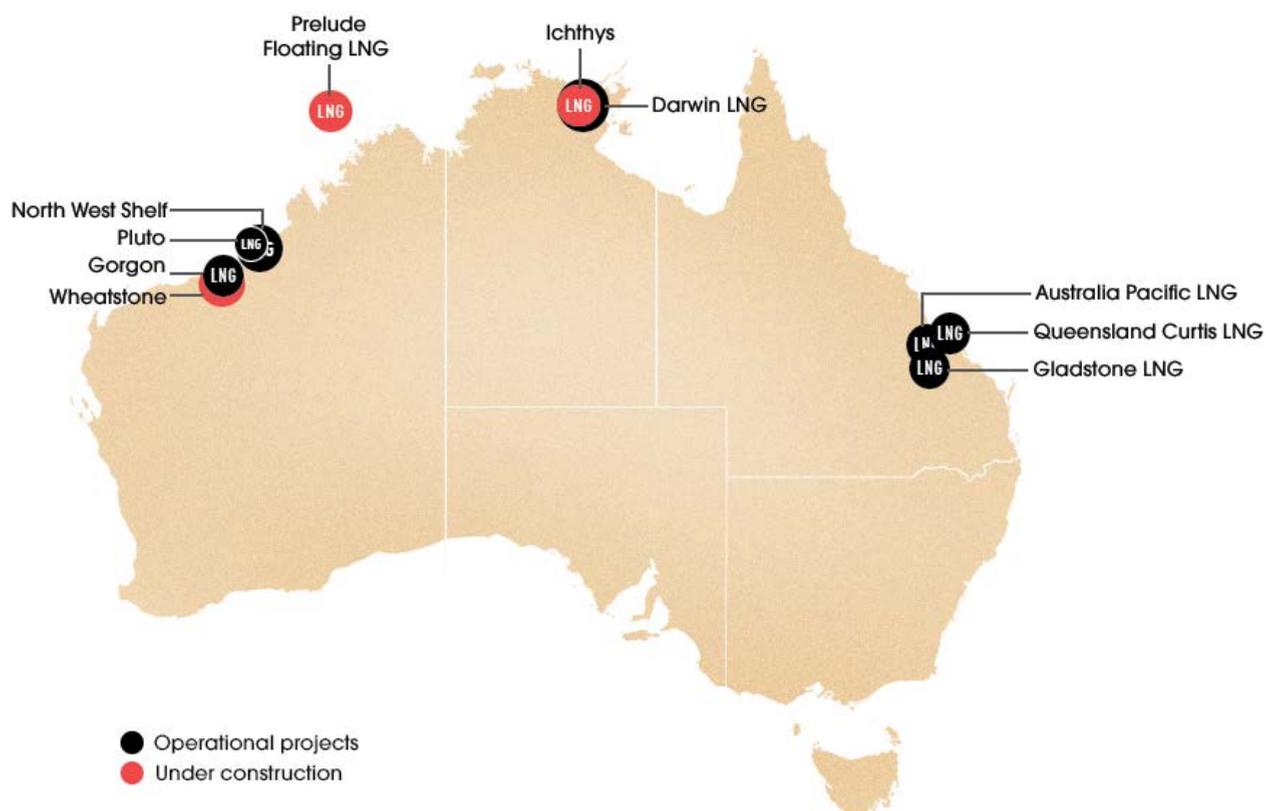


# The rapid growth of Australia's LNG industry

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- 1989:** Australia has one operating LNG project producing 2.5 million tonnes of LNG per year.
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- 2015:** Australia becomes the world's second-largest LNG exporter, shipping 30.4 million tonnes of LNG with a value of \$16.53 billion. The country's 2015 December quarter production is 48% higher than Q4 2014 production.
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- 2019:** Australia will overtake Qatar to become the world's largest LNG exporter.
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- 2020:** 10 Australian projects will collectively produce more than 85 million tonnes a year of LNG.
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OPERATING PROJECTS (year of first production)	UNDER CONSTRUCTION
West Shelf Venture (1989)	Ichthys (2017)
Darwin LNG (2006)	Wheatstone (2017)
Pluto (2012)	Prelude Floating LNG (2018-19)
Queensland Curtis LNG (2014)	
Gladstone LNG (2015)	
Australia Pacific LNG (2015)	
Gorgon (2016)	

## Australian LNG projects



# Economic impact

LNG projects have two distinct phases.

1. Construction: massive investment and many short-to-medium term jobs.
2. Operations: decades of export income; taxes and royalties; and well-paid, highly skilled long-term jobs.

Both phases generate work and income for services companies.

At the peak of the construction phase, LNG accounted for a third of Australia's business investment. During this phase, the LNG sector created more than 100,000 skilled jobs across the Australia economy.

While a project's construction phase may last five or more years, the operations phase lasts for decades. Most companies now building LNG plants talk about project lifespans of at least 30 years. These are cautious estimates. Australia's foundation LNG plant – the North West Shelf Venture – shipped its first cargoes in 1989. It is expected to have a lifespan of at least 45 years.

As well as thousands of long-term, well-paid jobs at gas fields

and LNG facilities, there will be many benefits for Australia's services sector. In 2014, the LNG services market was worth \$29 billion<sup>5</sup>. This sector has the potential to grow, diversify and to offer its services to markets around the world.

Local content opportunities during operations include:

- Aviation, drilling and marine support services based in regional centres
- Supply, accommodation, catering and maintenance services
- Establishing and operating marine supply bases.

In its *Local Content Report*<sup>6</sup> (2014), Western Australia's Department of Commerce found the state's LNG projects awarded most of their contracts to companies from WA and other parts of Australia.

- North West Shelf (operator Woodside) – 63% WA local content; 19% other Australian.
- Gorgon (operator Chevron) – 78% WA; 4% other Australian companies.
- Wheatstone (operator Chevron) – 68% WA; 13% other Australian companies.

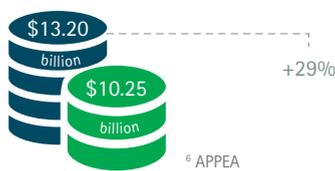
## Economic impact

Based on Australian dollars

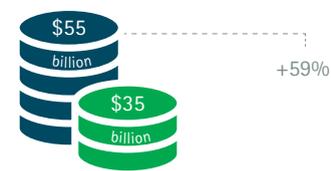
Contribution to GDP (%)



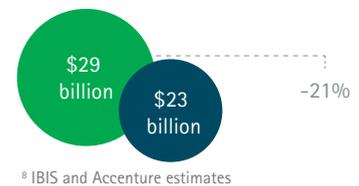
Royalty & Taxes from Oil & Gas Revenue<sup>6</sup>



Contribution to GDP, absolute



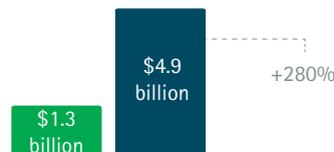
Size of Services Market<sup>8</sup>



Opex Services<sup>7</sup>



Annual Operational Expenditure (Opex)



Cumulative Capital Expenditure (Capex) + Opex Investment



All sources not otherwise identified are based on Accenture research and estimates

Source: Accenture Ready or Not? report<sup>5</sup>

5 Accenture (2015) *Ready or Not? Creating a world-leading oil and gas industry in Australia*  
[www.accenture.com/us-en/\\_acnmedia/Accenture/Conversion-Assets/DocCom/Documents/Global/PDF/Dualpub\\_14/Accenture-Australia-LNG-Report.pdf](http://www.accenture.com/us-en/_acnmedia/Accenture/Conversion-Assets/DocCom/Documents/Global/PDF/Dualpub_14/Accenture-Australia-LNG-Report.pdf)  
 6 [www.commerce.wa.gov.au/sites/default/files/atoms/files/local\\_content\\_report\\_may\\_2014.pdf](http://www.commerce.wa.gov.au/sites/default/files/atoms/files/local_content_report_may_2014.pdf)

# Value-adding

The oil and gas sector – and LNG in particular – is one of Australia's highest value-adding industries. Analysis by PwC (commissioned by APPEA) shows that for every dollar of production, the oil and gas sector adds 70 cents of value-added compared to an average of 49 cents for all other industries.

This report<sup>7</sup> finds the oil and gas industry's annual contribution to Australia's economic output is expected to more than double from \$32 billion in 2012-13 to \$67 billion by 2029-30. This equates to around 2.6% cent of GDP, an increase of more than 0.5 percentage points in the industry's current contribution to the national economy.

Another report<sup>8</sup> – commissioned by several peak bodies for major gas-using sectors – made a similar finding. It finds gas production is one of the highest value-adding industries in the Australian economy. This reflects the technologically sophisticated and innovative nature of natural gas production.

*"Given the high value-added contributions associated with the gas sector, summing the industry value-added impacts for all sectors gives an overall net increase in GDP over the forecast period". Gas Market Transformations (Deloitte, 2014)*

## Infrastructure, regional development and community benefits

The LNG industry has a history of providing infrastructure for Australia and for local communities.

### Western Australia

The development of the North West Shelf Venture underpinned the construction of the state's Dampier to Bunbury Natural Gas Pipeline, which carries about 95% of WA domestic gas supply. The project has also driven the development of the town of Karratha and its emergence as a services and shopping hub for the surrounding region.

The ongoing growth of Western Australia's LNG sector also allowed the WA Government to establish the Australian Marine Complex Common User Facility at Henderson. This outstanding success provides infrastructure and facilities not only for the oil and gas industry, but also for the defence and maritime sectors.

Western Australia's LNG projects also contribute significantly to communities in the regions where they operate. For example, in 2014 the Chevron-operated Wheatstone Project contributed more than \$250 million to support key projects in the Onslow region, including: a new hospital, a swimming pool, a Shire administration centre, an all-weather access road, government workers' housing, a power station, and a water plant.

### Queensland

In Queensland, LNG developments have delivered massive new onshore infrastructure. This can be leveraged to greatly expand eastern states gas production.

The Queensland LNG sector has also enhanced social and economic development in the Surat Basin region (including Toowoomba and the Darling Downs/Western Downs). Its infrastructure and investment is strengthening and diversifying once-struggling regional economies.

A 2013 KPMG study<sup>9</sup> shows that resources developments are not only making regions more prosperous, but also making their communities more stable and socially sustainable. The retail trade sector has overtaken healthcare and social assistance as the region's largest industry of employment. This rebuts claims that money being made in the region is not being spent there.

In December 2015, Toowoomba's unemployment rate was 3.7%, while the Darling Downs was 2.5%. The Queensland and national rates were 5.8% and 5.9% respectively.

Queensland LNG companies have contributed to major upgrades at regional airports and have also collectively committed to spending \$210 million<sup>10</sup> on community investment. They are also supplying new water infrastructure and treating the water they extract from coal seams in the course of gas production. Each year, more than 7 billion litres (GL) of water sourced from coal seams are treated and used for beneficial purposes, such as:

- Stock watering
- Crop irrigation
- Tree plantations
- Augmenting town water supplies
- Aquaculture
- Industrial and manufacturing operations.

7 [www.appea.com.au/wp-content/uploads/2014/11/PwC-Report-Oil-and-Gas-Industry-Sept-2014-FINAL.pdf](http://www.appea.com.au/wp-content/uploads/2014/11/PwC-Report-Oil-and-Gas-Industry-Sept-2014-FINAL.pdf)

8 [http://pdf.aigroup.asn.au/Deloitte\\_Gas\\_Market\\_Transformations\\_-\\_Manufacturing\\_Impacts\\_Report\\_-\\_web\\_final\\_-\\_July\\_14\\_2014.pdf](http://pdf.aigroup.asn.au/Deloitte_Gas_Market_Transformations_-_Manufacturing_Impacts_Report_-_web_final_-_July_14_2014.pdf)

9 [www.appea.com.au/wp-content/uploads/2013/04/130204\\_APPEA-MCA-demographics-report.pdf](http://www.appea.com.au/wp-content/uploads/2013/04/130204_APPEA-MCA-demographics-report.pdf)

10 [www.gasfieldscommissionqld.org.au/resources/gasfields/csg-lng-project-update-jun-2014.pdf](http://www.gasfieldscommissionqld.org.au/resources/gasfields/csg-lng-project-update-jun-2014.pdf)

# Delivering reliable, cleaner energy to the world

## LNG spreads the benefits of natural gas.

Natural gas is a cleaner form of energy suitable for electricity generation, industry and households.

Of all fuel types, gas offers the best combination of cleanness, reliability and flexibility.

Unlike wind and solar power, gas-fired generation is reliable and can be run continuously. Unlike coal-fired power, gas-fired generation can be quickly started and stopped. Uniquely, gas can be used for baseload power or peaking power, and can also fill the gaps in intermittent power generation.

Increasing the use of natural gas can enhance energy security and deliver immediate and substantial carbon savings.

In Australia, switching from coal to gas can reduce greenhouse emissions by 40-50% and by as much as 75% in some circumstances<sup>1</sup>.

The LNG industry enables delivery of natural gas over greater distances and deeper oceans than would be possible using pipelines. It also allows more flexibility and multiple sources of supply. This is creating a more diverse and globally interconnected gas market.

Use of LNG helps reduce global greenhouse gas emissions and improves air quality in Asian cities.

LNG also enhances energy security and economic development – both in producing nations and in customer countries.



<sup>1</sup> Australian Council of Learned Academies (2013), *Engineering Energy: Unconventional Gas Production* (see <http://acola.org.au/PDF/SAF06FINAL/Final%20Report%20Engineering%20Energy%20June%202013.pdf>). The emissions benefit is lower when compared to ultra-supercritical coal fired power generation, but the Council notes "gas-fired electricity generation will generally replace existing coal-fired boilers that are less efficient subcritical facilities".

# Exports

LNG is now Australia's third-largest source of export revenue – behind coal and iron ore, and immediately ahead of education. Australia's LNG exports are now worth about \$17 billion annually.

“As LNG production continues to grow, petroleum is likely to make an increasingly positive contribution to the overall Australian trade balance.”<sup>2</sup>

*EnergyQuest Chief Executive Dr Graeme Bethune.*



Current low oil prices have muted the impact of this growth. But with more projects being developed, Australia's LNG production will grow further.

When global oil and gas prices rise again – as they inevitably will – LNG export revenue will increase and the economic impact will be even more pronounced.

McKinsey has forecast<sup>3</sup> that – with no final investment decisions now being made for new plants – global LNG supply will tighten after 2022. This will put upward pressure on prices and create new opportunities for Australian LNG.

The 2016 edition of the well-regarded BP Energy Outlook report<sup>4</sup> forecasts that:

- World energy demand will increase 34% over the next two decades.
- Gas demand will rise 1.8% per cent annually.
- Gas will overtake coal as the second-most used fuel (behind oil).
- LNG trade will grow twice as fast as gas consumption, with LNG's share of gas world demand rising from 10% in 2014 to 15% in 2035.
- By 2035, LNG will surpass pipeline imports as the leading form of internationally traded gas.

2 [www.energyquest.com.au/insightsandanalysis.php?id=244](http://www.energyquest.com.au/insightsandanalysis.php?id=244)

3 <https://www.mckinseyenergyinsights.com/insights/new-lng-markets-key-to-growth.aspx>

4 [www.bp.com/content/dam/bp/pdf/energy-economics/energy-outlook-2016/bp-energy-outlook-2016.pdf](http://www.bp.com/content/dam/bp/pdf/energy-economics/energy-outlook-2016/bp-energy-outlook-2016.pdf)



appea

the voice of australia's  
oil and gas industry

APPEA and its members will continue to work with all of Australia's governments to enhance the business and regulatory environment for the country's LNG industry and its related service sectors.

Maintaining the industry's global competitiveness and attracting further investment in LNG would enhance Australia's prosperity. It would also improve Australia's trading partners' energy security and economic growth.

Further increasing Australia's LNG exports would also deliver environmental benefits. It would enhance air quality in Asian cities and help Australia's trading partners contribute to reducing global greenhouse gas emissions.

## LNG in Australia and globally: key points

1. LNG brings the environmental and energy security benefits of natural gas to the world.
2. Australian LNG is growing rapidly and is now a mainstay of the nation's economy.
3. LNG projects have long operating phases that will deliver decades of economic.

### About APPEA

The Australian Petroleum Production & Exploration Association is the peak national body representing Australia's oil and gas exploration and production industry.

APPEA's full member companies are oil and gas explorers and producers active in Australia. APPEA members account for an estimated 98 per cent of the nation's petroleum production. APPEA also represents more than 170 associate member companies that provide a wide range of goods and services to the upstream oil and gas industry.

APPEA works with Australian governments to help promote the development of the nation's oil and gas resources in a manner that maximises the return to the Australian industry and the community.

APPEA aims to secure regulatory and commercial conditions that enable member companies to operate safely, sustainably, and profitably.

The Association also seeks to increase community and government understanding of the upstream petroleum industry by publishing information about the sector's activities and economic importance to the nation.

APPEA's strategic goals are to:

- Promote excellence in safety, health, environmental performance and community engagement.
- Achieve timely and secure access to resources for exploration and development.
- Facilitate access to capital through a regulatory framework that supports investment and industry productivity.
- Enable access to domestic and international markets on globally competitive terms without distortionary and interventionist policies.
- Facilitate the implementation of best practices and core values among members.