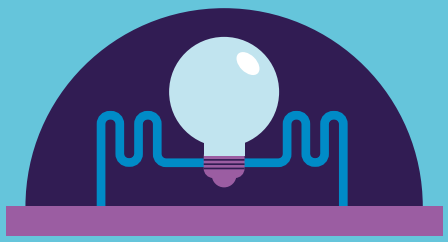
Find out more about...
Shale Gas

Did you know?

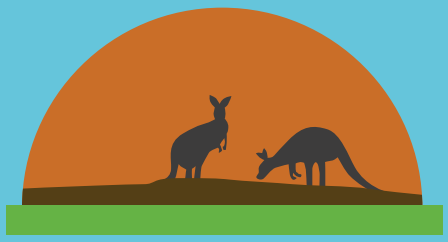
Shale gas is simply natural gas, composed mostly of methane. It was first commercially produced in the US in 1821.[1]



Hydraulic fracturing is used regularly in shale gas wells to increase the flow of gas from the shale reservoir.

Unconventional energy supports more than 2.7 million American jobs.[2]

By 2035, 46% of the United States' natural gas supply will come from shale gas.[3]



It is estimated that Australia has up to 396 trillion cubic feet in shale gas resources, equivalent to about 185 years of total Australian gas production. [4]

Santos drilled Tanumbirini-1 in the Northern Territory in 2014. This well demonstrated that significant gas resources existed in the Velkerri shales of the McArthur Basin.

+ Shale gas has revolutionised the US economy and cut energy-related emissions to their lowest level since 1991.[5]

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What is shale gas?

Shale gas is natural gas. It is found in fine-grained shales rich in the remains of organic material. Shale gas is odourless, colourless and mostly methane, exactly the same as natural gas used in homes and businesses.

Shale gas was first extracted in the United States in 1821, but it is only in the last decade that advances in technology have made production viable on a large scale. About 15.8 trillion cubic feet of dry natural gas was produced from shale resources in the US in 2016, that's about 60% of total US dry natural gas production in 2016.*

The United States Energy Information Administration has estimated that Australia could have 429 trillion cubic feet of recoverable shale gas, the equivalent of over 200 years of production at current rates.

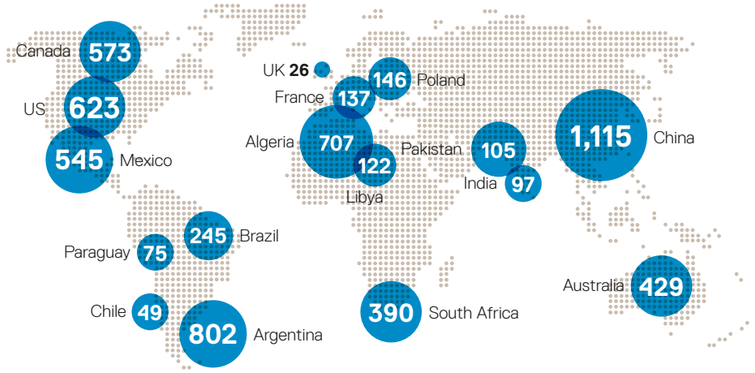
**U.S. Energy Information Administration (EIA)*

Where is shale gas found?

Shale gas was formed over millions of years in fine-grained sediments containing significant quantities of organic remains . Over time gas generated from the organic material as a result of increases in temperature and pressure became trapped within the sedimentary rock . Shale gas formations are typically 2500-4000m below the earth's surface.

In 2011, shale gas exploration began in earnest in the NT, where unconventional resources are now estimated to be a several hundred trillion cubic feet of gas in place. More exploration and appraisal is required to fully determine the economic viability of this resource. However, the areas with most promising shale gas potential, defined by recent well results, are limited to the McArthur Basin and in particular the Greater Beetaloo Basin.

Shale gas resources of the world



A map illustrating the shale gas potential of different countries.
To date only the US has produced significant quantities of shale gas.

Source: US Energy Information Administration

Benefits of shale gas

The benefits of shale gas are much the same as for natural gas in general. Natural gas is widely used in electricity generation. Because it can be quickly started and stopped, natural gas can be used for both baseload and peaking power, and to fill gaps in renewable power generation when wind or sunshine are not available.

Natural gas is also used for cooking, heating houses and buildings and heating water.

In addition, natural gas fuels many industrial operations, including glass and steel foundries and aluminium and nickel smelters. It is also compressed for use as a transport fuel.

Natural gas is also a key ingredient in fertilisers and a wide range of industrial products, including plastics and polymers, textiles, paints and dyes.

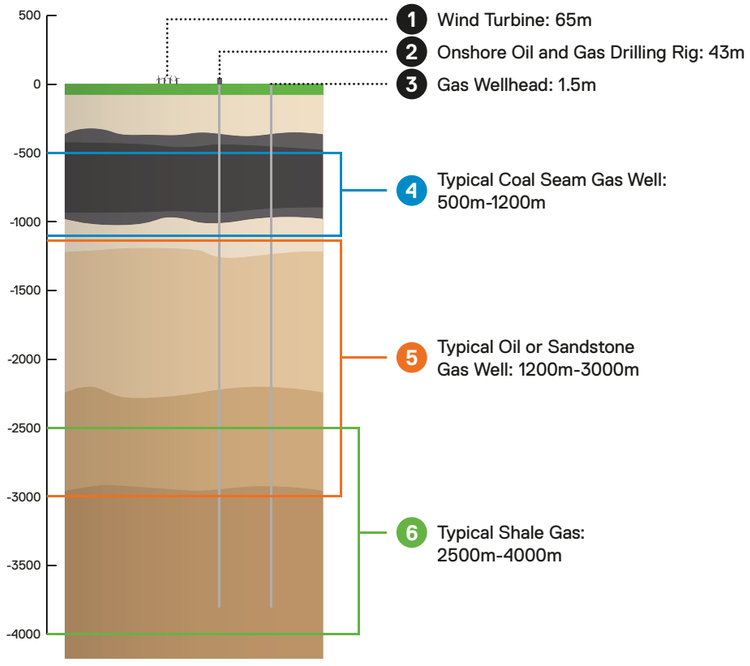
How do you produce shale gas?

To produce shale gas, we drill wells deep underground into the shale. Thesewells are surrounded by steel and concrete to ensure they are separate fromother underground layers, such as water aquifers.

Because the shales are hard and dense, we need to fracture them to create pathways for the gas to escape, using a process called hydraulic fracturing. This involves pumping a mixture of water, sand and a small percentage of chemicals into the shale at pressure. The water and chemicals are then pumped out and the sand remains in the shale, holding open the fractures to allow more gas to be released.

The gas is then pumped through a network of pipes to stations where it is compressed, purified and sent on to customers.

Geology of natural gas



Shale gas and the environment

Natural gas is the cleanest burning fossil fuel available. In fact, when it is used for electricity, it produces nearly half the emissions of coal and uses less water.

Using gas is one way that Australia and the world can reduce carbon emissions. The United States is one of the world's leading producers of shale gas and US energy-related emissions are at their lowest level since 1991. The US government credits this decline to the increased substitution of low cost natural gas (made possible by shale development) for coal.

Santos and shale gas

In 2014 Santos drilled Tanumbirini-1 in the Greater Beetaloo Basin of the McArthur Basin.

The well was drilled to almost 4km and demonstrated that significant quantities of shale gas were present in the Velkerri shales. This was one of the most exciting discoveries made in Australia in recent times.

A significant appraisal program will be required to ensure that this gas can be safely and economically extracted.

If proven to be commercial, the development of Tanumbirini has the potential to provide significant economic benefits to the Northern Territory, while making natural gas available to the east coast gas market, relieving gas shortages.

Industry references

1 aapg.org.

2 America's Unconventional Energy Opportunity, Harvard University & Boston Consulting Group, 2015.

3 https://www.appea.com.au/oil-gas-explained/benefits/the-shale-gas-opportunity/

4 https://www.appea.com.au/oil-gas-explained/benefits/the-shale-gas-opportunity/

5 US Energy Information Administration (EIA), 2016.

Interested in learning more about natural gas?

Visit **santos.com** for more fact sheets on a wide range of gas-related topics.

Santos – An Australian Energy Pioneer

We have safely and sustainably discovered, developed and delivered natural gas to the people of Australia and Asia for more than 60 years.

As an Australian owned and operated business, we work in partnership with local communities, governments and our business partners to make natural gas an affordable and reliable energy solution for all Australians.

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