

Petroleum information sheet



Government of Western Australia
Department of Mines and Petroleum

Natural gas from shale and tight rocks

Department of Mines and Petroleum (DMP) is responsible for regulating extractive industries in Western Australia; ensuring safety, environmental practice and resource management meet relevant legislation, regulations, guidelines and policies that reflect community expectations. DMP regulates onshore petroleum and geothermal activities through the Petroleum and Geothermal Energy Resources Act 1967, the Petroleum Pipelines Act 1969, the Petroleum (Submerged Lands) Act 1982 and associated regulations.



Examples of shale (left) and tight rock.

Natural gas can be extracted from different geological formations and, depending on the type of formation, different extraction methods are required.

This information sheet explains where natural gas can occur and how it is extracted.

How is natural gas extracted?

Typically, natural gas is extracted from permeable rock formations such as carbonates, sandstones and siltstones which can flow freely from the rock formation when tapped by a petroleum well. This is because permeable rock formations have tiny interconnected cavities which enable the gas to flow.

Natural gas can also be found in less permeable rock (typically found 2 to 5 km underground) and is recognised by the type of rock it is extracted from, such as:

- Shale gas – found in shale
- Tight gas – found in compacted sandstone or limestone
- Coal seam gas – found in coal seams

Shale and tight gas requires hydraulic fracture stimulation (fracking) to create fractures (cracks) in the gas-bearing rocks to create a path for the natural gas to flow at commercially viable rates (see information sheet on hydraulic fracture stimulation).

Coal seam gas (not prospective in WA) typically requires dewatering of coal seam beds to relieve the pressure which holds the natural gas tightly to the coal seams. Occasionally hydraulic fracture stimulation is required.

The table below provides information on different types of natural gas resources in Australia and their extraction methods. Figures are estimates only.

Rock type	Gas Extraction Methods			
	Shale	Compacted* sandstone and limestone	Coal seams	Sandstone and limestone
Resource type	Natural gas	Natural gas	Natural gas	Natural gas
Depth below surface	2000 – 5000 metres	2000 – 5000 metres	300 – 1000 metres	1000 – 5000 metres
Production well type	Vertical or Horizontal	Vertical or Horizontal	Vertical	Vertical and Horizontal
Is hydraulic fracture required?	Always	Usually	Occasionally	Rarely
Average number of production wells per well pad	6	6	1	1
Average well pad spacing in producing field	1.5km apart	1.6km apart	0.5 – 1km apart	Varies

* Low permeability and porosity

Petroleum information sheet

Natural gas from shale and tight rocks

How does natural gas form?

Natural gas exists within sedimentary basins. These basins develop over tens of millions of years and gradually fill with sediment and organic matter which gets compacted into rock layers. Within these rock formations, oil and gas develops.

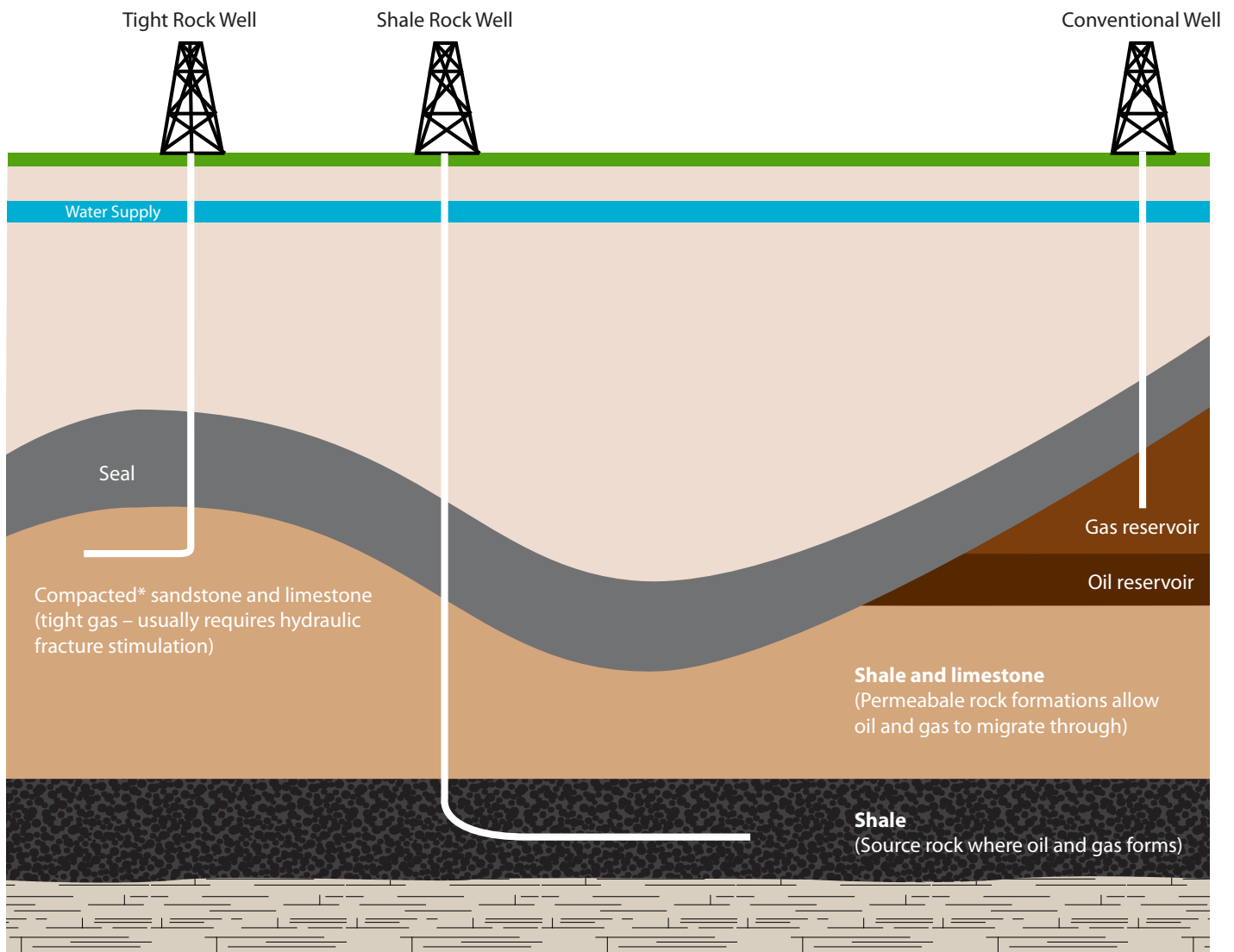
Formations which generate oil and gas are called 'source rocks' and most oil and gas remains trapped within the source rock itself.

However, a small proportion of oil and gas from source rocks migrates towards the surface until it reaches an impermeable rock formation.

This rock formation acts as a natural seal or trap, preventing the oil or gas from rising to the surface.

Petroleum operators extract natural gas by locating underground traps where it has accumulated in one spot.

Advancements in technology have enabled operators to drill deep into the ground and extract natural gas from the source rocks (where oil and gas is formed and trapped) economically.



* Low permeability and porosity

More Information

Department of Mines and Petroleum
Mineral House, 100 Plain Street
East Perth, Western Australia 6004
Tel: +61 8 9222 3333
Email: shaleandtightgas@dmp.wa.gov.au

Website: www.dmp.wa.gov.au/shaleandtightgas