

UCG is not CSG

08 Corporate Series



Underground Coal Gasification (UCG) and Coal Seam Gas (CSG) both rely on coal, but are entirely different energy extraction processes and use different technologies. This information sheet will provide details on just how different UCG is to CSG.

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What is Underground Coal Gasification?

Gasification is the conversion of coal to a gas (called synthesis gas or syngas) through a series of controlled reactions involving heat, pressure, oxygen, coal and water.

UCG is the process of gasifying coal in-situ, that is, where it lies under the ground. This process eliminates the need for mining the coal and processing it through a surface gasification plant. UCG has been utilised in both commercial scale and trial applications since the early 1900s.

UCG uses the process of gasification to produce syngas, which is rich in hydrogen (H_2), carbon monoxide (CO) and methane (CH_4).

Ten years of operations and government required water quality testing at Linc Energy's Chinchilla

Demonstration Facility has proven that a structured approach to UCG provides an impressive track record in regards to groundwater quality management.

What is Coal Seam Gas?

Methane gas can occur naturally within coal. It is bound to the coal through the pressure exerted by groundwater. When the pressure is reduced (by dewatering the coal), the methane disassociates from the coal and flows with the water to wells for collection and piping. The associated water drained from the coal seam, which is usually saline, is either evaporated in ponds or treated through a reverse osmosis process.

How are they different?

The two processes and their products are vastly different. While UCG and CSG both produce gas, the product

gases are very different and applied to different end uses.

The key difference between UCG and CSG relates to the role that water plays in the process. UCG requires that water remains in the coal and adjacent to the underground environment to provide the hydrostatic pressure needed for containment of the process. A relatively small portion of the water takes part in the reaction to produce syngas. Conversely, CSG requires that most of the water be drained from the coal in order to relieve the pressure to produce methane.

CSG produces large volumes of saline wastewater. Salt is persistent in the environment and cannot be broken down. UCG produces lower volumes of water, containing organic compounds that are readily degradable and can be easily treated using existing, commercially available technologies.

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	Underground Coal Gasification (UCG)	Coal Seam Gas (CSG)
Energy source	Coal	Gas in coal
Process description	Gasification, in the presence of pressure from groundwater in the coal, generates syngas that is produced through wells	Extraction of water in the coal to relieve pressure allows naturally occurring methane gas to flow out of the well
Product	Processed gas of primarily hydrogen, carbon monoxide and methane	Methane
Energy recovery	About 85% of energy in the coal	About 5% of energy in the coal
Delivery	Wells and pipelines	Wells and pipelines
Final product	Liquid fuel, chemical feedstock, petrochemicals and plastics, power generation	Liquefied natural gas, liquid fuel, power generation
Footprint	For the same energy value, about half the area of an open cut coal mine and 20 times less than CSG	Variable
Land disturbance	Minimal	Minimal, but over large land area
Waste water	Relatively small quantities of water containing organic compounds (oils)	Large quantities of water containing inorganic compounds (salts)
Persistence of waste	Readily recoverable as a useable by-product and /or degradable	Persistent in the environment
Water treatment process produces	Clean water and CO ₂	Clean water and lower volumes of hyper-saline water (brine)
Regulated in Queensland by	<i>Mineral Resources Act 1989</i> , (i.e. mining)	<i>Petroleum and Gas (Production and Safety) Act 2004</i> , (i.e. oil and gas)

About Linc Energy

Linc Energy is an Australian energy company which listed on the Australian Securities Exchange (ASX) in May 2006 and the OTCQX in December 2007. Through the unique combination of Underground Coal Gasification (UCG) and conventional Fischer-Tropsch technology to produce Gas to Liquids (GTL), Linc Energy is developing a significant energy business based on the production of cleaner energy solutions for the future.

Related information sheets

[About Linc Energy](#)

[Overview of Underground Coal Gasification](#)

[UCG Explained](#)

[UCG and the Environment](#)

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