

The facts about EVOL LNG



What is LNG?

LNG is a clear, colourless, non-toxic liquid that is produced when natural gas is cooled to -161°C at atmospheric pressure.

Being a liquid, LNG has 600 times the energy density of natural gas and three times the energy density of compressed natural gas (CNG). LNG is therefore the most cost efficient method of transporting natural gas to customer locations where natural gas pipelines are not present.

LNG is usually vapourised or 'reconverted' back to natural gas (or CNG) at the final point of consumption, where it is used as a fuel source in any application where natural gas is used.

How is LNG (or CNG) used?

- Power generation;
- Domestic applications – heating & cooking;
- Process heat for industrial applications; and
- As a transport fuel for:
 - heavy and medium duty vehicles;
 - light duty vehicles (including buses, taxis, passenger cars, light trucks, forklifts)
 - marine applications; and
 - locomotives.

Why use LNG?

- **Lower fuel costs** – Natural gas is an indigenous source of energy that is found throughout Australia. Being locally produced, and in some cases a by-product of the petroleum industry, natural gas costs are typically lower than other forms of energy on a like for like basis. Therefore LNG has the potential to yield fuel cost savings for fleets that choose to consider this growing fuel type.

Further, unlike traditional transport fuels like diesel LNG price movements are less volatile and move in line with natural gas contracts, which tend to move quarterly in arrears.

- **Improved air quality** – Natural gas is regarded as the cleanest burning fossil fuel. When used in modern truck engines, LNG can produce significantly less PM and Nitrogen Oxides than equivalent diesel engines.
- **Reduced Greenhouse Gas production** – Australian Government sponsored testing highlighted that an ADR80/02 15-Litre LNG engine produced 25% less greenhouse gas emissions ($\text{CO}_2\text{-e}$) than the equivalent diesel engine. Therefore, use of LNG can make a contribution towards a reduced carbon footprint and may help fleets when the proposed Carbon Emissions Trading Scheme is introduced.
- **Less noise** – natural gas vehicles are noticeably quieter to operate when compared to equivalent diesel powered vehicles.
- **Secure supply** – Australia has an abundant supply of natural gas, with recent estimates indicating more than 100 years at projected demand rates.
- **Proven** – In Australia alone there is in excess of 200 trucks operating on LNG, along with a number of remote power stations taking advantage of this alternative fuel.

Worldwide, the number of natural gas vehicles has doubled in the past five years, and its use in power generation continues to grow at a rapid rate.



Fuel type	Storage Temperature (degrees Celsius)	Vehicle Tank Pressure	Fuel density (compared to pipeline natural gas)
LNG	-130 to -161	0 bar to ~6 bar	600x
CNG	Atmospheric	~200 bar	200x

What are the benefits of LNG over CNG?

The difference between LNG and CNG is the method of storage and the fuel density. The table above outlines key technical differences between the two.

LNG is often preferred over CNG because the higher fuel density increases the range a vehicle can travel, and from a safety perspective the significantly lower storage pressure makes LNG safer to store.

It should be highlighted that LNG can easily be converted to CNG (usually called L-CNG). In this application LNG and CNG can simultaneously be dispensed from the one refuelling location.

A further benefit is that the LNG refuelling station can be located on any site, whereas a CNG refuelling station must be located adjacent to a natural gas pipeline.

Storage and transport

By liquefying natural gas, its volume is reduced approximately 600 times. This makes it easier and cheaper to transport over long distances and to store it in large quantities.

LNG is stored in twin skinned insulated storage vessels that are built to specifically hold LNG (including vehicle fuel tanks). Essentially LNG storage tanks are larger versions of a typical “thermos” flask. They are a tank within a tank, and a vacuum is maintained within the space between the two vessels. They are inherently very strong and are built to strict international codes and standards.

The LNG industry in Australia

LNG has been produced worldwide for over fifty years. Thanks to technological advances it is now produced, transported and stored at a relatively low cost, increasing the market for this product to include the industrial and heavy vehicle market segments.

Australia is currently the world’s fifth largest producer of LNG. Volumes are expected to increase with the commissioning of the coal seam methane based LNG projects proposed in Queensland.

Increased gas use could make a much larger contribution to reducing Australia’s greenhouse gas emissions, at the same time generating substantial economic benefits, energy diversity and security.

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