

# Glossary of Terms, Commonly used for Natural Gas Projects

**APPEA**

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

**Associated gas**

Natural gas produced in association with crude oil.

**Bcf**

See billion cubic feet.

**Bcm**

See billion cubic meters.

**Billion cubic feet**

A natural gas industry term for the amount of gas in a field's reserves or an amount of gas produced and moved to market daily, monthly or annually. A standard cubic foot of natural gas is the amount of gas within a cubic foot at 60 degrees Fahrenheit and at atmospheric pressure (about 14.7 pounds per square inch).

**Billion cubic meters**

The natural gas industry's metric term — mainly used outside North America — for the amount of gas in a field's reserves or an amount of gas produced and moved to market daily, monthly or annually. A standard cubic meter of natural gas is the amount of gas within a cubic meter at 59 degrees Fahrenheit and pressurized at 100 kilopascals (about 14.5 pounds per square inch). A cubic meter of gas equals 35.3 cubic feet. See billion cubic feet.

**Boiling point**

The temperature above which a liquid becomes a vapour, and below which a vapour becomes a liquid. For example, the boiling point of water is 100°C (212 degrees Fahrenheit). For methane, the boiling point is -minus 162°C (minus 260 Fahrenheit), the temperature at or below which it is liquefied natural gas.

**Boil-off gas**

Liquefied natural gas that revaporises in storage tanks or at sea during a tanker voyage.

**BREE**

Bureau of Resources and Energy Economics

**British thermal unit**

The amount of heat needed to raise the temperature of one pound of water one-degree Fahrenheit. Natural gas, especially in the LNG trade, typically is priced in terms of 1 million Btu of energy — roughly 1,000 cubic feet of gas.

**Brownfield**

A project built on a previously developed or partly developed site. For liquefied natural gas, brownfield projects would include expansions of capacity at existing LNG plants, and adding liquefaction and export services to an LNG import terminal. These sites might already have in place utilities, pipeline connections, tanker berths and storage tanks, for example. Brownfield liquefied natural gas developments are less expensive than Greenfield developments.

**Btu**

See British thermal unit.

# Glossary of Terms, Commonly used for Natural Gas Projects

## **Carbon dioxide**

An inert gas often produced with natural gas. Carbon dioxide gets removed in whole or in part from the gas stream before gas heads to market. Gas buyers don't want CO<sub>2</sub> because it doesn't burn. Gas pipelines don't want CO<sub>2</sub> because it can corrode steel. Liquefied natural gas makers don't want CO<sub>2</sub> because before the methane cools into a liquid, the carbon dioxide would freeze into a solid (think dry ice) and possibly damage liquefaction equipment. See gas treatment plant.

## **CIF**

See cost, insurance and freight.

## **CNG**

See compressed natural gas.

## **CO<sub>2</sub>**

See Carbon dioxide.

## **CO<sub>2</sub> emissions**

Carbon dioxide emissions are those stemming from the burning of fossil fuels and the manufacture of cement.

## **CO<sub>2</sub>-e**

Carbon dioxide equivalent is a measure used to compare the emissions from various greenhouse gases based upon their global warming potential and expressed in terms of their relative magnitude, compared to that of carbon dioxide emissions.

## **Combined-cycle gas plant**

A power plant that uses natural gas turbines to generate electricity and uses exhaust heat from the gas turbines to make steam that generates more electricity via a steam turbine. The higher efficiency of these plants compared to straight coal or gas-fired generation has helped natural gas catch on as a power plant fuel in recent years.

## **Compressed natural gas**

Known as CNG. Natural gas that has been compressed under high pressure, typically to between 3,000 to 3,600 pounds per square inch, to make it more compact to store. For some vehicles, particularly city transit buses, CNG is an alternative fuel to gasoline or diesel. Compressed natural gas occupies about 1/100<sup>th</sup> of the volume of natural gas.

## **Compressor station**

A facility that pressurizes natural gas to provide the energy the gas needs to move through a pipeline to its next destination, such as another compressor station. Compression also allows the pipeline operator to put more gas into the line.

## **Condensate**

A high-Btu component of natural gas that changes from vapour to liquid with a change of temperature and pressure during production. Condensate commonly is a mixture of heavier gas liquids, sometimes with lighter gas liquids such as ethane or propane. The presence of condensate, can complicate production. If production changes the reservoir pressure enough so that the condensates become liquid inside the reservoir rather than later, smaller amounts of hydrocarbons will be recovered.

## **Conventional gas**

A gas reservoir that usually is more profitable to produce than "unconventional" shale gas or coal-bed methane. The gas has migrated from its source rock and is trapped in abundance below a sealing strata of rock. It can flow under pressure relatively easily to a well drilled into the reservoir. See also unconventional gas.

## Glossary of Terms, Commonly used for Natural Gas Projects

**Cost, insurance and freight**

A sales-contract term meaning that the LNG sales price covers the cost of natural gas, insurance and shipping to its destination.

**Coal Seam Gas**

Known as CSG, It is natural gas, trapped in underground coal seams by water and ground pressure

**CSG**

See Coal Seam Gas.

**Cubic meter of LNG (liquid cubic meter)**

The capacities of LNG tankers and storage tanks are reported in terms of liquid cubic meters. One liquid cubic meter of LNG equals about 585 cubic meters of vaporous gas, or about 20,600 cubic feet of vaporous gas. An average-sized LNG tanker in international trade has a capacity of about 150,000 cubic meters of LNG, the equivalent of about 3 billion cubic feet of vaporous gas.

**DGE**

Diesel gallon equivalent.

**Diesel Litre Equivalent**

Is the amount of alternative fuel it takes to equal the energy content of one liquid litre of diesel. DLE allows consumers to compare the energy content of competing fuels against a commonly known fuel such as diesel.

**DLE**

Diesel Litre Equivalent.

**Dry gas**

Natural gas either lacking gas liquids, water and inert components such as carbon dioxide, or for which the liquids, water and inerts have been removed. Methane is dry gas.

**EDR**

Economic Demonstrated Resources

**EIA**

Energy Information Administration

**Engineering, procurement and construction**

An agreement between a developer and a contractor that covers work through construction. Separate EPC contracts might cover different parts of an LNG project, such as one for a gas treatment plant, another for a pipeline and a third for an LNG plant.

**EPC**

See engineering, procurement and construction.

**Ethane**

The simplest natural gas liquid found in a natural gas stream. Ethane has more carbon and hydrogen atoms than methane - the form of natural gas piped to industry and power plants, but fewer carbon and hydrogen atoms than propane, butane and heavier gas liquids. Ethane will change from vapour to liquid at temperatures below minus 126 degrees Fahrenheit or at pressures above about 800 pounds per square inch. Ethane is a petrochemical-industry feedstock used in producing plastics, anti-freeze and detergents, among other products.

**FEED**

See front-end engineering and design.

**Feedstock gas, or feed gas**

Gas that is used as the raw material for a liquefied natural gas plant or for a petrochemical plant.

## Glossary of Terms, Commonly used for Natural Gas Projects

**FID**

See final investment decision.

**Final investment decision**

A decision by an LNG project developer to go ahead and build the project. This step typically occurs after detailed design and engineering is finalized, financing has been arranged and long-term buyers for most of the gas have been secured.

**FLNG**

See floating liquefied natural gas.

**Floating liquefied natural gas**

A form of LNG production where the LNG plant is offshore rather than onshore. This is a new production concept and technology, tried for the first time in the 2010s. FLNG is aimed at bringing to market natural gas reservoirs stranded far from shore that otherwise would go undeveloped, as well as at simplifying environmental and other permitting for a project by moving production offshore. The FLNG vessel would produce, liquefy and store the gas, loading it aboard tankers for delivery to customers.

**Floating storage and regasification unit**

An LNG receiving terminal located offshore, typically close to shore. The LNG is received, stored and warmed back into a vapour then piped ashore. Sometimes FSRUs can be less expensive to build and faster to permit than an onshore LNG receiving terminals.

**Front-end engineering and design**

The stage where the detailed design and environmental work is done so that a project developer can make a final investment decision and let the contract for engineering, procurement and construction.

**FSRU**

See floating storage and regasification unit.

**Gas-to-liquids**

A highly technical and capital intensive operation in which methane is processed into such products as low-sulphur diesel, jet fuel and heating oil that typically are refined from crude oil.

**Gas treatment plant**

A plant, usually located near a gas field, that cleanses raw produced gas of water, carbon dioxide and other impurities to prepare the gas for transport to market.

**GHG**

Green House Gas

**Greenfield**

A project that is built on a previously undeveloped or minimally developed site. Compare with *brownfield*.

**GTL**

See gas to liquids.

**GTP**

Gas treatment plant.

**HDV**

Heavy Duty Vehicle

**Heads of agreement**

A non-binding preliminary agreement that outlines main issues to be settled for the sale and purchase of LNG. An HOA guides both parties in negotiating a final sales and purchase agreement.

## Glossary of Terms, Commonly used for Natural Gas Projects

**Henry Hub**

A major gas pipeline intersection in Erath, La., that is the most widely used reference point or benchmark for U.S. natural gas prices. Henry Hub is the New York Mercantile Exchange's official delivery point for its gas futures contracts.

**HOA**

See heads of agreement.

**IEA**

International Energy Agency

**IGU**

International Gas Union

**Liquid Cubic metre**

See Cubic meter of LNG.

**Liquefaction**

An industrial process that cools methane until the temperature hits minus 162 degrees Celsius, at which point the methane changes from vapour to liquid. The liquid methane occupies 1/600<sup>th</sup> the space of vaporous methane, making it more efficient to ship to market on special tankers that keep the methane cold.

**Liquefied natural gas**

A liquid form of methane achieved by the liquefaction process. LNG takes up 1/600<sup>th</sup> the volume of vaporous methane, making it more economical to ship across oceans. At the destination port, the LNG is offloaded into storage and warmed back into a vapour as needed for distribution to homes, businesses or other consumers.

**Liquefied petroleum gas, liquid petroleum gas**

A mixture of two natural gas liquids: propane and butane. LPG is used globally in transportation, commercial and industrial businesses, farming, and residential heating and cooking.

**LNG**

See liquefied natural gas.

**LPG**

See liquefied petroleum gas.

**MARPOL**

International Convention for the Prevention of Pollution from Ships

**Mcf**

One thousand cubic feet of natural gas. For further definition, see billion cubic feet.

**MMcf**

One million cubic feet of natural gas. For further definition, see billion cubic feet.

**Methane**

The simplest hydrocarbon, one carbon atom and four hydrogen atoms. It is the main constituent of natural gas. Its primary use worldwide is as a fuel, for heating and a power-generation.

**Metric ton**

1,000 kilograms, or 2,204.6 pounds. An LNG plant's annual capacity and output — and the capacity of LNG receiving terminals — usually are denoted in units of million metric tons. A metric ton sometimes is called a "tonne." A metric ton differs from a ton or short ton (2,000 pounds), and a long ton (2,240 pounds).

**MHV**

Mine Haulage Vehicle

## Glossary of Terms, Commonly used for Natural Gas Projects

### Million tonnes per annum

One million metric tons of LNG a year, a standard unit used to describe an LNG export plant or receiving terminal's capacity. One million metric tons of LNG equals 48.7 billion cubic feet of natural gas once the LNG is converted back into a vapour. For example, a 15 million tonne LNG plant could liquefy the equivalent of 730 billion cubic feet of natural gas each year, or an average of 2 Bcf a day.

### MLNG

Mobile LNG Pty Ltd

### MPF

Major Project Facilitation

### Mtpa

Million tonnes per annum.

### Natural gas

A naturally occurring mixture of combustible hydrocarbons and inert non-hydrocarbons, existing as vapours or as solution in crude oil, inside underground reservoirs. The main hydrocarbon present typically is methane, but ethane, propane, butane and other natural gas liquids also can be present in smaller volumes. The non-hydrocarbon molecules can include carbon dioxide, hydrogen sulphide, nitrogen and helium.

### Natural gas liquids

Ethane, propane, butane, pentane and other liquid hydrocarbons extracted from field gas. Each of these has its own market.

### NGV

Natural gas Vehicle

### Off-take

The acquisition and removal of gas from a pipeline or LNG plant. For example, the pipeline for the producer- would feature a take points where utilities, mines or other larger-volume buyers could obtain gas for local use.

### Petajoule

One petajoule equals 1 000 000 000 000 000 joules (10 to the power 15).

One petajoule equals 31.60 million m<sup>3</sup> of natural gas.

### Petrochemicals

Chemicals made from natural gas or oil. While most petroleum products are used for energy, a small percentage of gas and oil gets processed into chemicals used in making many thousands of products, from plastics to automobile parts, clothing, furniture and on and on.

### Petrochemicals feedstock

The raw materials derived from natural gas that the petrochemical industry uses to make its products. For example, methane can be processed to make ammonia used in fertilizers and medicines, and ethane can be processed to make polyethylene used in plastics and insulation.

### Pre-FEED

Pre-front-end engineering and design is an early stage in which the developer decides what kind of project might be undertaken and does preliminary engineering and marketing work to get a sense of the project's economics. See also front-end engineering and design.

### Proved reserves

The estimated quantities of natural gas or oil that geological and engineering data demonstrate with reasonable certainty to be recoverable from known reservoirs under existing economic and operating conditions

## Glossary of Terms, Commonly used for Natural Gas Projects

### Refrigerants

Substances used to lower the temperature of vaporous methane — through a series of cycles — until the methane temperature reaches minus 260 degrees Fahrenheit, at which point it liquefies and becomes LNG. Many varieties of refrigerants can be used, from ethane and propane to such non-flammable elements as nitrogen.

### Regasification

The warming of LNG back into a vapour so that it can be piped to its ultimate users.

### Regasification plant

A plant at an LNG receiving terminal that retrieves LNG from storage tanks and warms it back into a vapour for delivery to a pipeline system.

### Rich gas

Natural gas that contains more than trace amounts of such gas liquids as ethane, propane, butane and pentane. Also known as "wet gas" because of the presence of these liquids. Rich gas has a higher Btu content than dry gas.

### RPG

Remote Power Generation

### Sales and purchase agreement (SPA)

A contract between a seller and buyer for a specified quantity of LNG, delivered over a specified period at a specified price. See also heads of agreement.

### Tariff

A fee charged for a service provided to get natural gas to market. For example, a pipeline tariff is the fee the pipeline owner charges for shipping gas through the line. In the LNG industry, other such fees — sometimes called tariffs — can be charged for liquefaction, regasification, shipping and port services.

### Tcf

Trillion cubic feet.

### Tcm

Trillion cubic meters.

### Tonne

A metric ton, or 2,204.6 pounds.

### Train (liquefaction train)

An LNG production unit at an export terminal. Each train can take feedstock gas and chill it to minus 260 Fahrenheit to make LNG. Most LNG terminals have more than one train operating at the same time, each producing a stream of LNG.

### Trillion cubic feet

A natural gas industry term for the amount of gas in a field's reserves or an amount of gas produced or consumed, usually on an annual basis. A standard cubic foot of natural gas is the amount of gas within a cubic foot at 60 degrees Fahrenheit and at atmospheric pressure (about 14.7 pounds per square inch). See also trillion cubic meters.

### Trillion cubic meters

A natural gas industry term for the amount of gas in a field's reserves. A standard cubic meter of natural gas is the amount of gas within a cubic meter at 59 degrees Fahrenheit and pressurized at 100 kilopascals (about 14.5 pounds per square inch). A cubic meter of gas equals 35.3 cubic feet. See also trillion cubic feet.

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### **Unconventional gas**

Natural gas that is harder and more expensive to produce than conventional gas because it is not concentrated in discrete reservoirs but rather spread over vast areas, often in rock layers that are relatively non-porous and non-permeable so that the gas doesn't flow to wells as freely. Shale gas and coal-bed methane are examples of unconventional gas. New technologies have been developed and refined to improve the economics of producing from unconventional plays; these include horizontal drilling to expose more of the play to an individual well and hydraulic fracturing, or fracking, to blast open the rock so that more gas flows to a well.

### **Wet gas**

Natural gas that contains more than trace amounts of such gas liquids as ethane, propane, butane and pentane. Also known as "rich gas." See also dry gas.

### **ACKNOWLEDGEMENT:**

The above list was produced in reference to;

Energy Information Administration      <http://www.eia.gov/tools/glossary/?id=natural%20gas>

Australian Petroleum Production & Exploration Association      <http://www.appea.com.au/i>