ENERGY TRANSFER

PROPERTIES AND CHARACTERISTICS OF LNG

WHAT IS LNG?

Liquefied natural gas (LNG) is simply natural gas which has been reduced to a liquid state by cooling it to minus 260°F (minus 162°C). The transformation to a liquid is accompanied by a volume reduction of approximately 600 to one.

Thus, one LNG tanker can transport enough LNG to equal 600 tankers carrying natural gas at atmospheric pressure and temperature.

Once loaded abroad specially designed tankers, LNG is maintained in a liquid state by highly efficient insulation which surrounds the cargo compartment. However, since no insulation system is perfect, a small amount of LNG vaporizes or "boils-off" during transit. This boil–off helps to auto-refrigerate the remaining LNG, thus keeping it in its liquid state. Boil-off is also used to supplement bunker oil as fuel for the tankers.

Upon arrival at the receiving facility, LNG is transferred into specially designed storage tanks where it is stored as a liquid at near atmospheric pressure and minus 260°F (minus 162°) temperature. The LNG remains in storage until it is demanded for redelivery. At that time, it is pumped from the tanks and subjected to both heat and pressure to return it to a gaseous state for transportation by pipeline.

The small amount of boil-off that occurs during storage is used as fuel or combined with the facility's daily send out.

PROPERTIES OF LNG

Extremely low temperature-minus 260° (minus 162°)

LNG will float on water–weight is about 29 pounds per cubic foot-slightly less than half that of water

Odorless and colorless–LNG looks like boiling water. When exposed to atmospheric temperatures and pressure, it vaporizes to about 600 times its liquid volume.

LNG is nontoxic

Vapor dissipation–as the vapor warms to minus 160°(minus 107°C), it becomes lighter than air and will dissipate.

LNG is maintained in a liquid state by highly efficient insulation which surrounds the cargo compartment.

LNG CONVERSION FACTORS

LNG

ITEM	1 METRIC TONNE	1 BARREL	1 GALLON	1 CUBIC METER	1 CUBIC FOOT	1 POUND
1 metric tonne - LNG	1	14.04	589.67	2.232	78.827	2,204.60
1 barrel - LNG	0.071	1	42	0.159	5.615	157.1
1 gallon - LNG	0.002	0.024	1	0.004	0.134	3.7
1 cubic meter - LNG	0.448	6.290	264.172	1	35.315	988.0
1 cubic foot - LNG	0.013	0.178	7.482	0.028	1	28.0
1 cubic meter - Gas	0.001	0.010	0.433	0.002	0.058	1.6
1 cubic foot - Gas	0.000	0.000	0.012	0.000	0.002	0.046
1 Mcf - Gas	0.021	0.292	12.266	0.046	1.640	46.0
1 MMBtu - Gas	0.019	0.272	11.402	0.043	1.524	42.7

GAS

ITEM	1 CUBIC METER	1 CUBIC FOOT	1 MMBtu
1 metric tonne - LNG	1,362	48,074	51.70
1 barrel - LNG	96.98	3,424	3.682
1 gallon - LNG	2.309	81.5	0.0877
1 cubic meter - LNG	610	21,537	23.161
1 cubic foot - LNG	17.277	610	0.656
1 cubic meter - Gas	1	35.315	0.0353
1 cubic foot - Gas	0.02832	1	0.001
1 Mcf - Gas	28.323	1,000	1,075
1 MMBtu - Gas	26.316	0.001075	1

ENERGY

1 therm = 100,000Btu

1 therm = 105.5 megajoules

1 therm = 29.31 kWh

1 kWh = .003412 MMBtu

1 MTOE = 43bcf - Gas

1 MJ = .000948 MMBtu

1 kcal = .00000397

OIL	MMBtu/Bbl
No. 2 fuel oil	5.83
No. 6 fuel oil	6.30
30° crude	5.94
32° crude	5.89
34° crude	5.84
36° crude	5.80’

QUICK REFERENCE CONVERSIONS

1 bcm - Gas = .734 Mill MT
1 bcm - Gas = 35.31 bcf - Gas
1 bcm - Gas/yr = 97 MMcf/d
1 Mill MT - LNG = 1.362 bcm - Gas
1 Mill MT - LNG = 48 bcf - Gas
1 bcm - Gas = 46,000,000 lbs. - LNG
1 bcm - Gas = .028 bcm - Gas
1 bcm - Gas = .021 Mill MT - LNG

1 bar = 14.504 psi
1 psi = .069 bar
14.696 psi = 1 atmosphere
C° to F ° F° = (1.8 x C°) + 32
F ° to C° C° = 5/9 x (F° - 32)

1 knot = 1.151 mph
1 mph = .869 knots

FUEL	MMBtu/Bbl	BTU/GAL
LNG	3.7	88,100
Diesel	5.9	140,500
Gasoline	4.6	109,500

Gas/Liquid Ratio: 610

Btu/scf: 1,075 (14.73 Dry)

LNG Density: 448.108 kg/m³