SAFETY DATA SHEET

LIQUIFIED NATURAL GAS

Date: 2015-11-10
No. FDS 001
Version 1.02

1. Product and Company Identification

- **Product Name:** Liquefied Natural Gas
- **Reference:** Safety Data Sheet from 2014-07-03
- **Chemical formula:** CH₄
- **Product Type:** Fuel or fuel supply for various processes
- **Product Use(s):** Mixture of petroleum hydrocarbons
- **Synonym(s):** LNG, liquid natural gas, natural gas in a liquid state
- **Manufacturer:** Energir GNL s.e.c. ou Energir GNL 2013 s.e.c., Energir, LSR Plant
  11201 Boul. Henri-Bourassa Est
  Montreal (Québec) Canada H1C 1H2
  Phone: 514 598 3339

- **Emergency Information:** 1 855 598 8111
- **Web site:** www.energir.com

2. Hazards Identification

- **Product Class:**
  - Category 1: Flammable gas
  - Category 1: Gas under pressure
  - Category 1: Simple Asphyxiant

- **Code:**
  - H220: Contains gas under pressure; may explode if heated
  - H280: Contains gas under pressure; may explode if heated

- **GHS symbol:**

- **Signal word:** DANGER - ATTENTION

- **Hazard statement:**
  - H220: Extremely flammable gas
  - H280: Contains gas under pressure; may explode if heated

- **Precautionary statements:**
  - **General:** N.A.
  - **Prevention:** P202: Do not handle until all safety precautions have been read and understood.
    P210: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
  - **Response:** P377: Leaking gas fire – do not extinguish unless leak can be stopped safely.
    P381: Eliminate all ignition sources if safe to do so.
  - **Storage:** P403: Store in a well ventilated place.
  - **Disposal:** N.A.
  - **Other Hazards Information:** Can displaced the oxygen and quickly cause asphyxiation.
3. Composition/information on ingredients

<table>
<thead>
<tr>
<th>COMPONENTS</th>
<th>CAS #</th>
<th>% (mass)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methane</td>
<td>74-82-8</td>
<td>98.3</td>
</tr>
<tr>
<td>Ethane</td>
<td>74-84-0</td>
<td>1.7</td>
</tr>
</tbody>
</table>

Additional Information Other elementary hydrocarbons may be present as an impurity.

4. First-aid measures

First aid procedures

Eye contact
Show this safety data sheet to the emergency personnel and the attending physician. In case of frostbite or freezing, gently rinse eyes with warm water. **DO NOT RINSE THE EYES WITH HOT WATER.**
Keep the eyelids open wide to allow the liquid to evaporate.
If the person cannot tolerate the light, protect eyes with a bandage or handkerchief.
If the person is unable to tolerate the light, consult a doctor immediately.

Skin contact
Remove contaminated clothing and rinse the affected area under warm water.
The exposed area may be warmed, but **DO NOT USE HOT WATER.**
Consult a doctor immediately in the event of frostbite or blisters.

Inhalation
Move the victim to the fresh air.
If the person is not breathing, call 911 or an ambulance, then administer CPR.
If breathing is difficult, give oxygen.
Consult a doctor immediately.

Ingestion
Rinse mouth and drink water in sips. **DO NOT INDUCE VOMITING.**
Never try to make an unconscious person drink.
Consult a doctor immediately.

Important Symptoms & Health Effects

**SIMPLE ASPHYXIANT:** a physiologically inert gas that exerts its action by displacing oxygen from the air. If the percentage by volume of oxygen falls under 19.5%, there is not enough to maintain oxygen saturation in the blood.

Indication of any immediate medical attention and special treatment needed

Not applicable

5. Fire-fighting measures

Suitable extinguishing media

Do not try to extinguish the fire if the gas leak cannot be stopped.
Dry chemical, powders, high expansion foam, carbon dioxide (CO₂).
Water spray may be used to cool the contents.

Unsuitable extinguishing media

Do not use carbon dioxide, low-expansion foam or a strong water spray directly on the liquefied gas.
Using water or any liquid at room temperature directly on the liquefied gas will instantaneously vaporize the gas.

Dangerous Product Specific Hazards

The vapours may form a flammable mixture with air, which, in case of ignition, may release an explosive force if in an enclosed space.
Risk of RPT (Rapid Phase Transition): the significant difference in temperature between the LNG and a hotter liquid may cause the “almost instantaneous” vaporization of the LNG. The sudden increase in total volume occupied by the LNG may generate a “cold explosion” shock wave (sudden generation of overpressure but without combustion).

Hazardous Combustion Products

Carbon monoxide (CO), Carbon dioxide (CO₂), fumes

Particular Protective Equipment and Precautions for Firefighters

Wear a supplied-air respirator near the leak to avoid any risk of asphyxiation.
Do not try to extinguish the fire if the gas leak cannot be stopped. Intervene at a distance, approaching downwind, if necessary. If needed, use a combustible gas detector (explosimeter).
Establish a security perimeter.
In case of fire, and if it can be done safely, close the gas inlet valve.
The vapours generated during a significant spill of liquefied gas may travel a long way to a distant ignition source and produce a flashback.
6. Accidental release measures

**Personal Precautions, Protective Equipment and Emergency Procedures**
- Activate the Emergency Measures Plan in case of a spill.
- Evacuate non-essential personnel and establish a security perimeter.
- Suppress or control all ignition sources.
- Do not touch the spilled liquid.
- Never respond alone to a significant incident.
- Use only in well-ventilated areas. See also OSHA regulations regarding the handling of this product, including standard 29 CFR 1910.110: Storage and handling of liquefied petroleum gases.

**Environmental precautions**
- Let the gas escape into the atmosphere.
- Do not flush, or allow the LNG to flow, down the drain or into the sewer system. Check if combustible gas is present in the sewers, underground structures and buildings.
- In case of a bottle leak, close the bottle and return it to the supplier.
- In case of significant quantities, consult the regional office of the environmental authority that has jurisdiction.

**Methods and materials for containment and cleaning up**
- Check the condition and characteristics of the container.
- Consider the meteorological conditions (wind speed and direction, temperature, humidity).
- Stay upwind and, if possible, evaluate the direction taken by the product.
- The vapour cloud may be white, but the color dissipates and there is always a risk of fire or explosion.
- Use water spray to disperse vapours.
- Isolate the area until the gas has dispersed.
- Aerate and test the area before entering.

7. Handling and storage

**Secure Handling Precautions**
- Use only in well ventilated zones. See also OSHA regulations for the manipulation of this product, including the 29 CFR 1910.110 standard: Storage and handling of liquefied petroleum gases.
- Handling must conform to the LSST stipulations and its regulations, such as the RSST (in particular sections VII and X), the RSSM and the CSTC.

**Secure Storage Conditions**
- Keep away from naked flames, sparks and excessive temperatures.
- Store only in containers approved for liquid natural gas.
- Storage must conform to the LSST stipulations and its regulations, such as the RSST (in particular sections VII and X), the RSSM and the CSTC. According to the situation, the chapter Building of the Safety code and the CNPI can also apply.

**Incompatible materials**
- This product is incompatible with these substances: air, oxygen, strong oxidizing agents, compounds of chlorine or fluorine, and other halides.

8. Exposure controls/personal protection

<table>
<thead>
<tr>
<th>Control parameters – admissible ROHS value (QC)</th>
<th>NOM CHIMIQUE</th>
<th># CAS</th>
<th>Type</th>
<th>Valeur</th>
<th>Remarque</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Methane</td>
<td>74-82-8</td>
<td></td>
<td></td>
<td>Simple asphyxiant</td>
</tr>
<tr>
<td></td>
<td>Ethane</td>
<td>74-84-0</td>
<td></td>
<td></td>
<td>Simple asphyxiant</td>
</tr>
</tbody>
</table>

**Other Information**
- None known
SAFETY DATA SHEET

LIQUIFIED NATURAL GAS

Appropriate engineering controls N.A.

Personal protective equipment (PPE)

Eye/face protection Wear eye protection if there is a risk of refrigerated liquefied gas splatters. The choice of eye protection, goggles, face shields, etc., depends on the nature of the work to be done and the risk of exposure.

Skin and body protection In case of a risk of contact with refrigerated liquefied gas, wear a face shield and waterproof low-temperature-resistant clothing (apron, cryogenic gloves). Flame-retardant clothing may also be worn, depending on the nature of the work and the risk of fire.

Respiratory protection Wear a supplied-air respirator if the gas concentration in working areas is presenting any risk of asphyxiation. Use a NIOSH / MSHA approved protector with positive air pressure, a respirator with adduction of air or an autonomous respiratory system (ARS) in situations where the content in oxygen atmosphere is deficient or uncertain. Attention: the limits of flammability should be considered during the evaluation of the necessity of exposing the staff to concentrations requiring a respiratory protection.

Refer to OSHA 29 CFR 1910.134, ANSI Z88.2-1992 or to NIOSH Respirator Decision Logic, the CSA Z94.4-93standard process to get more advice about the selection of a respiratory protection equipment.

9. Physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance (form, color)</td>
<td>Liquefied gas (cryogenic fluid)</td>
</tr>
<tr>
<td></td>
<td>Clear liquid</td>
</tr>
<tr>
<td></td>
<td>Cold vapour; white cloud</td>
</tr>
<tr>
<td>Odor</td>
<td>Odourless (or very faint odour)</td>
</tr>
<tr>
<td>Odor threshold</td>
<td>None</td>
</tr>
<tr>
<td>pH</td>
<td>N.A.</td>
</tr>
<tr>
<td>Melting / freezing point</td>
<td>-182.47°C</td>
</tr>
<tr>
<td>Initial boiling point and boiling range</td>
<td>-161.5 °C (1 atm)</td>
</tr>
<tr>
<td>Flash point</td>
<td>-136 °C (methane)</td>
</tr>
<tr>
<td>Evaporation Rate (ether = 1)</td>
<td>N.A.</td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>N.A.</td>
</tr>
<tr>
<td>Upper / lower flammability or explosive</td>
<td>Upper : 15.4% à 25 °C</td>
</tr>
<tr>
<td></td>
<td>Lower : 5.0% à 25 °C</td>
</tr>
<tr>
<td>Vapor pressure</td>
<td>110 KPa</td>
</tr>
<tr>
<td>Vapor density (air = 1)</td>
<td>0.555</td>
</tr>
<tr>
<td>Density (water=1)</td>
<td>0.4415 à -162 °C</td>
</tr>
<tr>
<td>Solubility (in water)</td>
<td>soluble</td>
</tr>
<tr>
<td>Partition coefficient</td>
<td>0.0812</td>
</tr>
<tr>
<td>Auto-ignition</td>
<td>580 °C</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>N.A.</td>
</tr>
<tr>
<td>Viscosity</td>
<td>N.A.</td>
</tr>
<tr>
<td>Specific gravity</td>
<td>N.A.</td>
</tr>
</tbody>
</table>

10. Chemical Stability and Reactivity Information

Reactivity Keep away from sources of ignition and heat, high temperatures, open flames, sparks, welding, static electricity and other ignition sources. Do not smoke.

Chemical stability Stable under normal conditions of use, storage, and transportation.

Hazardous polymerization Hazardous polymerization does not occur.

Conditions to avoid Gaseous methane, within the flammable or explosive limits, can easily ignite if subject to a sufficiently high-energy electrostatic discharge.

Incompatible materials May burn or explode in a confined space when mixed with strong oxidizing agents (peroxide, chlorine, chlorine dioxide, liquid oxygen)

Dangerous decomposition products CO, CO₂, fumes (combustion)
11. Toxicological Information

**Information on the likely routes of exposure**

Inhalation and skin contact. Physiologically inert. Ingestion is not likely to happen during normal industrial use.

**Health effects associated with ingredients**

**Inhalation/Skin/Eyes**

Tissue damage caused by frostbite on contact with liquefied gas. The vapours are not irritants. However, direct contact of the eyes, skin or mucous membranes with the cold vapours or liquid gas may cause frostbite, burns and permanent ocular and skin lesions.

The signs of frostbite are a change in the colour of the skin to grey or white, followed later by blisters. The skin may become inflamed and painful.

The vapours have a narcotic effect. Because of the very rapid rate of evaporation, all the air may be displaced, leading to a risk of asphyxiation.

Methane is a simple asphyxiant. Exposure to very high concentrations of methane may induce asphyxiation since it displaces the oxygen in the air.

The principal symptoms associated with asphyxiation are rapid pulse and respiration, headaches, dizziness, visual problems, mental confusion, impaired coordination, mood changes, muscular weakness, trembling, cyanosis, narcosis, numbness of the extremities, unconsciousness leading to a lesion in the central nervous system that may result in death by anoxia.

The effects of asphyxiation may be felt more rapidly during physical effort since oxygen consumption is increased.

Even though considered non-toxic by inhalation, exposure to high concentrations of LNG may cause a depression of the nervous system (rapid respiration, dizziness, somnolence, headaches—symptoms similar to those of drug use), but without any long-term effects.

People with pre-existing heart, lung and/or blood conditions may have an increased sensitivity to symptoms of asphyxiation.

### Acute Toxicology Data

<table>
<thead>
<tr>
<th>COMPONENTS</th>
<th>CAS</th>
<th>LD₅₀</th>
<th>LC₅₀</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methane</td>
<td>74-82-8</td>
<td>N.A.</td>
<td>35 355 ppm 4 hours (mouse)</td>
</tr>
<tr>
<td>Ethane</td>
<td>74-84-0</td>
<td>N.A.</td>
<td>N.A.</td>
</tr>
</tbody>
</table>

**Skin Corrosion/Irritation**

This product is not irritating, but may cause frostbite on contact with liquefied gas.

**Eye Corrosion/Irritation**

Tissue damage caused by frostbite on contact with liquefied gas. The vapours are not irritants. However, direct contact of the eyes, skin or mucous membranes with the cold vapours or liquid gas may cause frostbite, burns and permanent ocular and skin lesions.

**Skin/Respiratory Sensitization**

No data concerning the respiratory or skin sensitization was found in the consulted documentary sources.

**Specific target organ toxicity**

No data concerning the effect on the target organs was found in the consulted documentary sources.

**Carcinogenicity**

No data concerning the carcinogenic effect was found in the consulted documentary sources (OSHA, ACGIH).

**Reproductive Effects**

No data concerning the reproductive effect was found in the consulted documentary sources.

**Germ Cells Mutagenicity**

No data concerning the in vivo or in vitro mutagenic effect on germ cells from mammals was found in the consulted documentary sources.

12. Ecological Information

**Aquatic Ecotoxicity**

<table>
<thead>
<tr>
<th>Components</th>
<th>CAS</th>
<th>CL₅₀</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methane</td>
<td>74-82-8</td>
<td>N.A.</td>
</tr>
<tr>
<td>Ethane</td>
<td>74-84-0</td>
<td>N.A.</td>
</tr>
</tbody>
</table>
Land Ecotoxicity
This material is not harmful to environment.

Persistence and degradability
The product is not persistent in the environment.

Bioaccumulation potential
The product is not bioaccumulating.

Mobility in soil
Not considered mobile.

Other adverse effects
No data available

13. Disposal considerations

Disposal instructions
Let the gas escape into the atmosphere.
In case of a bottle leak, close the bottle and return it to the supplier.

14. Transportation Information

UN Identification
UN 1972

Proper shipping name
NATURAL GAS, REFRIGERATED LIQUID (with high methane content)

Class
2.1

Packing group
N.A.

Environmental Hazards
This material is not harmful to aquatic life or environment.

Additional description & information
N.A.

15. Regulatory Information

Applicable Regulations
Product classification and SDS have been elaborated in accordance to DGR.
This product has been classified according to the criteria of the DGR and the SDS contains all the information required by the DGR.
Act respecting Occupational Health and Safety (AOHS) (CQLR, c. S-2.1)
Regulation respecting Occupational Health and Safety (c. S-2.1, r. 19.01)
The product is controlled according to WHMIS 2015.
In Canada, all ingredients are part of the Domestic Substances List (DSL)

16. Other information

Prepared by
Envirospec for Energir
www.envirospec.qc.ca

SDS history
First edition 2015-11-10 (French)

SDS status
Active

Other information
The information in this data sheet was written based on the best knowledge and the best experience currently available.

Références
ACGIH. Guide to Occupational Exposure Values 2012, Compiled by the American Conference of Governmental Industrial Hygienists (ACGIH)
CANUTEC
CSST. Service du répertoire toxicologique.
GOUVERNEMENT DU QUÉBEC. Règlement sur la santé et la sécurité du travail (c.S-2.1, r.19.01) Update August 1st 2015
Transport Canada, Règlement sur le transport des marchandises dangereuses (RTMD)
SAFETY DATA SHEET

LIQUIFIED NATURAL GAS


U.S. NATIONAL FIRE PROTECTION ASSOCIATION. Standards
- NFPA 77, Standard for Static Electricity
- NFPA 68, Standard on Explosion Protection by Deflagration Venting
- NFPA 69, Standard on Explosion Prevention Systems

Acronyms
- ACGIH: American Conference of Governmental Industrial Hygienists
- AICS: Australian Inventory of Chemical Substances
- CAS: Chemical Abstract Services
- CNPI: National Fire Code of Canada
- CPR: Cardiopulmonary resuscitation
- CSA: Canadian Standardization Association
- CSST: Commission de la santé et sécurité du travail (Occupational Health and Safety Commission, Quebec)
- CSTC: Safety Code for the Construction Industry
- DGR: Dangerous Good Regulation
- DSL: Domestic Substances List (Canada)
- ECL: Existing Chemicals List
- GHS: Globally Harmonised System of Classification and Labelling of Chemicals
- IARC: International Agency for Research on Cancer
- LC: Lethal Concentration
- LD: Lethal Dose
- N.A.: Not Applicable / Not Available
- NFPA: National Fire Protection Association
- NIOSH: National Institute for Occupational Safety and Health
- NTP: National Toxicology Program
- OEL: Occupational Exposure Limit
- ONU: Organisation des Nations Unies
- OSHA: Occupational Safety and Health Administration
- QC: Québec Province, Canada
- REPTOX: CSST Toxicological Directory
- ROHS: Regulation respecting Occupational Health and Safety
- RPC: Chemical Products Regulation
- RSSM: Health and Security Regulation for Mine Industry
- RTMD: Transportation of Dangerous Goods Regulations
- SDS: Safety Data Sheet
- STEL: Short Term Exposure Limit
- TSCA: Toxic Substances Control Act
- TWA: Time Weighted Average
- WHMIS: Workplace Hazardous Materials Information System