

SIRAGA : innovation, environment, safety

We at Siraga we always like to take up technical challenges: innovation, safety and environment are at the heart of our concerns !

INNOVATION AND ENVIRONMENT

Concerned to preserve the environment and offer to future generations a cleaner world, we have decided to invest ourselves in the development of a greener energy source: **the DME**.

This involvement results in the adhesion to the **IDA Association** (International DME Association). As IDA members, we show our ambitions and position clearly as a major actor in the development and the promotion of **the DME**.

Specific characteristics for the environment and benefits for the human make the DME the green and ecologic gas for the future : **the future starts now !**

Benefits for the environment

- No impact on the ozone couch (ODP :0)
- Insignificant impact for the greenhouse effect (GWP : insignificant)
- Quick water evaporation in a open system
- Half-life time in the lower troposphere : 3-30 hours
- Life time in the upper troposphere: from 100 to 150 hours

Benefits for the man

- 5000 ppm in the air : no physiological action
- No skin irritation
- No accumulation in the tissues and organs after inhalation

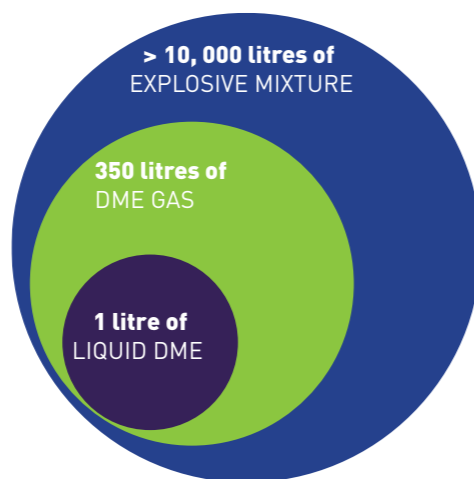


INNOVATION AND SAFETY

Used since long in skin-care industry, DME is a gas with a future for domestic applications, **energy and transport**.

However, being a gas much more demanding than LPG, DME **needs special precautions** and **know-how** during its **handling and filling**.

For example, because of a larger flammability range than that of LPG, DME is a more flammable product. Otherwise, the limit concentration range is three times the range of LPG.



We have considered all these **technical specificities** and are able to offer a revolutionary solution combining **safety, comfort** and **preservation of the environment**. Indeed, in order to comply with requirements of DME filling, our materials and components have undergone tests in rough conditions in independent laboratories.

All those tests and researches have lead to the development of our « DME Ready » solution which complies with each technical constraints.



DMEready[®]
solution in compliance with DME filling requirement

IDA | About

Since 2011 Siraga is member of the IDA...



International DME Association

Established in 2001, The International DME Association (the IDA) serves as the global voice for the DME industry, and works to promote the use of DME as a clean alternative fuel worldwide, to gather and communicate authoritative information about DME, and to coordinate international DME activities and initiatives.

The Association unites those companies most active in the development of DME worldwide, and IDA members come from every sector of the industry, representing a wide range of interests within both the upstream and downstream value chains.

The IDA has a global membership of more than 50 companies, institutions and individuals from Asia, Africa, the Americas, Australia, Europe and the Middle East, involved in the production, distribution and use of DME, and in the research and development of technologies related to its use.

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DMEready[®]
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scan it !

Siraga

DME | What is it?



Clean and Safe

*DME (dimethyl ether) is a clean, colorless gas that is easy to liquefy and transport. It has remarkable potential for use as an **automotive fuel**, for electric **power generation**, and in **domestic applications** such as heating and cooking.

DME can be derived from many sources, including renewable materials (biomass, waste and agricultural products) and fossil fuels (natural gas and coal).

DME has been used for decades in the personal care industry as a benign aerosol propellant, and for the production of ultra-pure glass (DME burns without soot formation), and is now increasingly being exploited for use as a **clean burning alternative to LPG** (liquefied petroleum gas), diesel and gasoline.

Like LPG, DME is gaseous at normal temperature and pressure, but changes to a liquid when subjected to modest pressure or cooling. This easy liquefaction makes DME easy to transport and store. This and other properties, including a high oxygen content, freedom from sulfur or other noxious compounds, and ultra clean combustion make DME a versatile and promising solution in the mixture of clean renewable and low-carbon fuels under consideration worldwide.

DME | How is it Produced ?

DME can be produced from a **variety of abundant sources**, including natural gas, coal, waste from pulp and paper mills, forest products, agricultural by-products, municipal waste and dedicated fuel crops such as switchgrass.

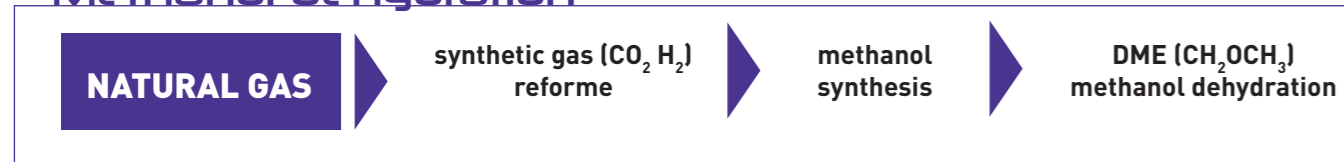
World production today is primarily by means of **methanol dehydration**, but DME can also be manufactured directly from synthesis gas produced by the gasification of coal or biomass, or through natural gas reforming. Among the various processes for chemical conversion of natural gas, direct synthesis of DME is the most efficient.

Production Processes

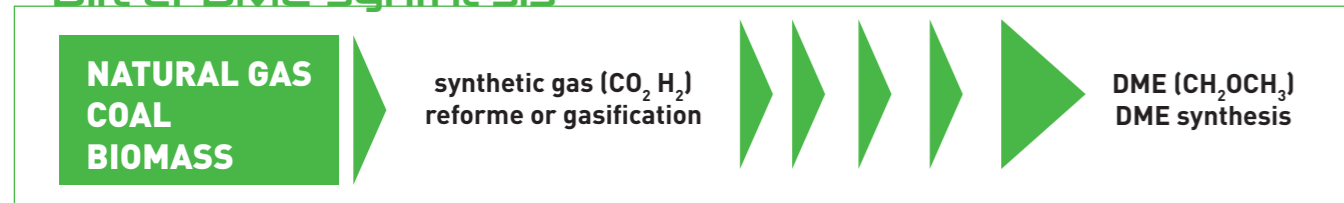
DME can be produced following two process :

- An indirect synthetic method **using the dehydration reaction of methanol**
- A direct synthetic method of producing DME from **natural gas, coal, bed methane and synthetic gas made from coal, biomass....**

Methanol dehydration



Direct DME synthesis



Our solution

DMEReady®

solution in compliance with DME filling requirement

The Siraga's added value lies in our know-how and over all in our equipment design philosophy. That is why all our innovations comply with safety rules, environment preservation and customer protection.

1 Safety

Electrical material : II1G Ex ia certified intrinsically safe equipment, allow to work in total safety directly in "zone 0", and this even in case of 2 faults.

ATEX II 1G category : 2 independent means to guarantee the safety. The use of equipment with II 2G Ex ib type of safety is only authorized in zone 1 and 2.

Mechanical material :

- Limited non-conductive substances
- Limited use of aluminum/magnesium alloys which could, by friction, shocks generate sufficient energy to create ignition.
- Material designed to comply with explosive atmospheres and is IECEx certified.



2 100 % compatible components and materials with DME

Studies and researches lead by our R&D teams, have allowed developing a unique and revolutionary solution in compliance with the DME filling requirement.

Tested in an independent laboratory, we guarantee that all our materials and components are 100 % compatible with the use of the DME gas.

3 Environment

Aware of climatic issue and of the sustainable development, we endeavour non-stop to provide ecological solutions to the market. Here's one of the examples : our filling machine made of about **95% recyclable material**.

And, once more with the objective to act in favor of environment preservation that we have decided to position ourselves on the DME market.



Uses

3 uses are possible with DME

- 1 Domestic Applications
- 2 Power Generation
- 3 Automotive Fuel



1 Domestic Applications

Often described as "synthetic LPG", DME can be blended with LPG (in a proportion of up to 20%) and used for domestic cooking and heating, without modifications to equipment or distribution networks. Growth in DME's use for domestic applications is expected to increase sharply as DME use and blending becomes more widespread within the large, and growing, LPG market - especially in developing countries where portable (bottled) fuel is providing a safer, cleaner and more environmentally benign fuel for cooking and heating.

2 Power Generation

DME has a performance comparable to natural gas when used for the production of electric power, and it has been approved by manufacturers DME is an efficient alternative to other energy sources for medium-sized power plants, especially in isolated or remote locations where it can be difficult to transport natural gas and where the construction of liquefied natural gas (LNG) regasification terminals would not be viable.



3 Automotive Fuel

DME is one of the most promising alternative automotive fuel solutions among the various ultra clean, renewable, and low-carbon fuels under consideration worldwide. DME can be used as fuel in diesel engines, gasoline engines (30% DME / 70% LPG), and gas turbines.

Benefits

DME : 21st Century Energy

