LOGISON

Offer to create a „virtual gas pipeline“ for the accelerated supply of LNG to Slovakia using container transport

Basic data

The transport of Liquefied Natural Gas (**LNG**) is based on its specific characteristics. Liquefaction is carried out by cooling to -163 °C. This reduces its volume by a factor of 600.

For the transport of LNG, **special sea-going ships, LNG river tankers, special wagons, LNG road trailers as well as ISO universal LNG** containers are used. There is currently a shortage of LNG terminals in European seaports, and there is also a small number of river tankers for inland LNG transport. For these reasons, we propose ISO LNG containers as the optimal solution (see Figure 1). The use of ISO containers will create a „virtual pipeline" leading from the supplier to the customer. A similar solution is used for the gas supply of the island of Madeira.

ISO container parameters, 40 feet

Volume: . . . . . **46,05 m³ LNG**
Weight: . . . . . **19,6 t LNG**
Container dead weight: . . . . . 12 t
Total weight of the loaded LNG container: . . . . . 31, 6 t
Volume of gas from one container after vaporisation: . **27 600 m³**

Fig. 1: Standard LNG container of 40 ft length

LNG transport parameters in ISO containers

The transport must be divided into three parts:

1) **Transportation from suitable LNG suppliers** (e.g. Qatar, SA, Egypt, Australia) to the optimal sea port - for Slovakia the port of Constanta. The section will be handled by conventional sea container ships, which will load the already filled LNG containers from the supplier.

2) **Container transport from the seaport to the terminal in Slovakia.**
In the first phase, use of existing container terminals in Slovakia, in the next phase the construction of a new terminal for LNG containers.
For the transport of LNG containers from the seaport Constanta to Slovakia, the existing container ships on the Danube or shuttle container trains can be used. (Figures 2 and 3)

3) **LNG distribution from the container terminal, 3 possible options:**
- **Vaporisation directly into the pipeline network** (assumption in MLC Holíč).
- **Distribution of LNG containers to gas storage facilities.**
- **Distribution of LNG containers to non-connected sites to the gas pipeline network.**

Capacity options of the virtual pipeline

SECTION 1:
Transport from suitable LNG suppliers
There is sufficient capacity on sea container ships and does not constitute a constraint for this section of the virtual pipeline.

SECTION 2:
Container transport from the seaport to the terminal in Slovakia

Transportation A: Container ships of the „Chan" type
(Figure 2)
In the current situation it is possible to deploy 2 container ships of the type „Chan" in a short timespan, for the transportation on the danube waterway. Each has a capacity of 150 40-foot LNG containers (in three layers).

1 ship will carry:
150 containers /40' x 27,600 m³ (volume of gas in 1 container) = **4.14 million m³ of gas.**

Annual volume of gas transported by 1 ship:
82.8 million m³ (20 turnovers per year)

Annual gas volume with 2 ships:
165.6 million m³

Fig.2: Motor freighter „Chan" with container load on the Danube. When loaded with three layers, it carries 150 40'-containers of LNG (300 TEU)

Fig. 3: Train set with containers

Transport B: Additional transport by rail
One rail set can transport 25 containers (40')
for LNG (so far 600 m train limitation)

Capacity of one rail set: 25 x 27,600 m³ = **690,000 m³ of gas**

Annual volume of gas transported by 1 train set:
17.94 million m³ (26 turnovers per year)

Annual volume of gas with 2 train sets: **35.88 million m³**

Summary:
By using existing container vessels on the Danube and reinforcing them with two sets of rail shuttle container trains (both types of transport can be provided by private carriers), LNG container transport to Slovakia can be started in a **relatively short time**. The real capacity of this continental part of the virtual pipeline can offer delivery of **201 480 000 m³ of gas/year** (165.6 million m³ for two ships and 35.88 million m³ by two railway trains).

This volume amounts to about 3.8% of the annual gas consumption in Slovakia (total 5.3 billion m³/year).

SECTION 3:
LNG distribution from the container terminal

Capacity and routing of the so-called „last mile" LNG containers in Slovakia will be determined by the needs of the company SPP.

A cruzial step for the realization of transports „virtual gas pipeline" to Slovakia is timely ensuring the purchase (lease) of 675 conventional 40' ISO LNG containers (600 ships, 75 trains).

Remark:
It is possible to ensure the transport of a much larger volume of LNG if the capacity of the container shipping fleet on the Danube is increased and the capacity of the lines for container trains is improved. **It is easier** to increase the capacity of the Danube shipping fleet, either by transferring a suitable fleet from the Rhine area (see Figure 4) or by ensuring the production of new special container ships suitable for the Danube.
As an illustration, for example, by increasing the shipping fleet from 2 to 10 container vessels, the capacity of the virtual LNG pipeline to Slovakia can be increased **from 3.8% to 19%, or even up to 30% of Slovakia**'s total consumption (depending on the type of higher-capacity seagoing vessel used - Figure 4, which is made possible by the spare capacity of the Danube waterway).

Fig. 4: Motor freighter boat and 3 push barges on the Upper Rhine. This set with a capacity of up to 600 TEU (300 40'-to-LNG containers) is suitable for the Danube.

Conclusion

This document presents a **basic summary of the facts** to make a quick decision on the further detailed elaboration of this very realistic option of transporting gas to Slovakia **from sources outside Russia**. The proposed virtual gas pipeline offers the **possibility of further diversification of sources of strategic raw materials for Slovakia**, including oil. In order to implement it and for the responsible authorities to make the right decision, a detailed „**Feasibility Study**" including the entire transport technology, the exact technological procedures, as well as a calculation of the economic impact of the solution and a comparison of options, should be prepared urgently.

Our company is ready to elaborate a precise and more detailed project of **the solution for short, medium and long term use in a short time**. We are ready to carry out the FS processing at a high professional level not only in terms of transport, but also with the use of our partners, including the most modern elements of the entire technology of transport and transshipment of LNG and other raw materials. **The aim of FS is to offer a comprehensive solution of our „virtual pipeline" technology not only for Slovakia but also for other Central European countries**.

Map of the possible „virtuál gas pipeline" route.

Supplier (Qatar variant) - Constanta – Slovakia