THE DEPLOYMENT OF LNG IN CONTINENTAL TRANSPORTS A TOOL FOR GREEN INTEGRATION OF EUROPEAN PORTS-CITIES?

Antoine Beyer

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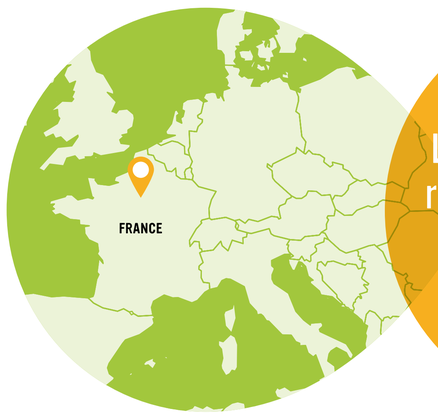
RHINE MEUSE DELTA, FRANCE



LNG will play a central role in future propulsion fuel for maritime transports

LNG fuel technology can be considered as networking tool for European ports

Liquefied Natural Gas (LNG) is considered as a transitional fuel towards low-emission services. The solution is technically mature and economically feasible for heavy trucks, inland barges and SSS-vessels.

This research tries to explore the potential impacts of the LNG technologies for further territorial developments in energy shift and technological "trans- and cross-fertilization".

LNG, THE CARGO THAT BECAME A FUEL

- A solution for transport purpose: at -163°C, methane occupies only 1/600 of its volume.
- Natural Gas: a huge supply (worldwide 200 years gas-supply /50 years oil-supply) - cheaper than oil.
- A greener energy compared to other conventional fuels: -100% Sox, -80% Nox, -80% fine particles, -20% CO2 less than heavy fuel oil.
- Maritime transport industry is committed to reducing its emissions of air pollutants and greenhouse gases cf. *Low Sulphur European directive* (2012/33/UE) at the beginning of 2015 in ECA (Emission Controlled Areas) the English Channel, the North Sea and Baltic.
- Increasing infrastructure availability: expansion in Western Europe for supplying lower emissive power plants, in Eastern Europe for more independence vis-à-vis Russian pipe-diplomacy.
- The transport sector: direct advantage from the LNG at the same time cheap fuel and cargo.

But ...

- Oil prices dropped after 2008, so that the replacement of the conventional motor engines is currently too expansive to be implemented at large scale.
- Transport firms are skeptical regarding the high investment in adapted material, although convinced by the lower exploitation costs.
- LGN acceptance lies on more demanding environmental legislation

Push effect can be gained by public subsidies, offering a wider continental coverage and a long term perspective for it investment return.

- The Chinese government has firmly committed itself to sustain its development and more than 1500 LNG stations have been opened across the country.
- The United States had nearly 6,000 LNG trucks and 209 LNG fuel stations in 2013.
- The European Union supports major projects :
  - for the Inland waterways supplies (LNG Masterplan for Rhine, Main, Danube)
  - *LNG Blue corridors* along the Core Trans European Network infrastructures (fueling availability by 2020 for sea ports and by 2025 for river ports).

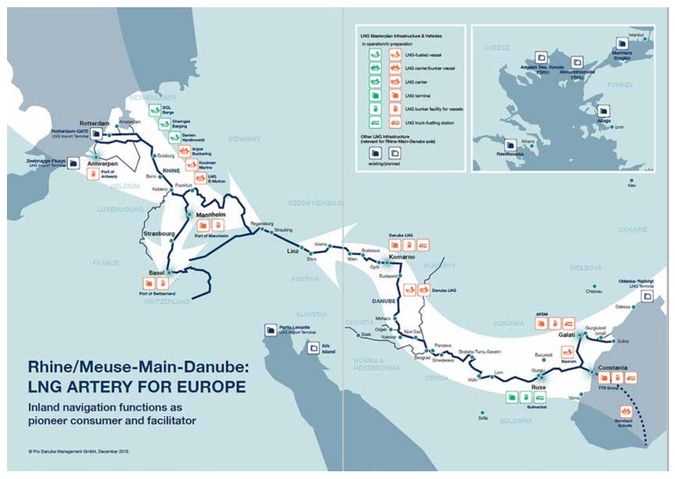
LNG DISTRIBUTION HAS TO RELY ON A TERRITORIAL MESHED OFFER TO CREATE A FUEL MARKET

- To be used efficiently as fuel methane has to remain liquid: economically and environmentally its regasification is a non-sense (10% loss in the operation).
- Huge terminal have to be adapted to store and handle lesser volumes: a LNG tanker carries 150 000m3 vs 1000 m3 needed by a cargo fueled by LNG.
- No international or even European rules and norms are adopted yet.

A wide hierarchal distribution system has to be conceived from the major ports (large scale LNG) to secondary installations (medium scale LNG) and lastly to temporary stations with portable tanks (small scale LNG) that have to be developed within major terminals and along the transport corridors.

Secondary seaports and inland facilities play a determinant role in the system by allowing cheap and secure transport for further continental stations;

National plans already undertaken in the Netherlands, in Spain and in advanced discussions in Germany, Belgium and France. Scandinavian countries have adapted their domestic fleets and ports with the new system, especially Norway where 30 secondary ports are by now offering LNG refueling capacities.



CONCLUSION: WHAT CAN WE LEARN?

For port-cities, LNG can present local advantages

- In the port area itself, LNG helps reducing the emission for local navigation and for the adapted handling and lifting vehicles.
- It may supply local demand for industrial plants that are not connected to existing pipes.
- Mutualizing the resource benefits urban and regional actors as the flow consolidation of transport by barge or train is safer and cheaper than road used for smaller quantities. Alternatives to pipe give more room for commercial negotiation.
- LNG is a valuable alternative for urban heavy vehicles: buses and freight delivery trucks. The local legislation in favor of Low Emission is expected to become more rigorous in the coming years and should foster among other the LNG technology.
- For the gas network companies the new offer makes it possible to rebalance more easily the pressure at the end of the pipes.
- The technical expertise in gas may also benefit to global energy transition in urban areas as the infrastructure can be used as means of storing intermittent sources (wind - sun) of energy by compressing or liquefying or valorizing biogas.
- Locally synergies may develop. In some places, they already exist in an industrial ecology perspective (energy exchange).

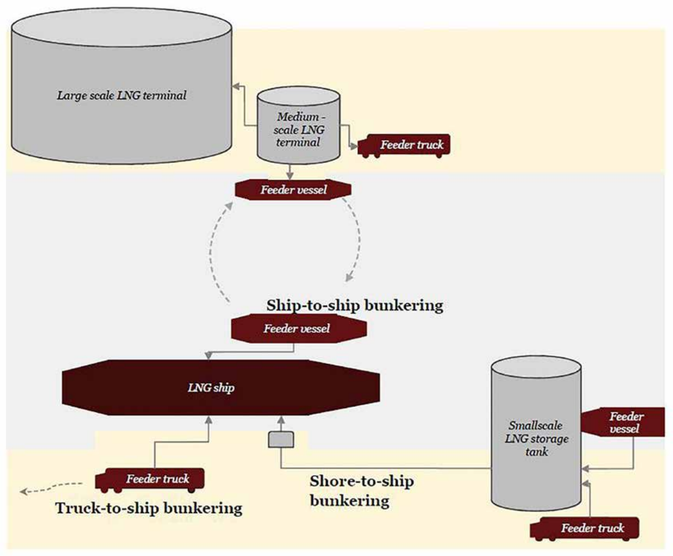
But ...

- The industrial hazards introduced by handling highly inflammable gas may be taken into account in the location choice in the port area as well as in the neighboring urban spaces.
- Their development may be rejected by a part of the public opinion.
- The prevention of risks may lead to segregation of flows to access the port areas.

LNG – A TOOL FOR A GREENER CITY?

LNG will play a central role in future propulsion fuel for maritime transports. Sectoral applications may be developed for continental and urban purposes. As such, the LNG fuel technology can be considered as networking tool for European ports. It has to be understood from a technical and economic point of view as well as from an integrated territorial project.

Figure B1: Bunker solutions for ships (illustrative)



Source: DMA 2012, PwC analysis, PwC interviews

SOURCES

BURDEAU J. (2015), "Le gaz naturel liquéfié, un carburant maritime", Annales des mines - Réalités industrielles, Nov. 2015, pp. 44 -48.

DANISH MARITIME AUTHORITY (2012). North European LNG Infrastructure Project. A feasibility study for an LNG filling station infrastructure and test of recommendations, Copenhagen, 234 p.

EUROPEAN COMMISSION (2012), LNG Masterplan forRhine-Main-Danube Masterplan for introduction of LNG as fueland as cargo for inland navigation 2012-EU-18067-S, Bruxelles, 70 p.

GERMAN ENERGY AGENCY (2014), LNG in Germany: Liquefied Natural Gas and Renewable Methane in Heavy-Duty Road Transport.What it can deliver and how the policy framework should be geared towards market entry. Berlin, 28 p.

MALER P., ERHARDT J.-B. (coord) (2015), Coordination des actions ministérielles pour l'usage du gaz naturel liquéfié (GNL) comme carburant. Le GNL, composante européenne de la transition énergétique du transport routier de marchandises. CGEDD. Rapport n° 008091-03, Paris, 108 p.

ROZMARYNOWSKA M. (2010). "LGN in the Baltic sea region, opportunities for the ports", Akademia Morska w Gdyni, nr 67, grudzień 2010, pp. 89 -100.

MORE INFORMATION AND CONTACT:

Antoine Beyer
Sorbonne University Paris and IFSTTAR
antoine.beyer@ifsttar.fr
www.ifsttar.fr