# Liquefied Natural Gas – alternative fuel for transportation expanding into Danube region

## Workshop on Modernization of Danube Vessels Fleet
## Vienna, 18 April 2018

### LNG in the Danube Region

- LNG Masterplan for Rhine-Main-Danube
- LNG for Upper Austria
- Projects in Slovakia
- Projects in Hungary
- Projects in preparation in Romania (Constanta & Galati)



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# LNG Masterplan: Terminals – Deployment & Concepts

## ➢ RHINE REGION ELABORATION OF TECHNICAL DESIGN AND OBTAINING PERMITS

### LNG BUNKER STATION IN THE PORT OF ANTWERP

**Capacity:** 400 $m^3$ of LNG
**Facilities:** storage of LNG and CNG, bunkering inland ships with LNG, fuelling road transport with LNG & CNG
**Investment & operation:** by concessionaire
**Start of operations**: by January 2019

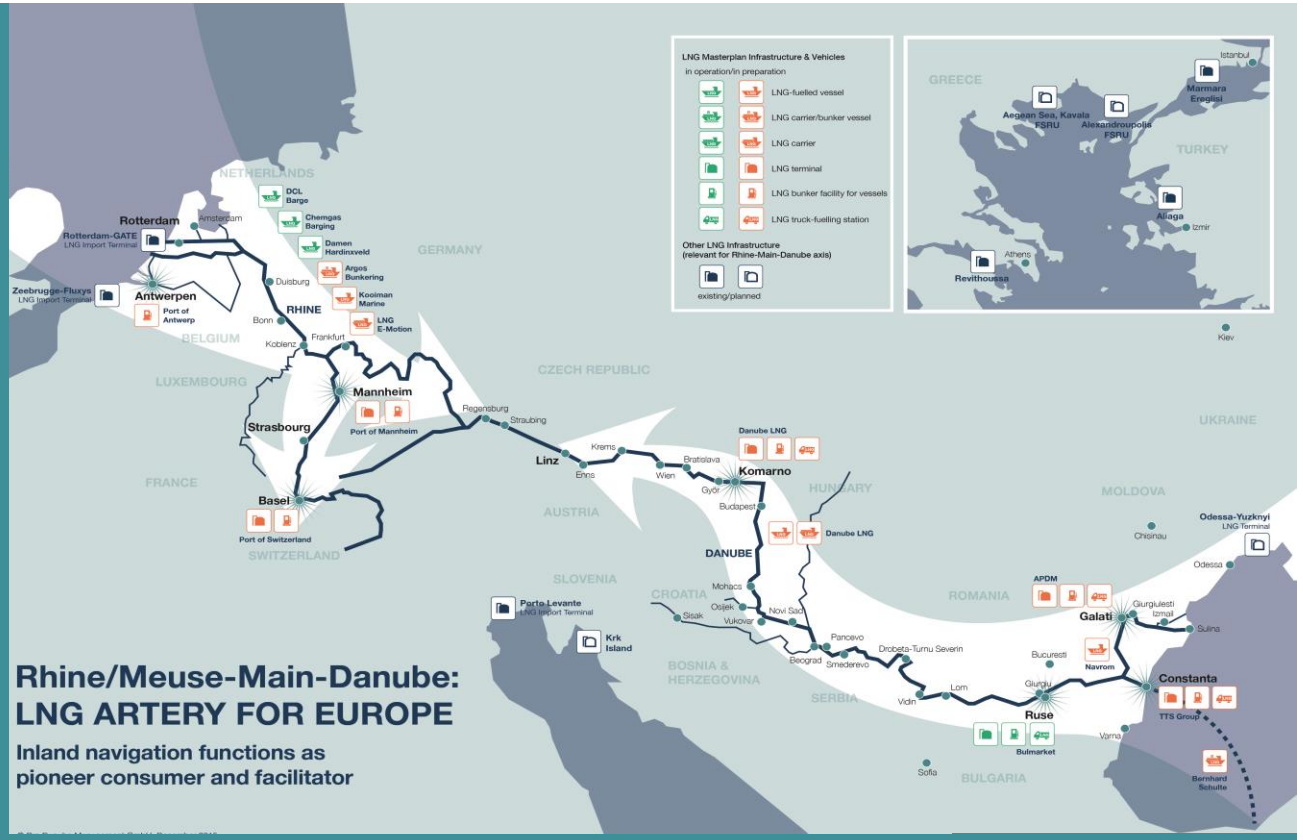
## ➢ RHINE REGION FEASIBILITY STUDIES CHECKING THE OPTIONS

### LNG INFRASTRUCTURE IN THE PORT OF MANNHEIM

**Capacity**: 500 $m^3$ of LNG
**Facilities**: LNG storage, truck fuelling, vessel bunkering
**Estimated investment**: 6-7 MEUR
**Operational costs/year**: 250,000 EUR
Interested investors are welcome

### LNG INFRASTRUCTURE IN THE PORT OF SWITZERLAND

**Capacity**: 1,000 $m^3$ of LNG
**Facilities**: LNG storage, truck fuelling, vessel bunkering
**Estimated investment**: 6-7 MEUR
**Operational costs/year**: 250,000 EUR




## ➢ DANUBE REGION (FEASIBILITY STUDIES & DEPLOYMENT)

### LNG FLOATING TERMINAL IN KOMARNO (SLOVAKIA)

**Size**: 126 x 24 m (L x W). Draught: 2 m
**Capacity**: 12 x 350 $m^3$ of LNG
**Facilities**: LNG storage, vessel bunkering, facilities for other services, e.g. ship waste reception facilities, potable water, etc.

### LNG TERMINAL IN RUSE (BULGARIA)

*Bulmarket DM Ltd.*

**Location:** on the river Danube in the port area in Ruse, on the grounds of former heavy machinery building factory, on an area of 1,000 $m^2$
**Capacity:** 4 vertical tanks of 250 $m^3$ of LNG (total 1,000 $m^3$)
**Facilities**: storage, vessel (un-) loading facility, truck-loading station, truck & vessel fuelling station

### LNG TERMINAL IN GALATI (ROMANIA)

**Capacity**: 4,000 $m^3$ in semi-pressurised tanks with option to increase up to 8,000$m^3$
**Facilities**: LNG storage, truck fuelling, vessel bunkering
**Estimated investment**: 17 MEUR

### SMALL SCALE LNG TERMINAL IN CONSTANTA (ROMANIA)

**Capacity**: 5,000 $m^3$
**Facilities**: LNG storage, (un-) loading of (smaller) seagoing vessels, fuelling of inland vessels and trucks

[www.lngmasterplan.eu](http://www.lngmasterplan.eu)

# LNG PROJECTS IN DANUBE REGION – ONGOING & IN PREPARATION

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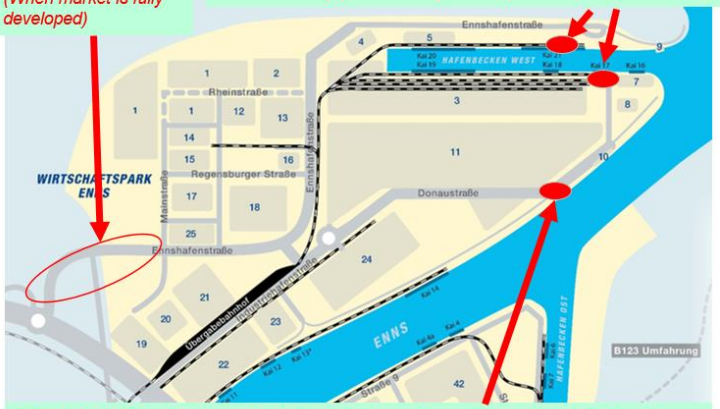
# LNG HUB IN UPPER AUSTRIA

- Exploitation of (fossil) natural gas resources in Upper Austria by small scale **liquefaction**
- **First LNG filling station for trucks in Austria** at Ennshafen already available
- Subsequently deploying a supply infrastructure at Ennshafen for **bunkering of inland vessels**
- Building a strong **bio-LNG** component
- Developing **LNG filling stations (L-CNG)** on further transport hubs in Upper Austria
- **Generating the demand for LNG** as an alternative fuel in trucking / food distribution / other market segments
- Originate a **critical number of LNG trucks** for market development
- Creating synergies along the LNG value chain
- Regional partners under lead of RAG AG, Ennshafen OÖ GmbH, Iveco Austria, trucking companies, et al.

*Later option for location of a truck service station; close to B1 (When market is fully developed)*

Possible location for provisional **ship bunkering** by truck
(Quay 21 or existing dolphin system at the quay 17 - own authority procedure planned)




**First LNG fuelling station for trucks** - potential **railway connection** + medium-term expansion for larger **storage** (in the water or quay area); moreover, the establishment of a stationary **ship bunkering** facility is planned



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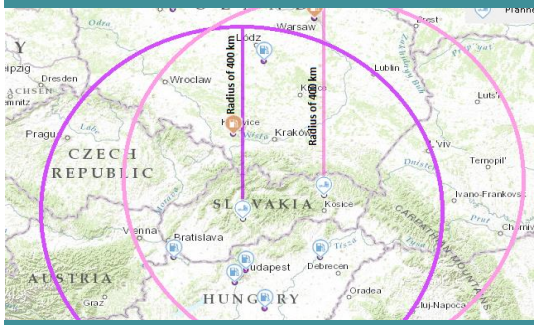
# PROJECTS IN SLOVAKIA

## LNGAFT - LNG AS ALTERNATIVE FUEL FOR TRANSPORT

First pilot deployment of 1 LNG-fuelling open access point for road transport in Zvolen & 15 LNG mono-fuelled buses in Slovakia – first infrastructure in line with the Directive 2014/94/EU on the deployment of alternative fuels infrastructure.




**TIME:** 10/2016 – 12/2019
**BUDGET:** 5,036,700 EUR
**PROGRAMME:** CEF 2015 *(2015-SK-TM-0348-S)*

**PARTNERS:**
- Danube LNG – EEIG – coordinator
- SAD Zvolen – public (bus) transport provider

**CONTACT**
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- Dusan Behun, behun@danubelng.eu

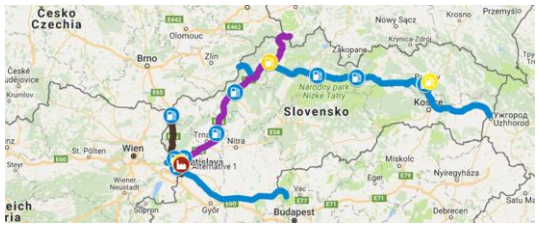
## SPP fueLCNG project

- Project applied for **CEF Transport Call 2016**
- **Small scale LNG production plant** (of assumed 1,25 ton/h production capacity)
- **3 large LNG stations** for filling vehicles along the core TEN-T corridors with LNG fuel
- **14 L2CNG stations** along the TEN-T core corridors on D1 and D2 highways.
- **LNG logistics supply infrastructure** (LNG semi-trailers) – creation of fueLCNG Virtual Pipeline with truck-to-ship and truck-to truck filling
- Creating a **pilot fleet** of more than 50 vehicles running on LNG

**Budget:** 18,462,690 EUR (85% EU Financial Contribution)

**Programme:** CEF 2016 *(2016-SK-TMC-0235-S)*

**Applicant:** Slovenský plynárenský priemysel, a.s. (SPP)




## LBG: FUELLING RENEWABLE TRANSPORT IN THE VISEGRAD COUNTRIES

Project applied for CEF Transport Call 2016. The aim is to support the transition from fossil fuels to the use of the renewable fuel Liquefied Biogas (LBG) for transport.
Develop a **network of 20 fuelling stations** (LBG/LNG) in Poland, the Czech Republic, Slovakia and Hungary, and **an initial fleet of 225 trucks.**

**BUDGET:** 32,443,103 EUR *(85% EU Financial Contribution)*
**PROGRAMME:** CEF 2016 *(2016-SK-TMC-0320-S)*

**APPLICANT:**
- ST Logistic s.r.o

# THREE EU-FUNDED PROJECTS IN HUNGARY

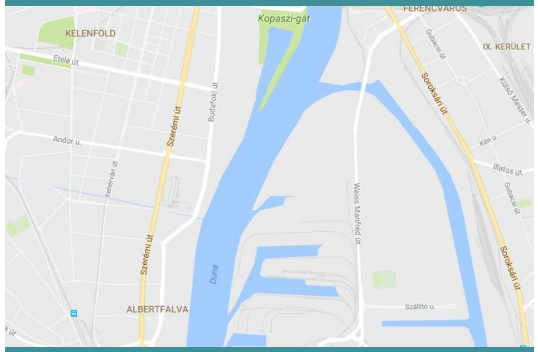
## PAN – LNG PROJECT

Studies, works & Pilot deployment for 5 L-CNG fuelling stations and one small scale liquefaction plant based on fossil gas wells & bio-methane sources .


**TIME:** 09/2014 – 09/2017
**BUDGET:** 16,983,290 EUR
**PROGRAM**: CEF 2014 (2014-HU-TMC-0629-M)
**Implementing Body & Contact:**
•Hungarian Gas Transport Cluster Association (MGKKE)
•Henrik Domanovszky - domanovszky@panlng.eu

## PAN-LNG-4-DANUBE

Making LNG available for Danube IWW transport at Csepel Freeport by deploying a fixed LNG refuelling station. Also fuelling trucks and possibly locomotives. In addition, retrofit of existing vessels for LNG propulsion.




**TIME:** 06/2016 – 09/2019
**BUDGET:** 7,097,150 EUR
**PROGRAM**: CEF 2015 (2015-HU-TM-0349-M)
**Project Promotor:**
- Ministry of National Development

## CNG Clean Fuel Box Project

CNG availability & use at country level with "Clean Fuel Box (CFB)" that is a LCNG self-service, compact compressor & refuelling station able to refill CNG vehicles independently of gas network. Deployment of 39 stations & purchase of LNG feeder & natural gas vehicles.


**TIME:** 10/2016 – 12/2018
**BUDGET:** 11,615,100 EUR
**PROGRAMME**: CEF 2015 (2015-HU-TM-0315-M)
**Implementing Body & Contact:**
- Hungarian Gas Transport Cluster Association (MGKKE)
- Henrik Domanovszky – domanovszky@panlng.eu

# LNG TERMINAL CONSTANTA

## Pre-feasibility study and a preliminary design for a small-scale LNG terminal in the port of Constanta

### Location

- Port of Constanta


### Functions

- The considerations were made for a terminal of an initial capacity of 5,000 $m^3$ with a future expansion up to a maximum of 10,000 $m^3$. The layout includes a storage facility, (un-)loading facilities for maritime vessels, bunkering of inland vessels and fuelling of trucks. The chosen location will allow vessels with a draught up to 7 m.

### Technical solution

- For its gradual expansion bullet-type horizontal storage vacuum-isolated tanks of 2,500 $m^3$ each are recommended.

## QUICK FACTS

**LNG small scale terminal:** 5,000 $m^3$ (up to 10,000 $m^3$) with LNG storage, (un-)loading of (smaller) seagoing vessels, fuelling of inland vessels and trucks.

**LNG regasification terminal (onshore):** 130,000 $m^3$ (up to 260,000 $m^3$) with regasification facility connected to the gas grid, (un-)loading of seagoing & inland carriers, bunker vessel supplying small-scale terminal and vessels



**CONTACT**

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MASTERPLAN FOR RHINE-MAIN-DANUBE

Co-financed by the European Union
Trans-European Transport Network (TEN-T)

# Proposed integrated project - LNG for Constanta

## LNG Fuelling Stations & Vehicles in City

- L-CNG-fuelling stations
- LNG-fuelled Buses & Trucks




## Project in preparation




## LNG Terminal in Constanta Port

- Storage tanks
- Truck loading station
- Truck & railroad fuelling station




- Bunker Station Maritime & Inland Vessels



## LNG-fuelled ferries to Georgia




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# LNG TERMINAL IN GALATI

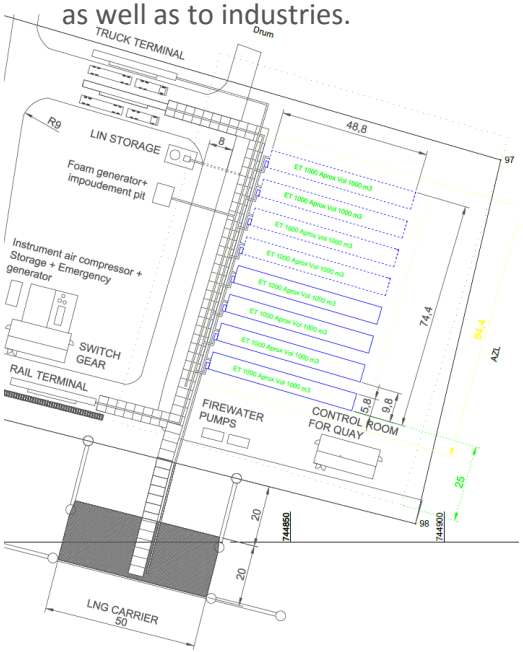
## Pre-feasibility study and a preliminary technical concept for a LNG terminal in the maritime Danube area in Romania

### Location

- Eastern part of the Port of Galati situated on the riverbank inside the Industrial Park Galati - area of 20,000 $m^2$. It has a convenient road access and is located in the vicinity of the Oil Terminal Galati (dangerous goods zone) and of other currently operating industrial areas (e.g. Damen Shipyard).

### Functions

- A proposed LNG terminal with an initial storage capacity of 4,000 $m^3$ (design capacity up to 8,000 $m^3$) may offer a wide range of distribution: LNG bunkering for inland and maritime vessels, supplying LNG to road transport as well as to industries.




### Technical solution

- Implementation of semi-pressurised tanks option in two phases is recommended, envisaging at first a LNG terminal with a capacity of 4,000 $m^3$.

## QUICK FACTS

**Capacity**: 4,000 m3 in semi-pressurised tanks with option to increase up to 8,000m3
**Facilities**: LNG storage, truck fuelling, vessel bunkering
**Estimated investment**: 17 MEUR


## CONTACT

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MASTERPLAN FOR RHINE-MAIN-DANUBE

Co-financed by the European Union
Trans-European Transport Network (TEN-T)

# Proposed integrated project - LNG for Galati

Project in preparation

## L-CNG Fuelling Stations & Vehicles

- L-CNG-fuelling stations
- LNG & fuelled Buses & Trucks

IVECO

IVECO

SOLBUS




## Bio-methane Sources



Landfill



Wastewater treatment facility

## LNG Terminal & Facility

- Agro bio-methane production
- Liquefaction
- Small-scale LNG Terminal
- Bunker Station Maritime & Inland Vessels







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# CHALLENGES FOR LNG IN DANUBE REGION

- **LNG supply to Danube** region is complex and more costly
  - regional fossil sources / liquefaction / pipeline gas
  - exploitation of high bio-methane potential
- **Multi-client strategy & combination of transport & energy projects** is essential
  - maritime & road sector, off-road sector
  - peak shavers, off-pipeline industrial clients add significant high market potentials for industrial fuel
- Significant **price gap LNG – Diesel essential** for sustainable business case
  - still extremely high prices for LNG equipment / standardized solutions / economies of scale
  - transparent and competitive pricing of LNG required
- Despite "proven technologies" **technical challenges for inland vessels** significant
- **Retrofitting** makes sense for certain types of vessel (e.g. container vessels, tankers) but requires **public co-funding & facilitation of finance** due to structural shortcomings of sector
- **Lack of public support schemes & severe restrictions of EU programs to fund critical mass of LNG vehicles**
- Politicians/Authorities tend to **overestimate safety risks** of LNG & **underestimate contribution to air emissions reductions** – more information needed
- **Future taxation policy of LNG** as transport fuel in several countries not predictable on mid/long-term perspective for road transportation

# And by the way when talking about trucks…

| | | Alternative Technology | | | | |
|---|---|---|---|---|---|---|
| | | Full Electric | Parallel Hybrid | Plug-in Hybrid | CNG Bio CNG | LNG Bio LNG |
| Range | Urban | +++ | + | +++ | +++ | +++ |
| | Regional | Not feasible | No benefit | + | +++ | +++ |
| | Light Off-Road | Not feasible | No benefit | + | +++ | +++ |
| | Mid Distance | Not feasible | No benefit | No benefit | +++ Chassis only | +++ |
| | (International) Long Distance | Not feasible | No benefit | No benefit | Not feasible | +++ |

+++ Benefit for environment

… LNG is ONE alternative but **for HDV** it is the ONLY ONE which is economically feasible, now and for the next decade

[LNG HD Truck € 130.000 (range 1.500 KM / Full Electric € 325.000 (range 200 KM (Status 2017)]

# LNG TERMINAL IN KRK/CROATIA – Possible LNG source

**Scope:**

- Stage I: FSRU based LNG terminal in Krk/Croatia
- Stage II: On-shore LNG terminal by retaining and upgrading the benefits of the FSRU solution

**Location:**

- Northern part of the Island of Krk, within the Municipality of Omišalj

**Capacity & Facilities:**

- FSRU with a storage capacity of 150,000 - 180,000 m3
- Dedicated jetty and auxiliary systems
- Connecting high pressure pipeline

**Project submitted & funding awarded:**

- Second 2016 CEF Energy Call for Proposals




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# Further Information & Contact

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