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KLAIPĖDA SCIENCE AND TECHNOLOGY PARK

TRANSFER/BUNKERING OPERATION OF LNG

Habil. Dr., prof. Vytautas Paulauskas

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KLAIPĖDA SCIENCE AND TECHNOLOGY PARK

Content

- LNG transfer from LNG import terminal to ships and bunkering stations
- Safety during LNG transfer
- Safety during bunkering operations
- LNG small supply and bunkering ships
- LNG supply and bunkering trucks, train wagons and tank containers
- Personal education and training

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LNG TRANSFER FROM LNG IMPORT TERMINAL TO SHIPS AND BUNKERING STATIONS

- LNG transfer by small LNG tankers
- LNG transfer by trucks
- LNG transfer by rail tanks
- LNG transfer by LNG tank-containers

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LNG IMPORT TERMINALS

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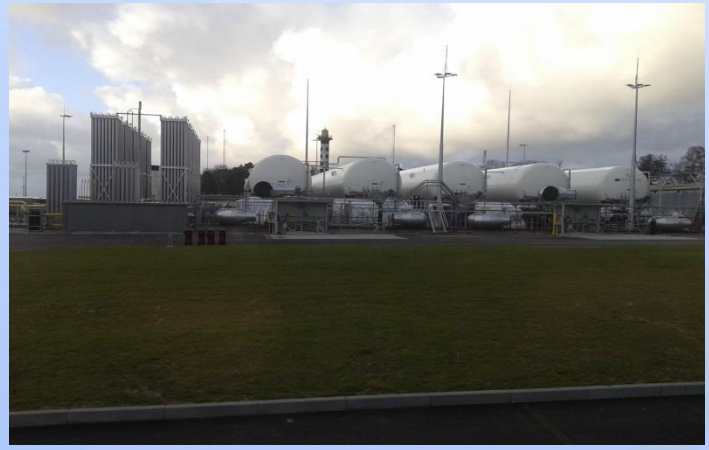
SMALL SCALE LNG TERMINALS



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SAFETY DURING LNG TRANSFER AND BUNKERING

- Legal basis of the safety during LNG transfer (Regulations)
- Safety zones
- Actions in emergency situation

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LNG DANGEROUS OR NOT???

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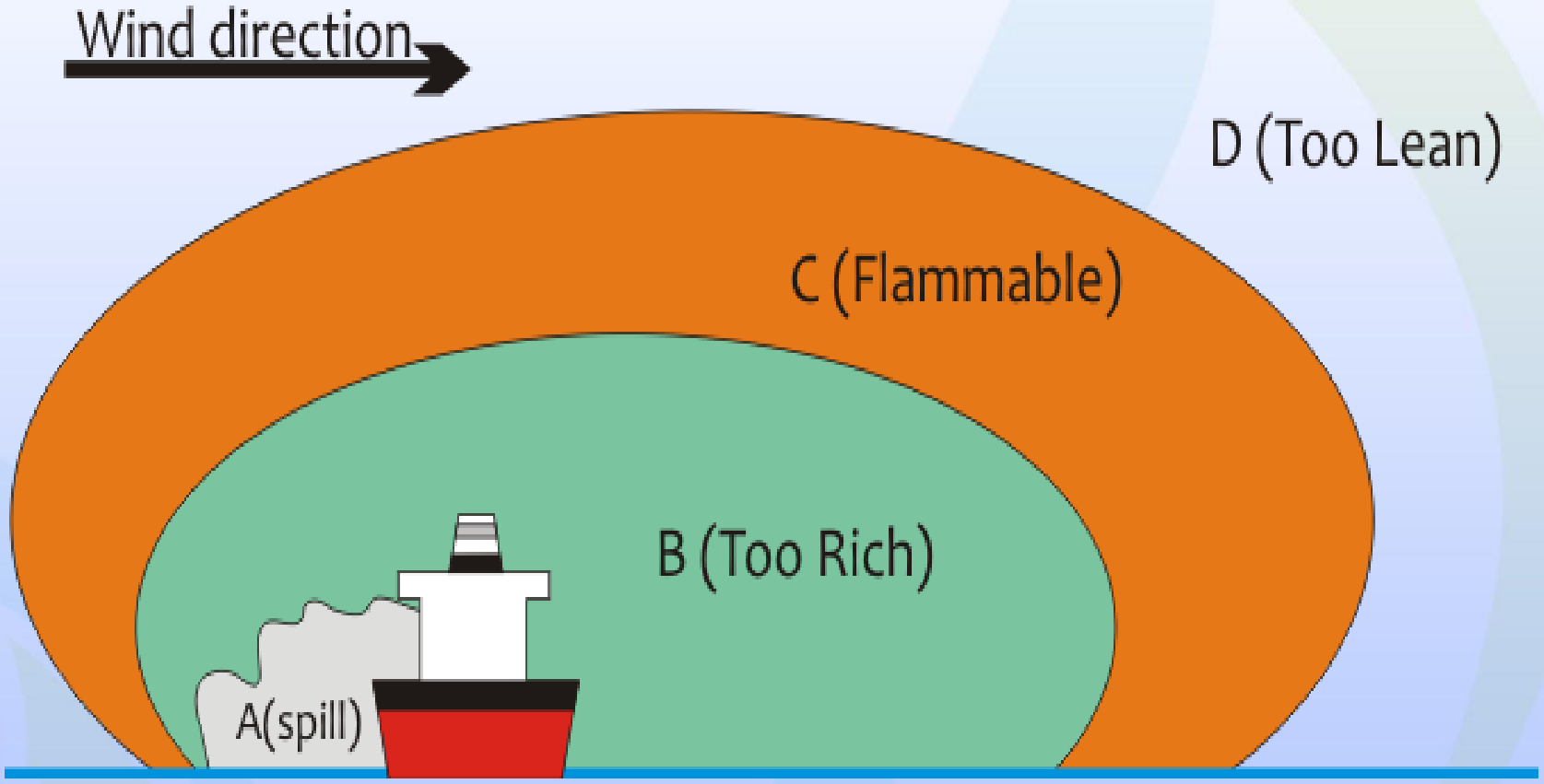
LNG SAFETY ZONES BASIS



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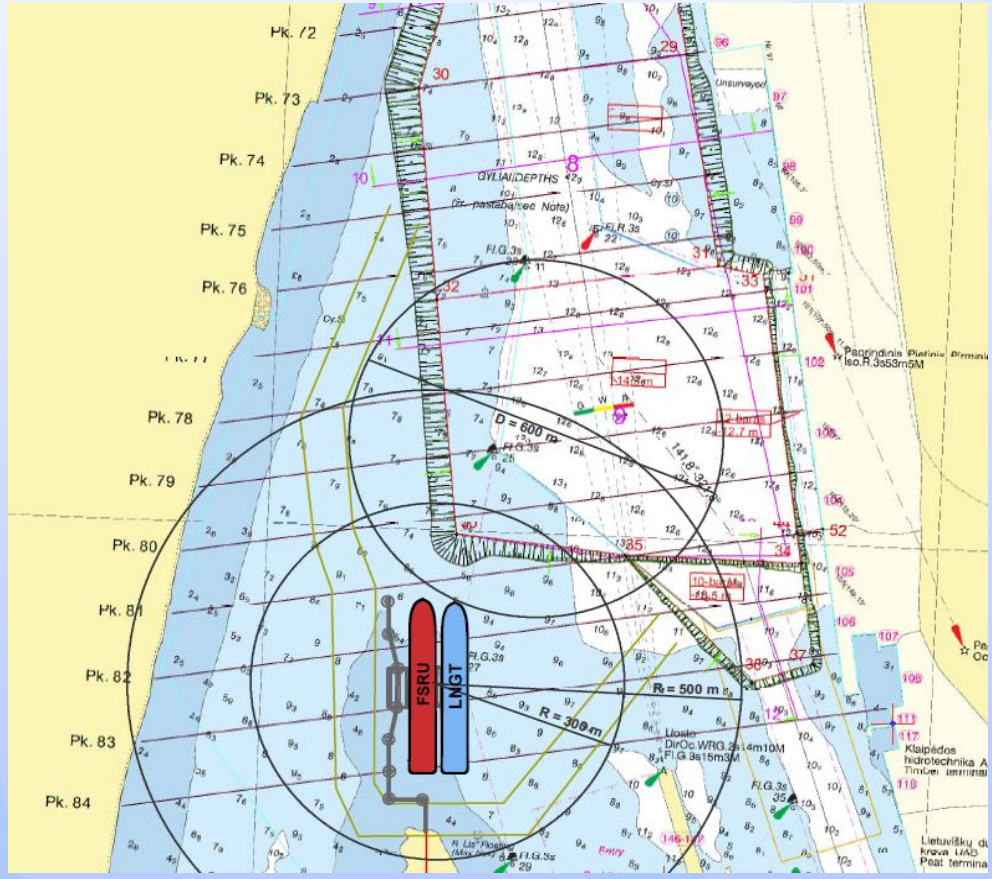
KLAIPEDA LNG IMPORT TERMINAL SAFETY ZONES



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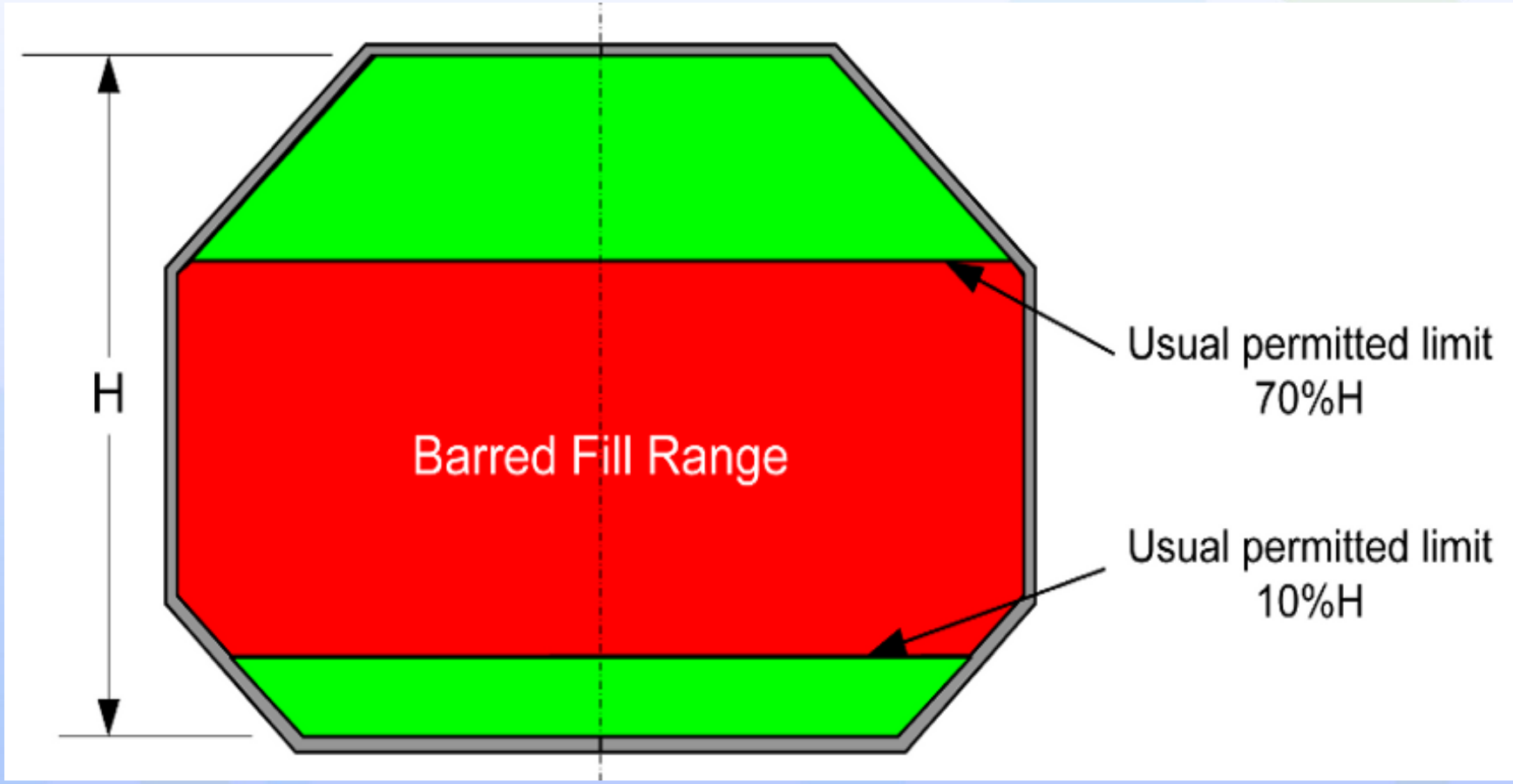
SAFETY OF THE LNG TANKS



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KLAIPĖDA SCIENCE AND TECHNOLOGY PARK

LNG SMALL SUPPLY AND BUNKERING SHIPS

- LNG small supply Sea ships (capacity from 4000 m³ up to 15000 m³ of LNG)
- LNG small supply IWW ships (capacity from 400 m³ up to 2000 m³ of LNG)
- Port LNG supply ships (capacity from 200 m³ up to 1000 m³ of LNG)

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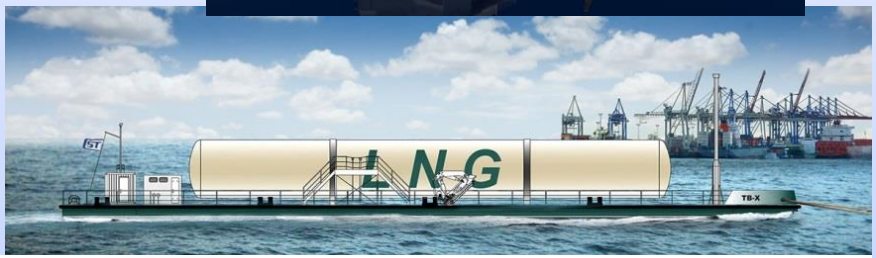
LNG SUPPLY AND PORT TANKERS



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LNG SUPPLY AND PORT TANKERS

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PORT LNG SUPPLY SHIPS MAIN PARAMETERS

- Length up to 40 – 50 m
- Width up to 10 – 12 m
- Draft up to 3,5 – 5,0 m
- Capacity (LNG) from 200 up to 1200 m^3
- Speed up to 10 knots

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LNG FUEL SUPPLY VESSEL IN PORT MAIN CONDITIONS

- LNG fuel quantity on LNG supply vessel should be at least for the 2 Ro-Ro vessels
- LNG supply vessel must have possibility fulfill at least 2 times per week on LNG terminal
- LNG supply vessel could provide LNG supply operations near Ro-Ro quay walls or in port waters
- LNG supply vessel should be able supply LNG shore facilities

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KLAIPĖDA SCIENCE AND TECHNOLOGY PARK

PLANNING LNG FUEL FOR THE RO-RO SHIPS QUANTITIES IN KLAIPEDA PORT

- 4 – 8 Ro-Ro ships constantly work on Ro-Ro lines link Klaipeda port with other ports
- Ro-Ro ship in average should use per day up to 40 – 60 m³ LNG
- Planning LNG fuel per week for the Ro–Ro ships (weekly bunkering) 3000 – 4000 m³ LNG

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LNG FUEL SUPPLY IN EAST BALTIC PORTS MAIN CONDITIONS

- **LNG fuel quantity on LNG supply vessel should be at least for the 1 – 2 ports (at least for 4 - 6 Ro-Ro vessels in one port)**
- **LNG supply vessel must have possibility fulfill at least 1 time per week on LNG terminal**
- **LNG supply vessel could provide LNG supply operations near quay walls or in port waters**
- **LNG supply vessel should be able supply LNG shore facilities**

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DISTANCES BETWEEN KLAIPEDA AND OTHER PORTS

- **Klaipeda – Baltjsk – 110 n.m. – 8 h – 1 d**
- **Klaipeda - Liepaja – 55 n.m. – 5 h – 18 h**
- **Klaipeda – Ventspils – 120 n.m. – 12 h – 1,4 d**
- **Klaipeda – Riga – 236 n.m. – 18 h – 1,8 d**
- **Klaipeda – Paldisky – 285 n.m. – 22 h – 2 d**
- **Klaipeda – Tallinn – 320 n.m. – 24 h – 2,5 d**

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LNG SUPPLY SHIPS FOR THE EAST BALTIC SEA MAIN PARAMETERS

- Length up to 100 - 115 m
- Width up to 12 – 16 m
- Draft up to 5,5 – 6,5 m
- Capacity (LNG) up to 5000 – 9000 m³
- Speed up to 14 – 16 knots

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LNG LOADING ON LNG SUPPLY TANKER

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SUPPLY SMALL SCALE LNG TERMINAL IN KLAIPEDA

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LNG TRANSFER TRUCKS, RAILWAY WAGONS AND TANK-CONTAINERS

Above: Rektor LNG containers are independent so they provide multiple options for transporting LNG such as over the road trucks, sea or rail.

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LNG BUNKERING FACILITIES IN BALTIC SEA (Planning)

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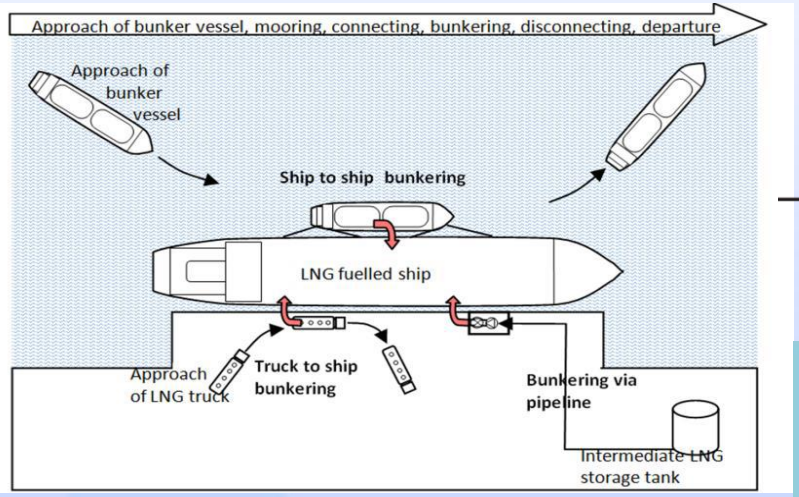
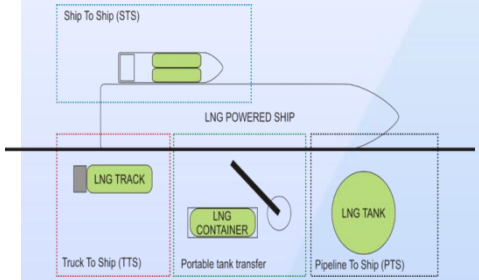
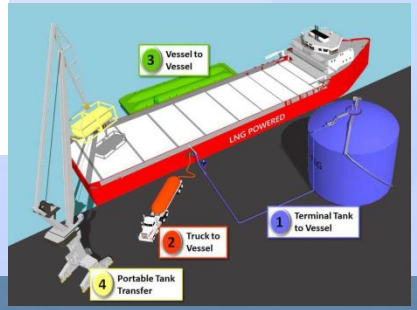
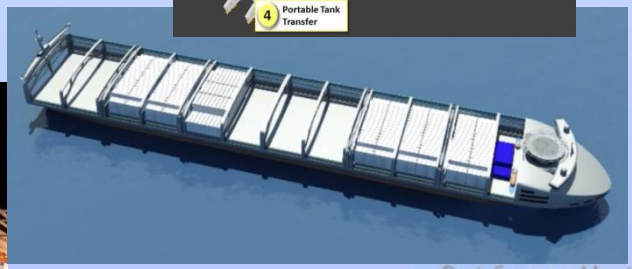
SHIPS LNG BUNKERING SYSTEMS









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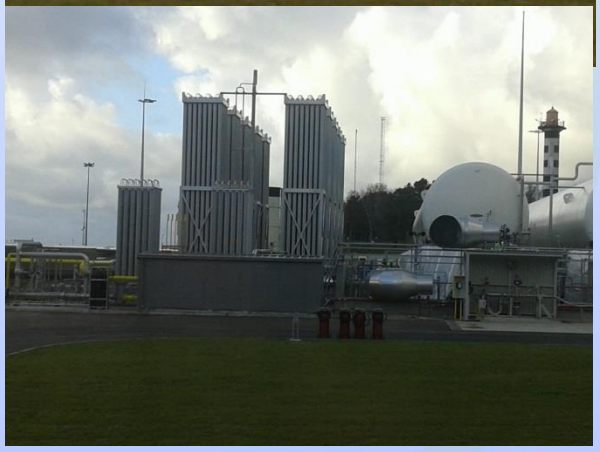
LNG BUNKERING (FILLING) STATIONS



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LNG BUNKERING STATIONS

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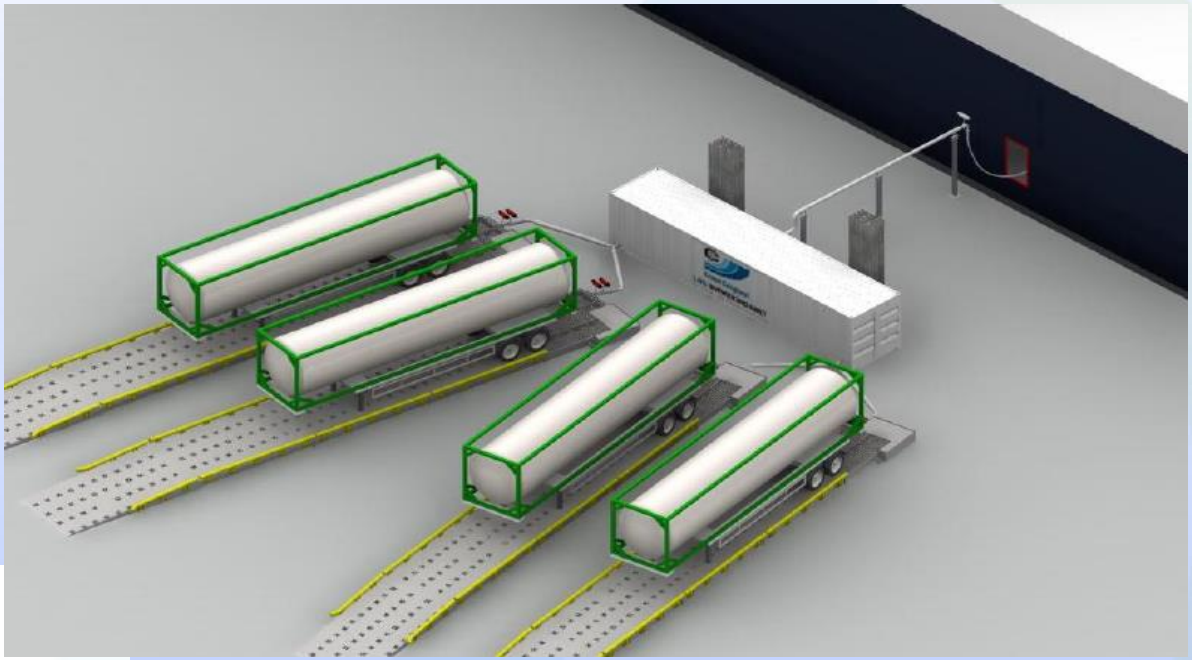
BUNKERING FROM MULTIPLE TANK TRAILERS



4 Tank Trailers

Serial or Parallel Connections

2 Pumps each with 60 m3/h

Flow rates 120 m3/h

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LNG BUNKERING – INTERMEDIATE TANK ON QUAY

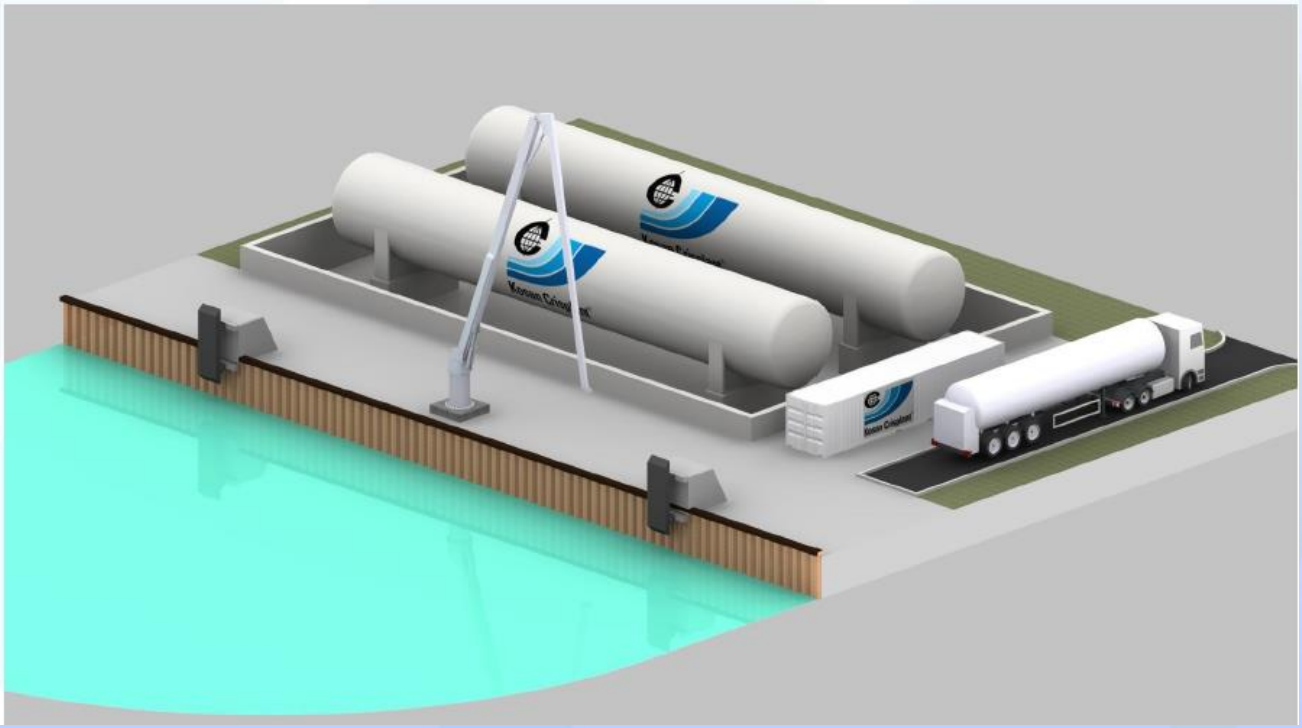
2 x 300 m3 tanks

Pump unit

2 x 65 m3/h pumps

Flow rates from 40-130 m3/h

One truck loading point



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LNG BUNKERING – STATIONARY STORAGE TANK WITH MULTI TRAILER

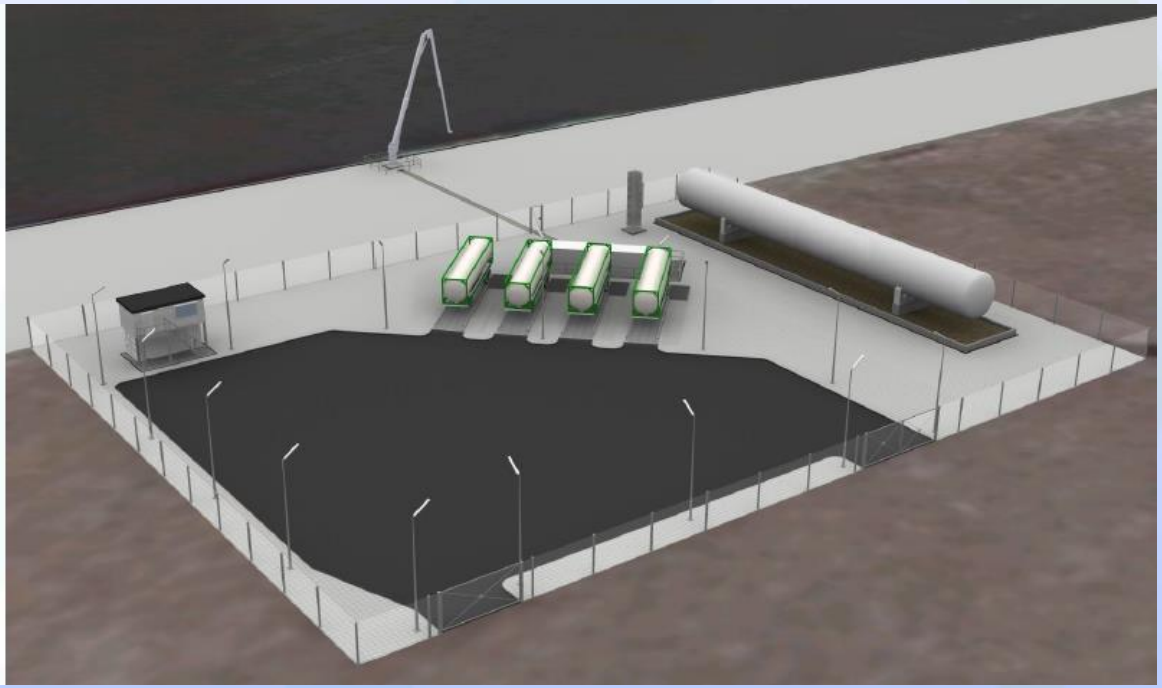
40 - 320 m3/h bunkering flow

5-450 m3 per bunker operation

Optionally equipped with PBU for fast bunkering

Ideal to achieve high flow and maximum flexibility

Possible to increase capacity and flow rate in phases



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MULTIPLE FUEL STATION

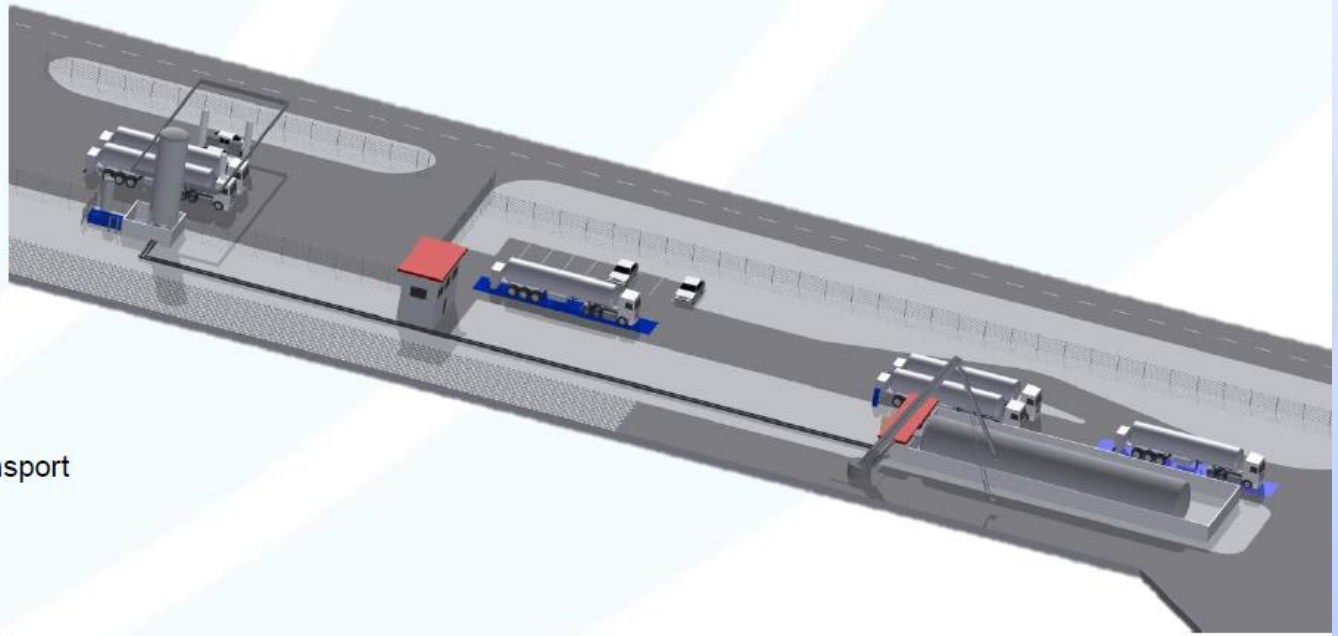
400 m3 & 30 m3 LNG storage tanks

LNG transfer pumps

LNG measurement system

LNG bunker system on the quay

LNG and CNG filling station for road transport



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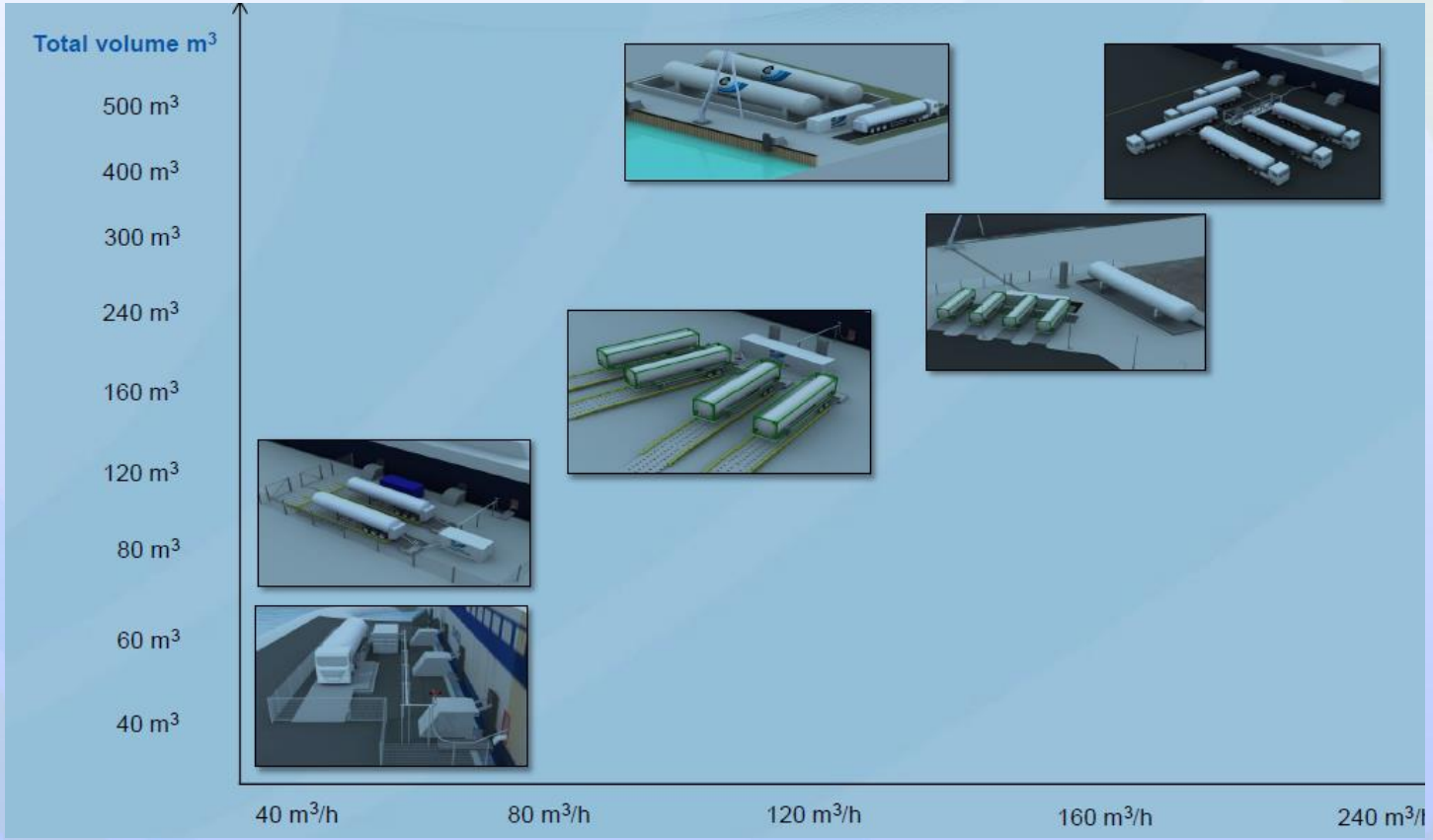
BUNKERING CAPACITIES AND INTENSIVELY



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SAFETY DURING BUNKERING OPERATIONS

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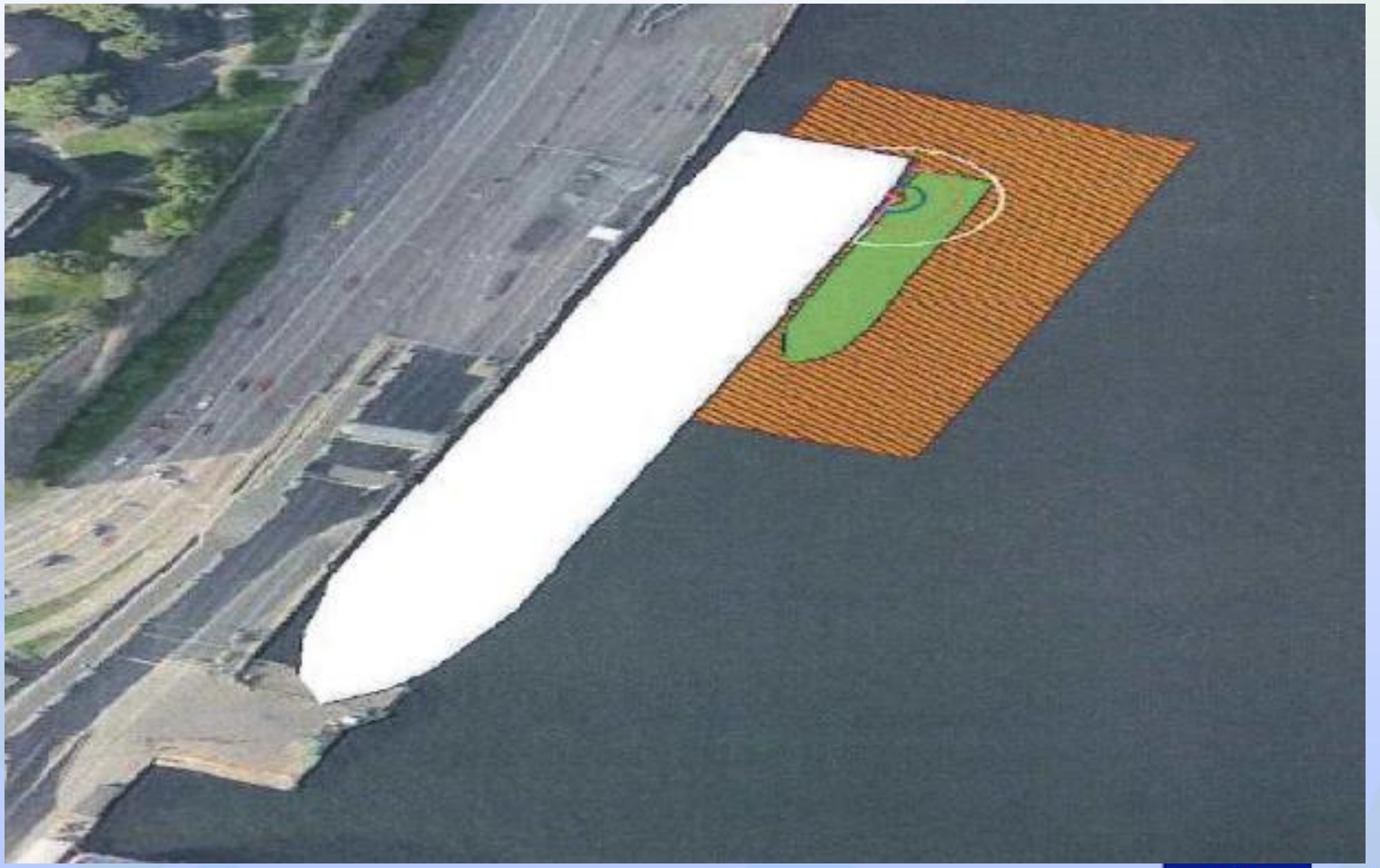
LNG BUNKERING STS SAFETY ZONE



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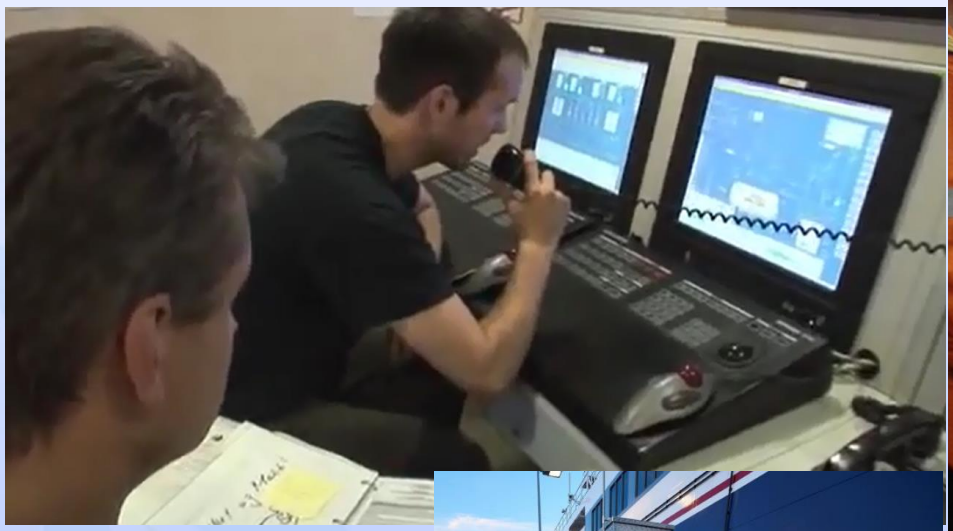
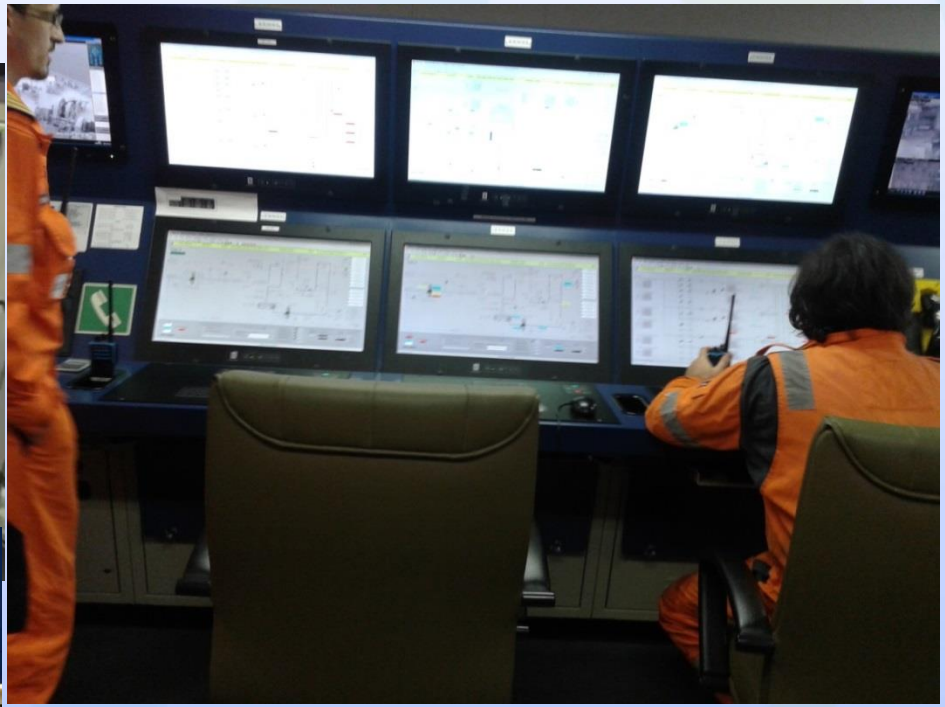
SAFETY FIRST (at least 2 persons must be on important operations)





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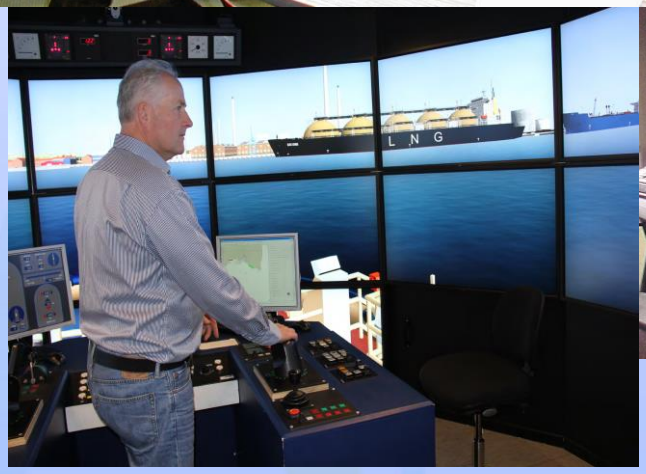
PERSONAL EDUCATION AND TRAINING



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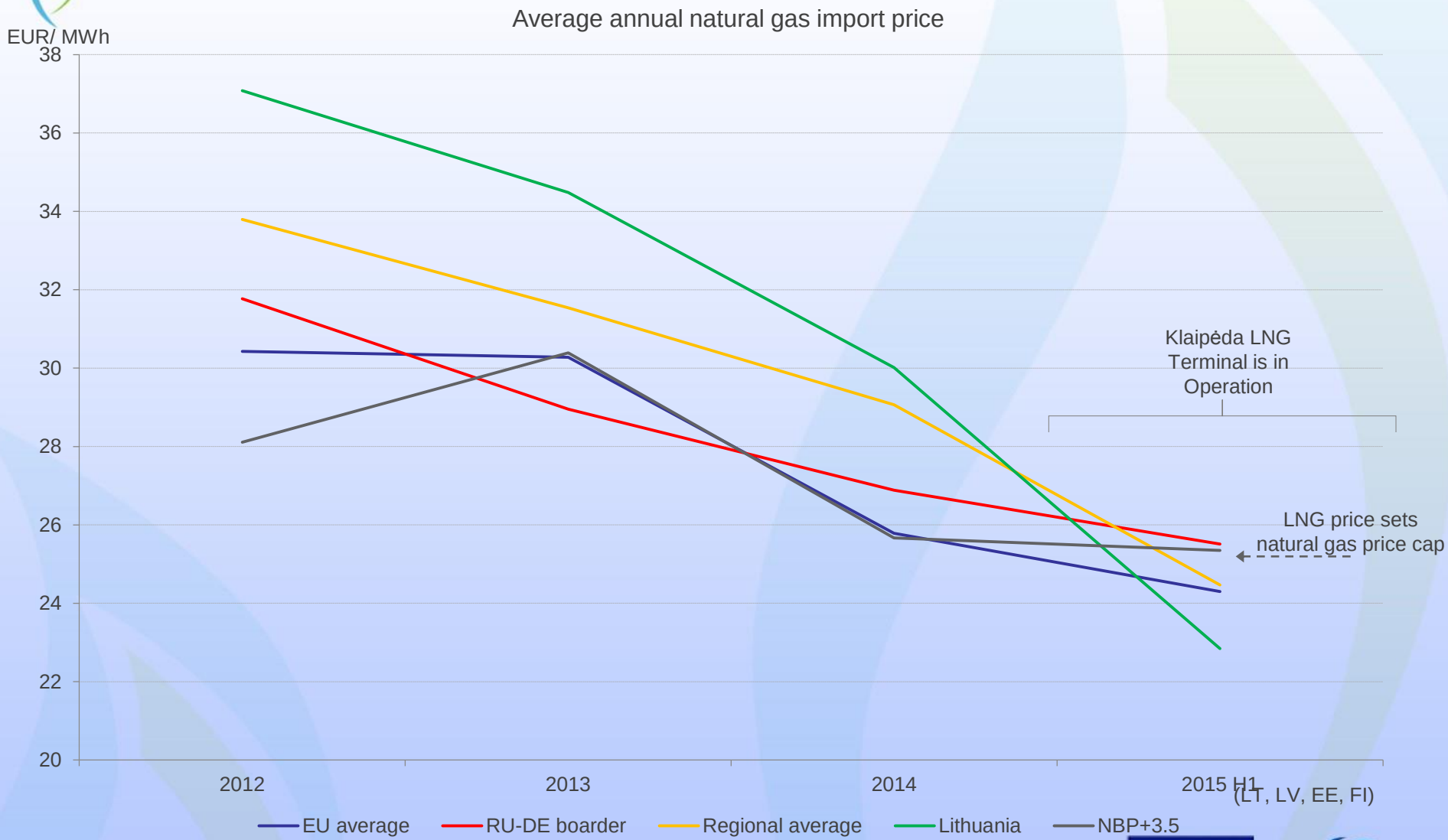
A Cap for Natural Gas Prices in the Region



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CONCLUSIONS

- **LNG transfer from LNG import terminals to ships and bunkering stations could be by LNG supply vessels, trucks, tank-containers**
- **Safety during LNG transfer must be on basis fulfil IMDG Code, ADR Agreement, etc. basis**
- **Safety during bunkering operations must be fulfil according terminal safety regulations and ISM Code on LNG ships**
- **LNG ships and terminals personal education and train is the main way minimize non standard situations.**

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