

LNG Terminal in Świnoujście

Mutual Joint Visit Workshop for Seveso Inspections
26 September 2017, Nicosia, Cyprus

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Polskie LNG

Polskie LNG Company

- ▶ **Polskie LNG** was founded in April 2007. Polskie LNG is 100% owned by GTO Gaz System S.A.
- ▶ **EPC Construction contract** signed in July 2010
- ▶ **Construction** completed in October 2015
- ▶ **Commissioning:** Q4 2015 – Q2 2016
- ▶ **Handover** of the plant signed on 30 May 2016; **commercial operations** since June 2016
- ▶ **2 commissioning cargos** unloaded in Dec. 2015 and Feb. 2016
- ▶ **13 commercial cargos** unloaded since Jun. 2016 until May. 2017



Polskie LNG Company



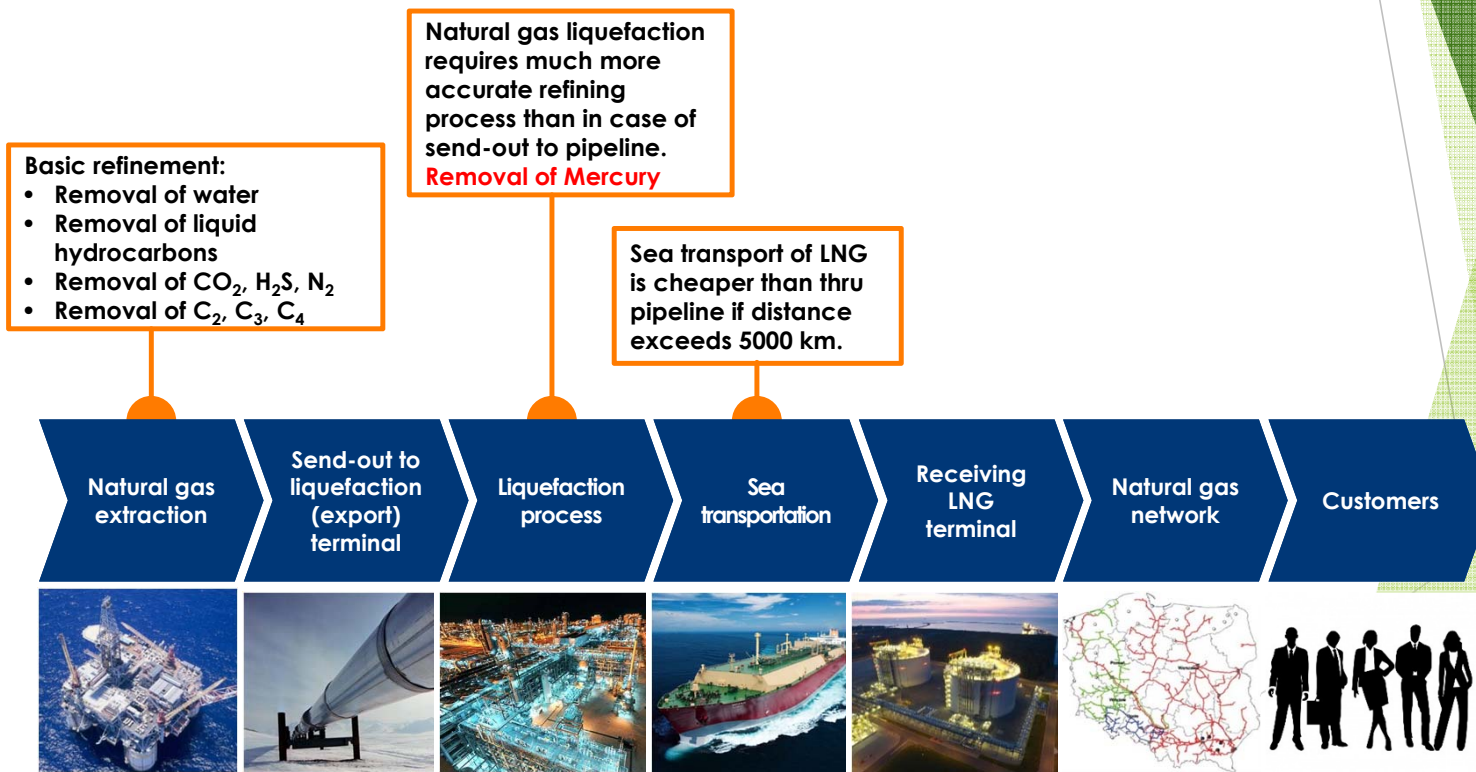
- ▶ As of June 2016, the LNG Terminal in Świnoujście is fully operational and running.
- ▶ We have already successfully received 15 cargoes.

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LNG Supply Chain

LNG Supply Chain

Natural gas pipeline distribution



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Key technical parameters of the LNG Terminal in Świnoujście

Overall technical description

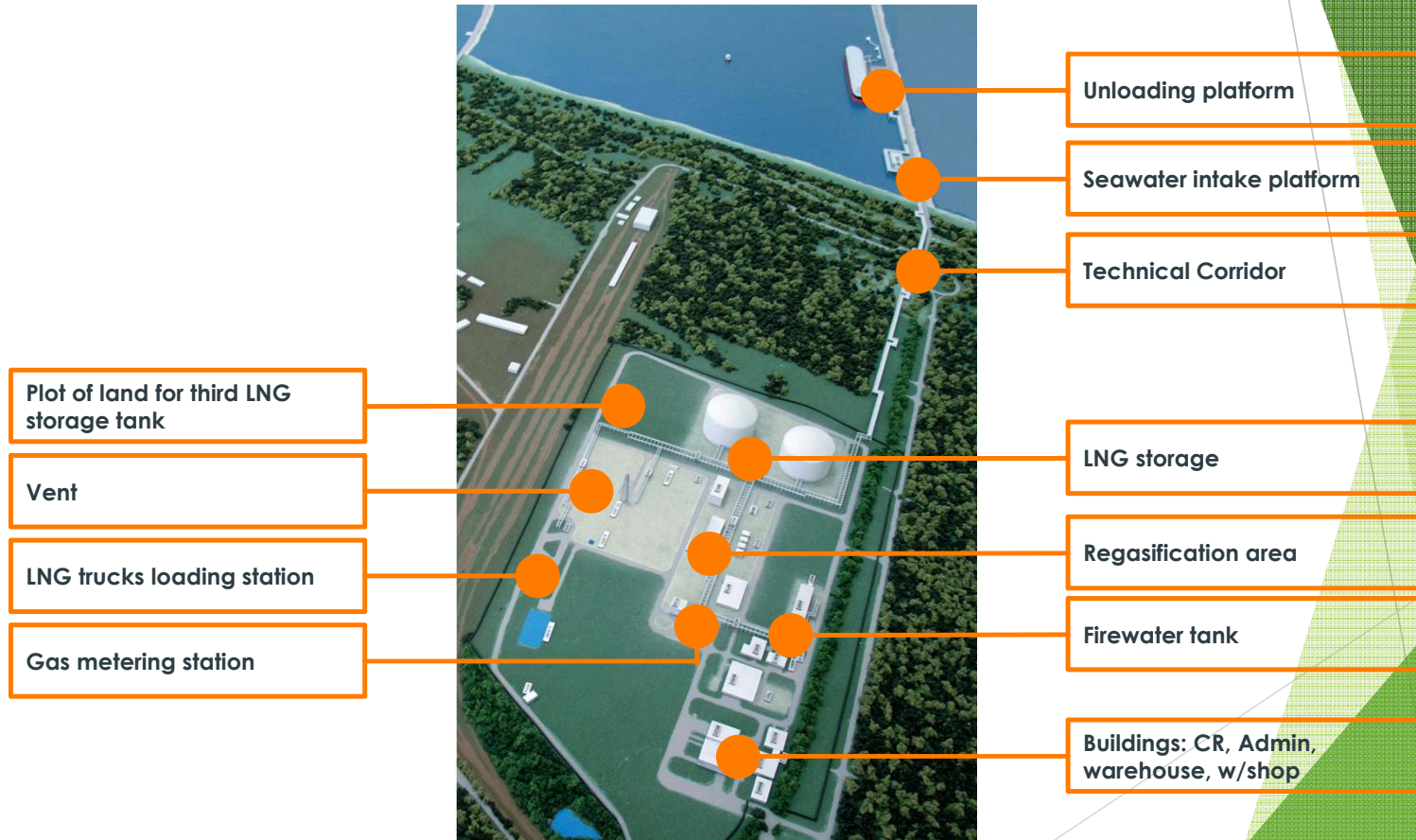
- ▶ **Design capacity** of the PLNG Terminal:
5.0 BCMA,
Nom/max. send-out: 570/656 000 Nm³/h
Min. send-out: 75,000 Nm³/h
Planned expansion: up to 7.5 BCMA.
- ▶ **LNG unloading facility** designed to receive LNGCs from 120 000 to 217 000 m³ (Q-flex), unloading at a rate of 12 000 m³/h.
- ▶ **2 full containment LNG storage tanks**, 165 000 m³ gross capacity each, space for the third tank.
- ▶ **Pipeline inlet pressure:** 6.3 – 8.4 MPa,
Temperature: 1°C.
- ▶ **LNG trucks loading station** with two loading slots of 95 000 tpy capacity and room for future expansion.
- ▶ **SCV vaporizers for regasification** ORVs to be installed in the future.
- ▶ **LNG Terminal designed according to PN-EN 1473**



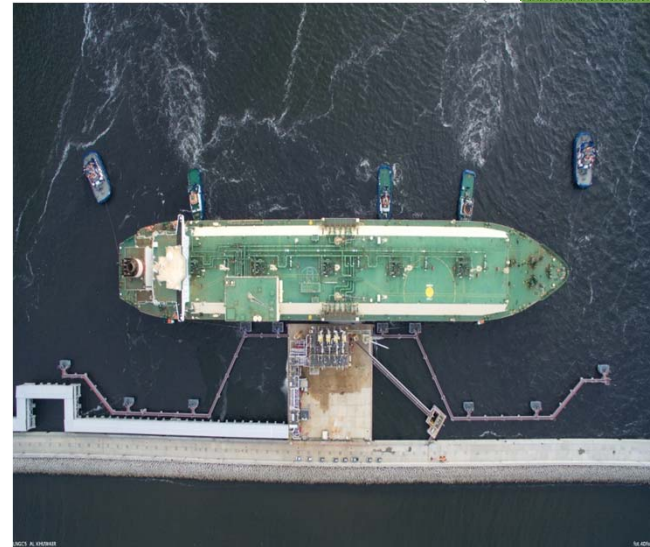
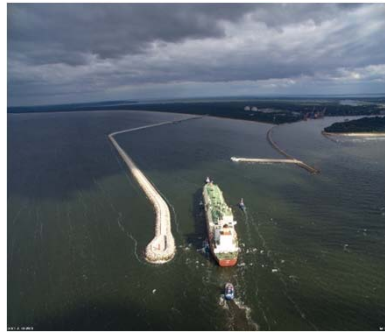
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LNG Terminal layout

LNG Terminal layout



LNG Terminal layout - vessel unloading



LNG Terminal layout

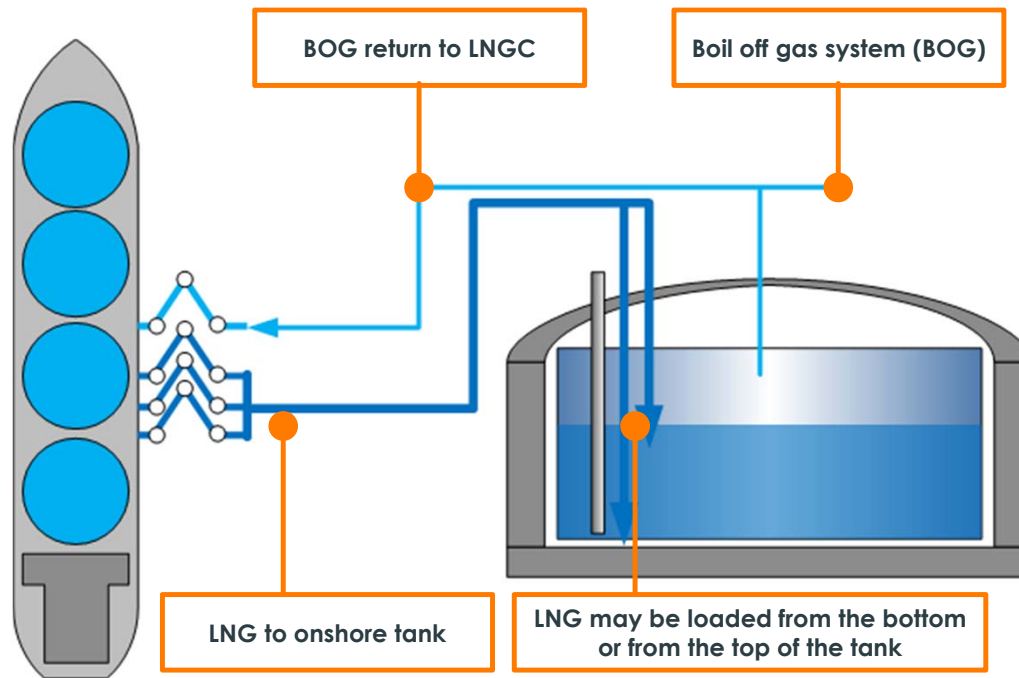


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LNG unloading and proces storage

LNG unloading & process storage

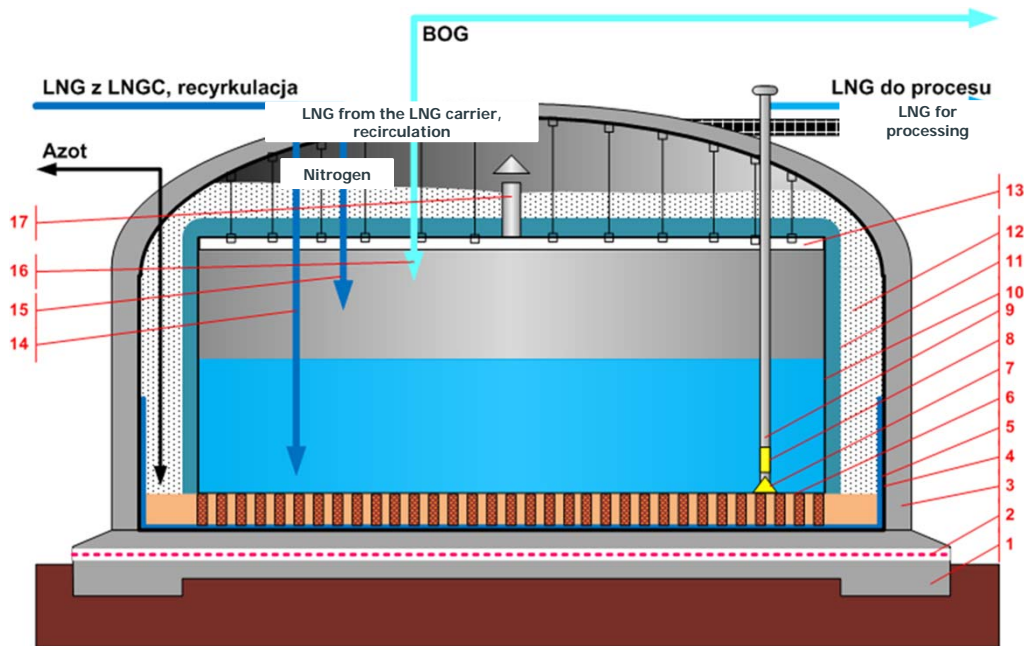
- ▶ LNG is discharged to onshore process storage tanks using 3 unloading arms and vessel pumps,
- ▶ fourth arm – BOG (boil-off gas) return to LNG carrier's tanks,
- ▶ the main liquefied gas pipeline is maintained cold (approx. -160°C) through circulation of LNG in piping system.



LNG unloading & process storage



LNG unloading & process storage



1. Foundation slab
2. Electrical heat tracing (coils)
3. External tank (prestressed concrete)
4. Carbon steel (moisture barrier)
5. Carbon steel EN-10028-4X7Ni9 up to 5 m (protection against LNG leak)
6. Insulation - foamed glass blocks
7. LP pump check valve
8. LP Pump (inner tank pump)
9. LP pump column
10. LNG tank, steel EN-10028-4X7Ni9
11. Insulation mats
12. Insulation perlite
13. Suspended aluminum roof
14. LNG tank - bottom inlet
15. LNG tank - upper inlet
16. BOG (inlet / outlet)
17. Interspace vent (to the inner space)

- LNG tanks are a full containment type. All newly constructed tanks in the EU are of this type.
- The inner tank is made of Ni steel.
- External concrete shell provides emergency containment in case of the inner tank's leakage.
- The interspace is filled with perlite insulation.
- The pressure inside the tank is slightly higher than atmospheric pressure (max. 0.3 bar). This is not a pressure vessel, there is no risk of gas expansion. The tank functions as a thermos, maintaining the LNG stock below its boiling point.
- All process connections are provided from the top, eliminating the leakage potential due to LNG piping damage. This is a requirement of EN-PN 1473.
- LNG pump is lowered to the bottom of the column on the cables, the column also serves as a LNG pressure pipe

LNG Storage Tanks



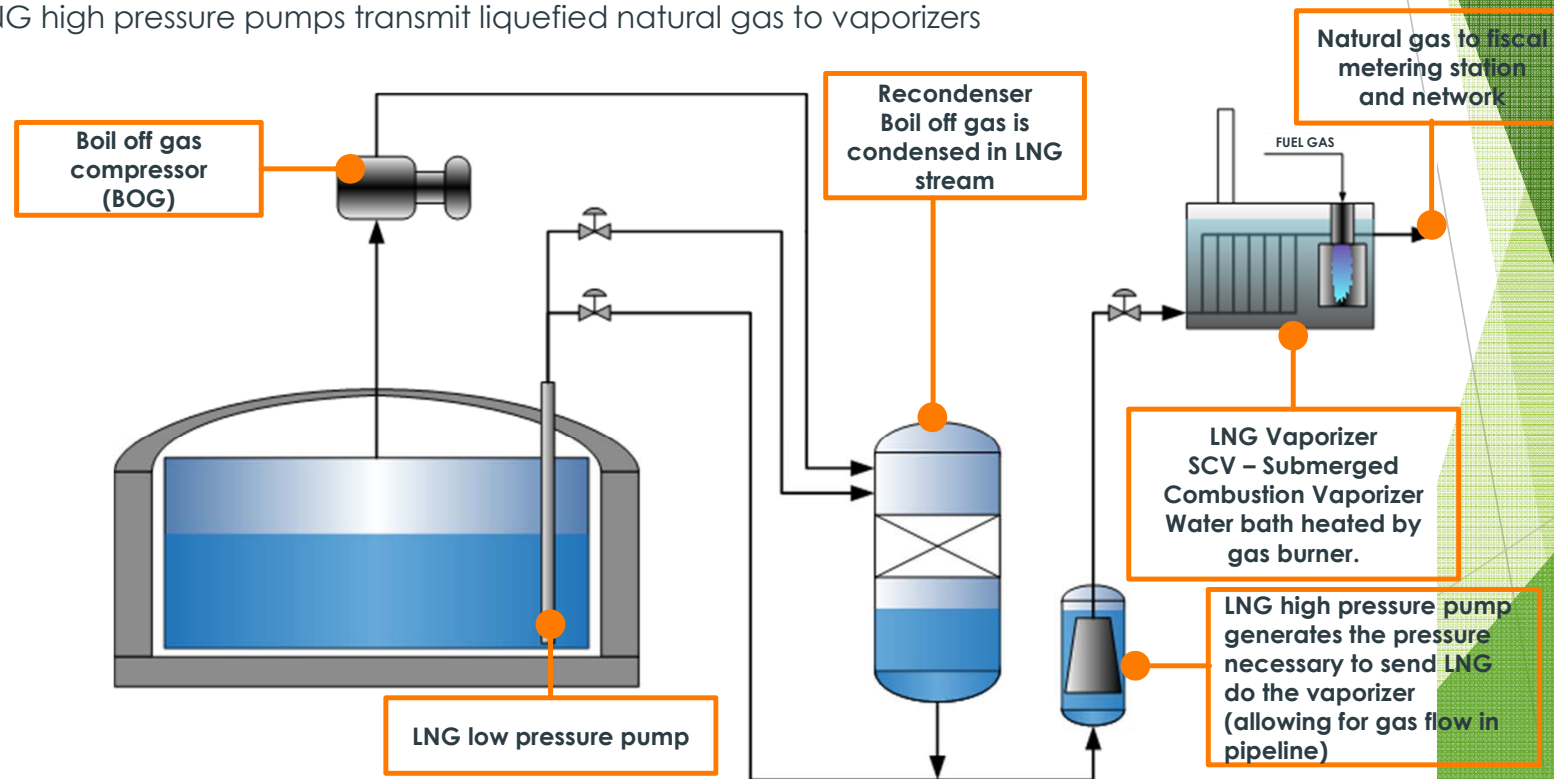


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LNG Regasification process

LNG Regasification process

- LNG low pressure pumps transmit liquid to recondenser.
- Boil off gas (BOG) compressors send BOG to the recondenser and the fuel system.
- Beside BOG condensation, the recondenser is used as an inflow tank for LNG high pressure pumps.
- LNG high pressure pumps transmit liquefied natural gas to vaporizers



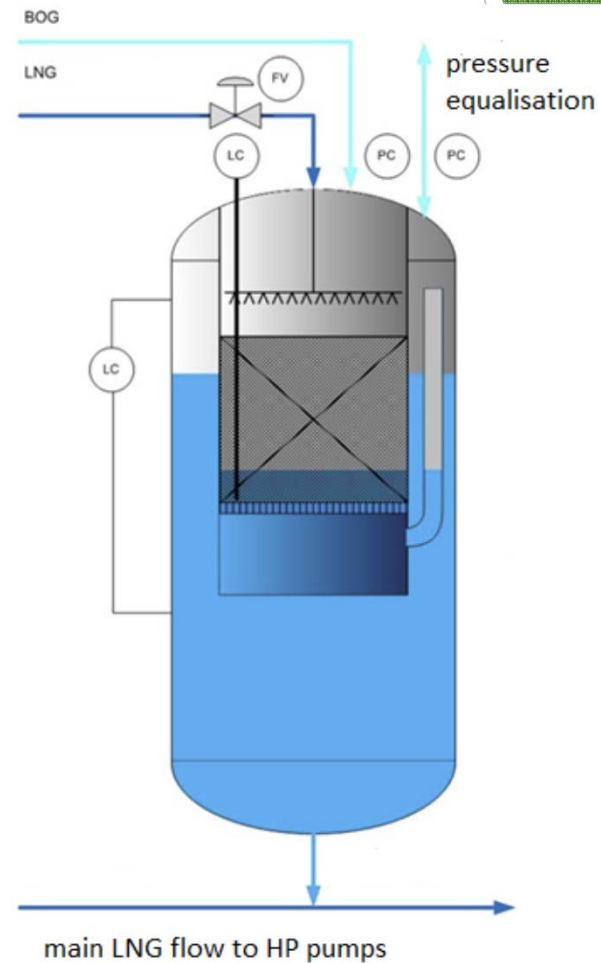


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Key equipment and systems

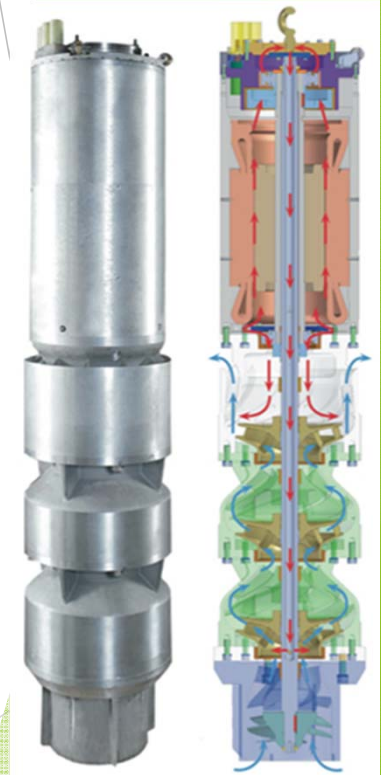
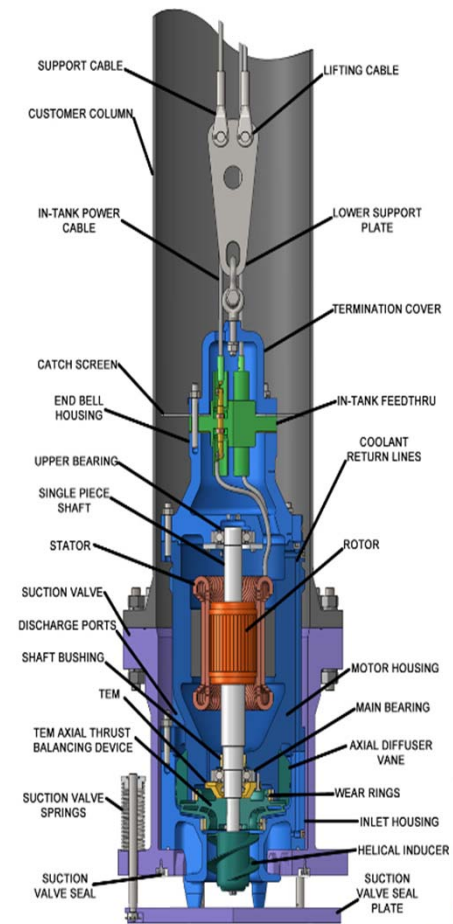
Recondenser

- Absorption of BOG in LNG stream,
- Raschig rings partially submerged in the LNG provides self-regulation of absorption
- Level adjustment in two containments
- LNG flow controlled against the flow of BOG
- Pressure regulation with the addition of a gas - > excess fuel is returned to the storage tank
- Strainer for HP pumps

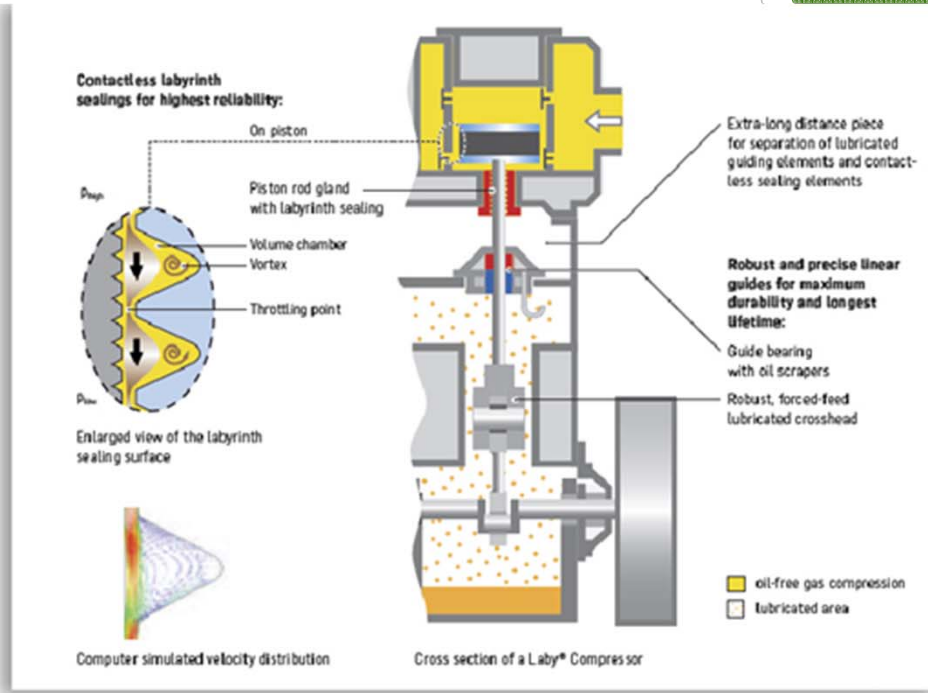


LNG LP pumps

- Low pressure pump (LP) is built in the column inside the tank,
- The column is also used as a discharge pipe for the pump,
- The pump is hanged on support cables,
- The electric motor is cooled by LNG flow,
- Pump inlet is located at a suction valve at the bottom of the column.

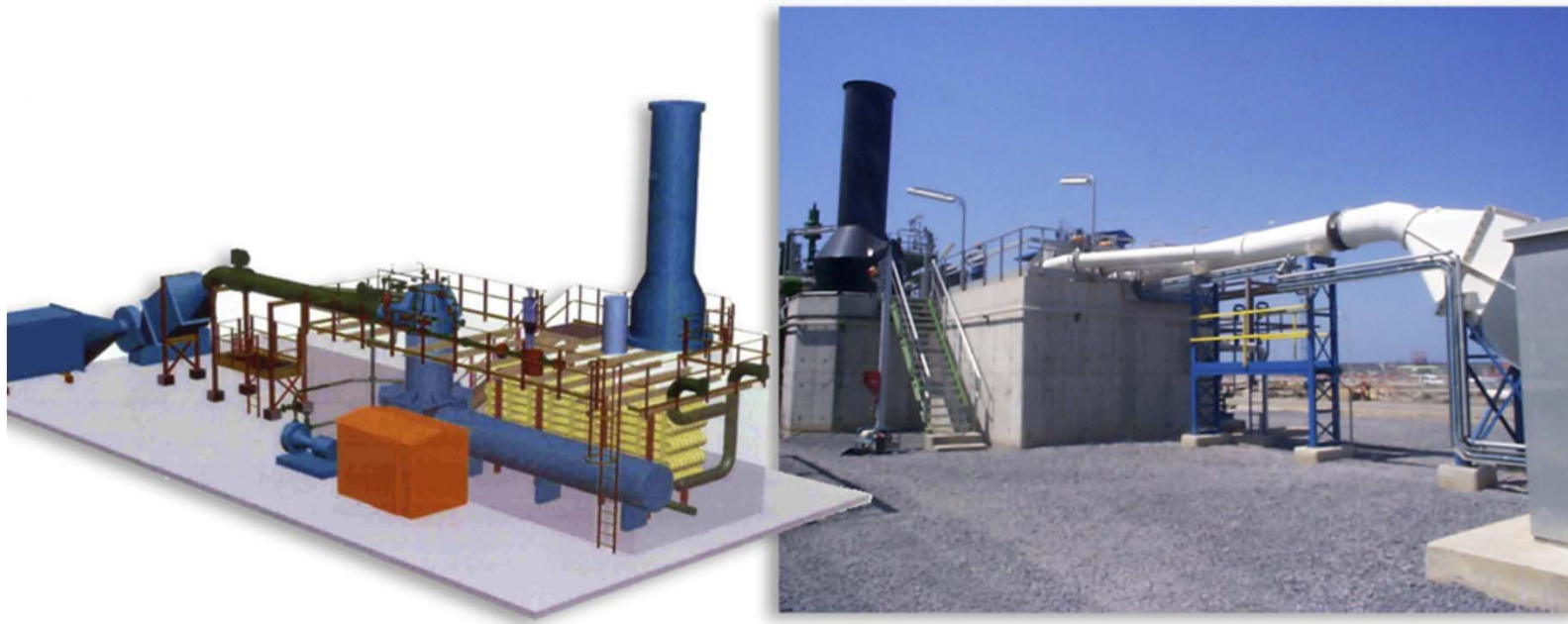


BOG Compressors



- Gas is compressed to 1000 kPa in order to absorb BOG from the recondenser and supply the fuel to fuel gas system.
- Burckhardt vertical compressor

SCV (Submerged Combustion Vaporiser)



- Low CAPEX, high OPEX – nominal fuel gas consumption ~ 2% NG
- Fast start-up, easy capacity adjustment (12 - 100%).
- Minimal emissions - burner Sub-X, 25 ppmv NOx

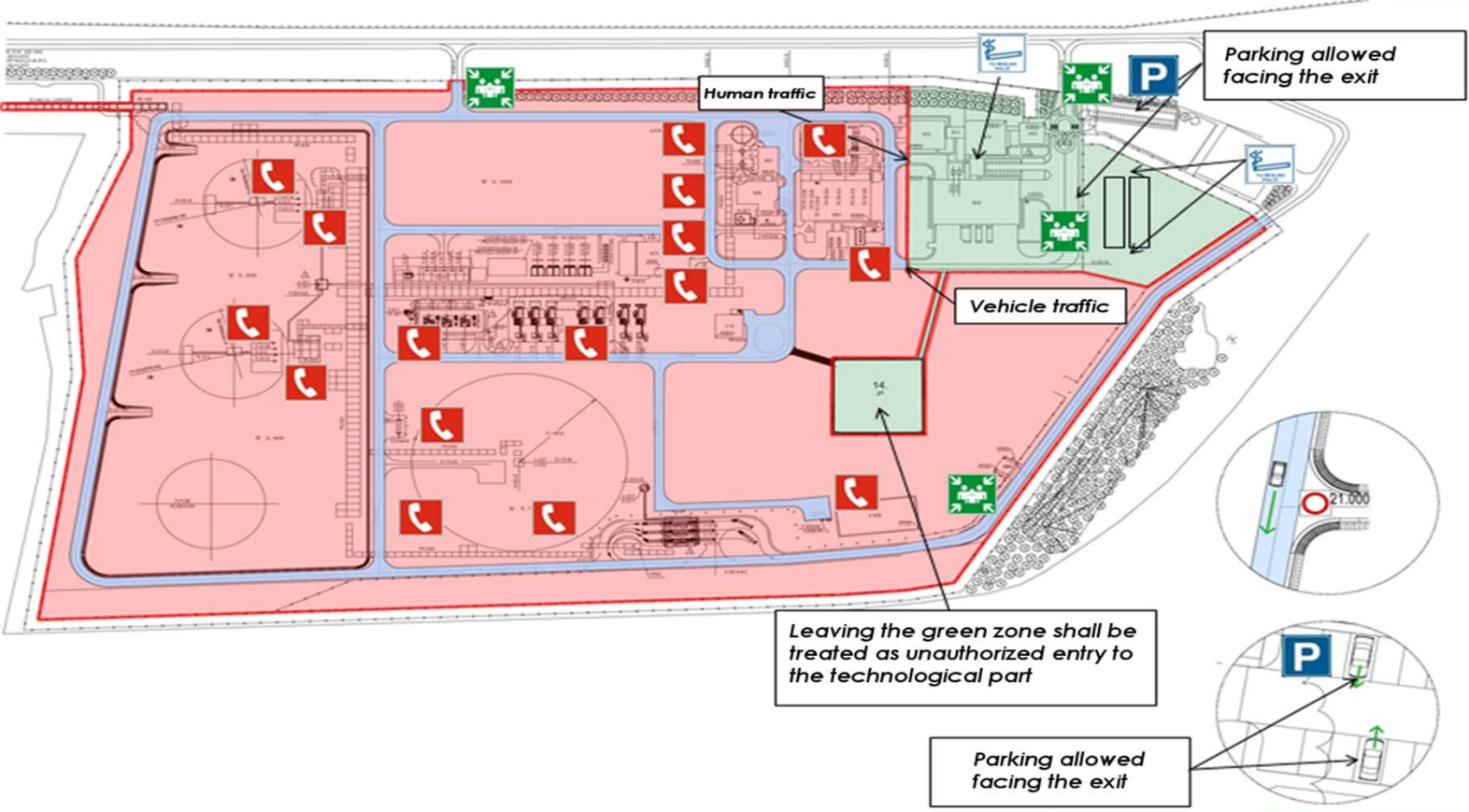
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Safety rules at LNG Terminal

Safety rules at LNG TERMINAL



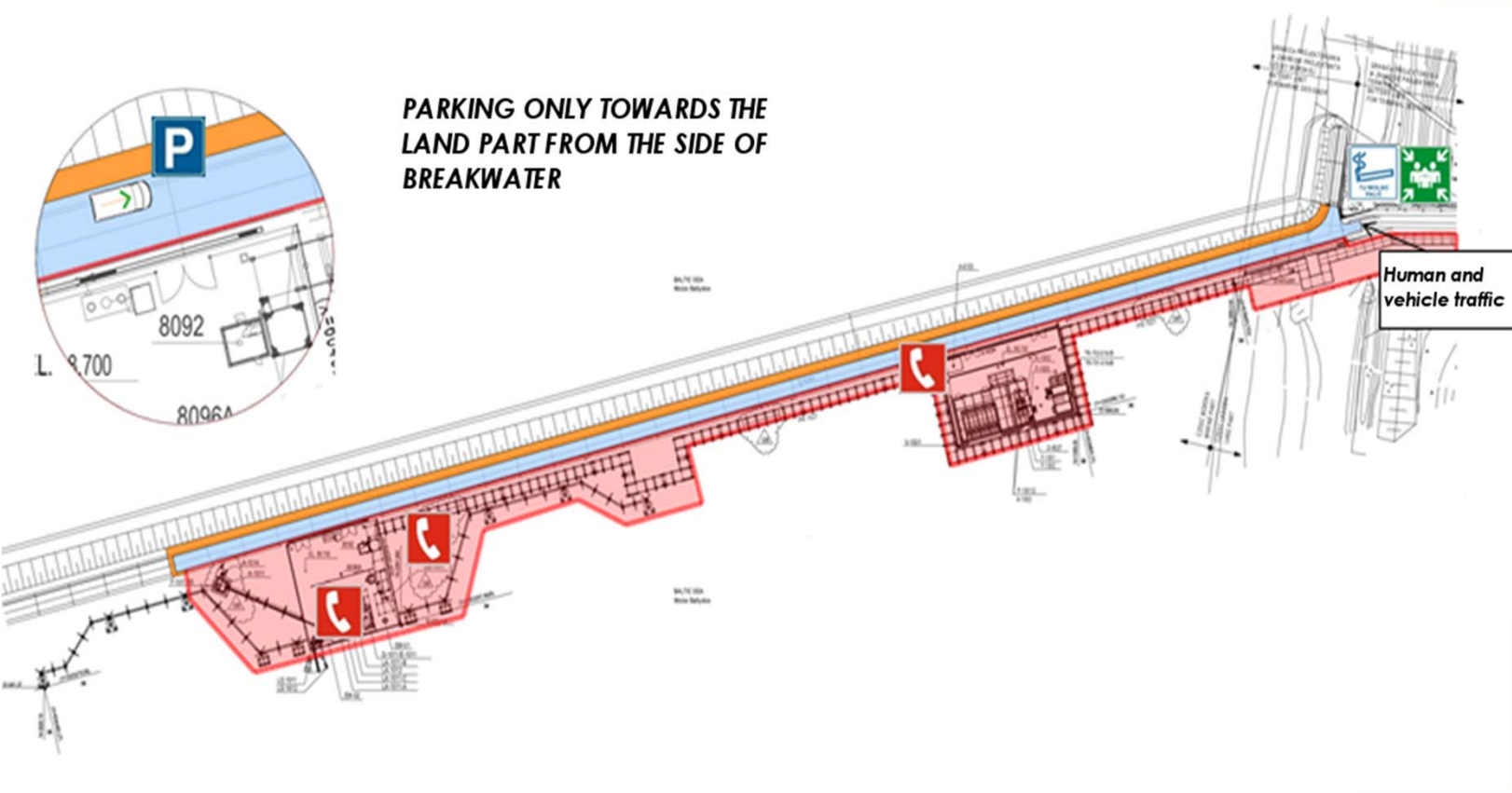
1. Green zone - administrative area of the Terminal (office buildings) ACCESS CONTROL LEVEL 1



Safety rules at LNG TERMINAL



2. Orange zone- JETTY ACCESS CONTROL LEVEL 2



Safety rules at LNG TERMINAL



2. Orange zone- JETTY ACCESS CONTROL LEVEL 2

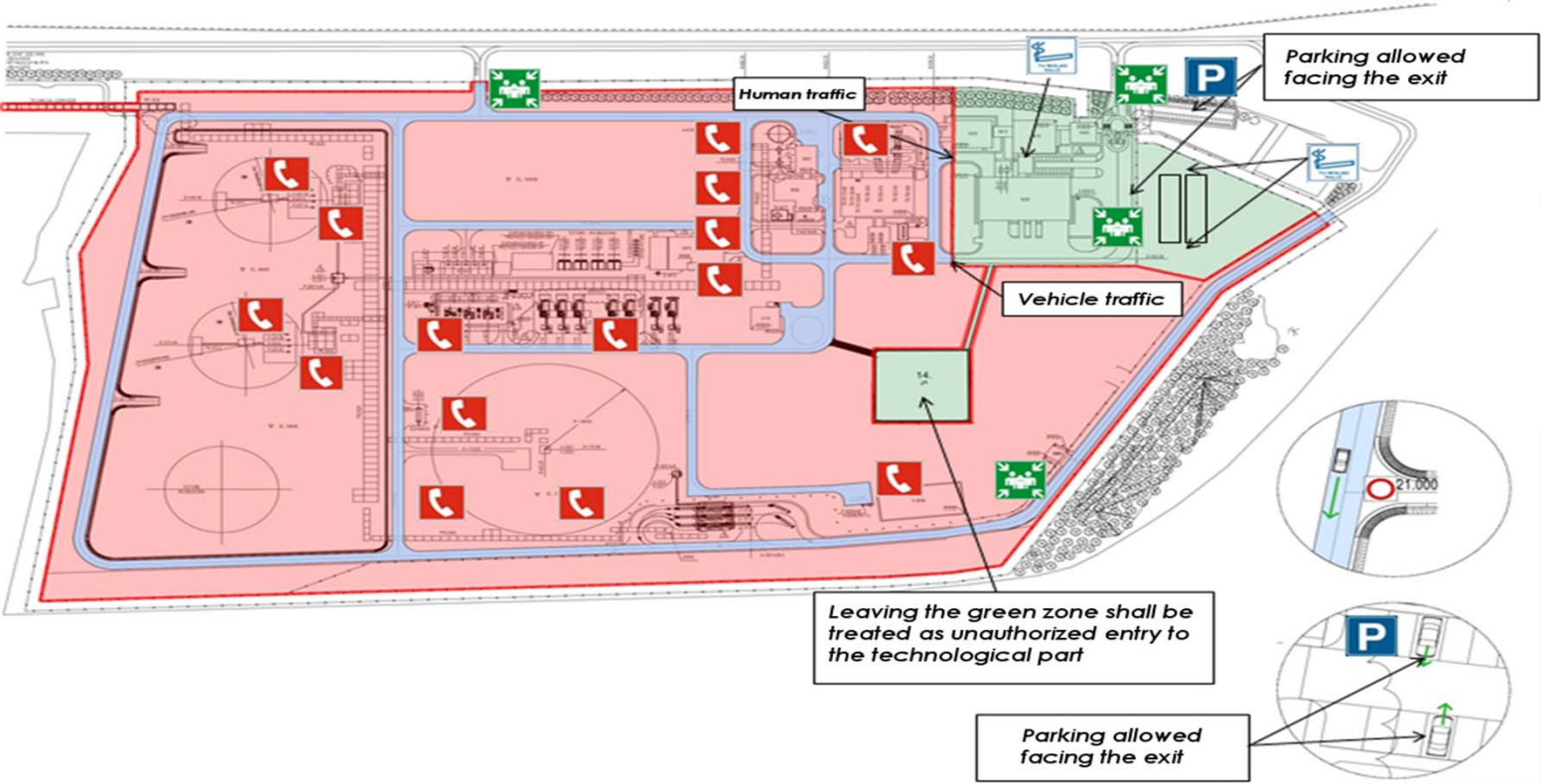
Basic rules of health and safety in the Orange Zone are:

- every person entering in the orange zone must do safety training
- every person must have PPE: helmet, safety glasses , safety clothing antistatic flame-retarded clothing , protective shoes
- all work employees are doing on the written order PTW.
- car entry only on command, driving only at designated road
- full smoking ban.

Safety rules at LNG TERMINAL



3. Red zone - technological area with access control by the gate
ACCESS CONTROL LEVEL 3

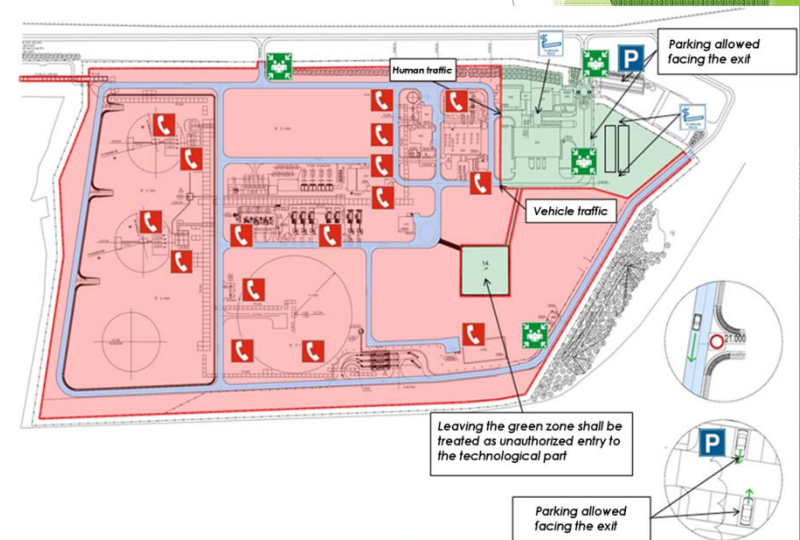


Safety rules at LNG TERMINAL

3. Red zone - technological area with access control by the gate
ACCESS CONTROL LEVEL 3

Basic rules of health and safety in the Red Zone are:

- basic rules of health and safety in the Red Zone
- obligation of using non-sparking devices and tools, compliant with ATEX Level 2 requirements (e.g. mobile phones, radio communicators, tools, etc.)





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**Joint inspections
at LNG Terminal**

Joint Inspections at LNG Terminal

- Joint inspections of the three bodies of the State Fire Service, Labour Inspectorate and Environmental Protection Inspectorate have been organized since the beginning of the terminal

One of the elements of joint control is verification of checklists

Checklists were created as a result of the work of the Working Group on Oil and Gas Industry, created by the Chief Labor Inspector with the participation of the Chief Commander of the State Fire Service and the Chief Inspector of Environmental Protection.

It was created based on the knowledge and experience of both oil and gas industry representatives and control authorities.

Checklists have been designed as a tool for both entrepreneurs and supervisors and supervisors to carry out proper self-monitoring and control.

Joint Inspections at LNG Terminal

- Checklists are used in the first stage for self-inspection by individual oil and gas sector entrepreneurs (from 1 March to 31 May).
- The second step is to carry out control and preventive actions on the selected group of entrepreneurs by the bodies of the National Labor Inspectorate, the State Fire Service and the Voivodeship Environmental Inspectorates according to the same checklists (from 1 June to 30 November).

Checklists cover four separate blocks of issues:

Vol. I - health and safety,

Vol. II - fire protection

Vol. III - environmental protection

Vol. IV - Common issue (SEVESO)

Joint Inspections at LNG Terminal

- 1) the checklists given to the plant operators allowed for reliable preparation and during the inspection have improved their work;
- 2) questions included in the lists for storage and distribution of fuel and oil, although not related to all security areas in the plants, allow for systematic control;
- 3) In 2017, due to the joint control at the LNG part PIRS, each of the services and inspectorates developed a list of the individual plants for that plant, which had already been sent to the plant operator;
- 4) Joint inspections allowed to develop working methods: joint start of inspections, analysis of documents, joint lustration of the plant, separate analysis of documents, information, etc., which are the responsibility of the various authorities (eg fire fighting equipment, fire control compliance), common conclusion and summary of activities;
- 5) with regard to not disturbing the functioning of the plant, it is advisable to develop by all participants of the control program at the start of the activity

Thank you for your attention

