Baltic Sea Region LNG Competence Centre
Scope of the service package.

BSR LNG Competence Centre is going to be an assosiation of research, educational, training and consulting institutions, which are interested in and express their will, to cooperate which each other for building LNG competency within Baltic Sea Region. The Centre provides a complex package in order to ensure enough personnel with LNG related competencies.

According to eco-friendly policies realized on international and national levels, more and more transport means and energy producers will use the natural gas as the fuel. Therefore within next few years, the wide business sector will need professionalists with competencies to proper behaving and handling when dealing with LNG fuel. The LNG oriented jobs and positions can be divided into three groups:

- LNG management level
- LNG support level
- LNG operational level.

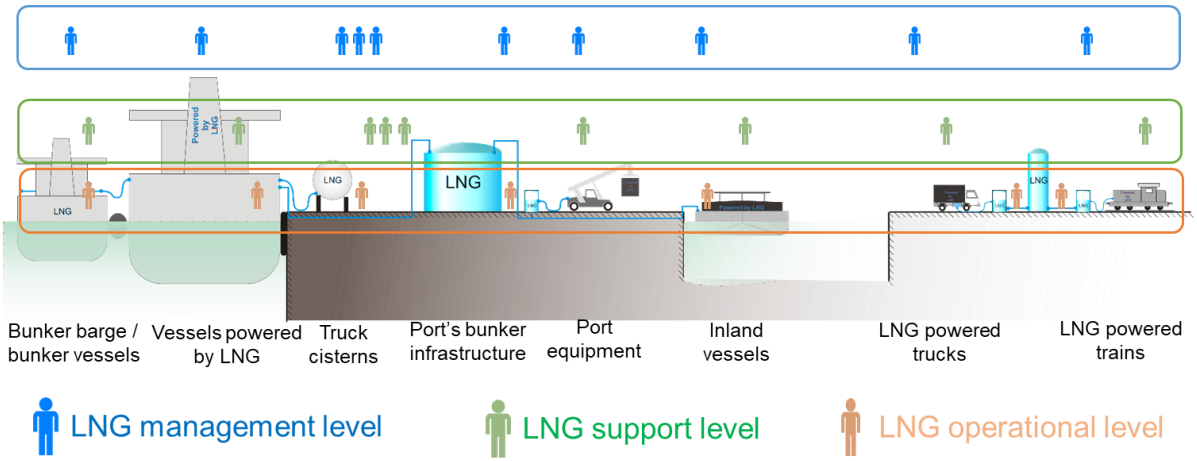

Figure 1 Positions and jobs where obtaining a proper LNG training is necessary.

1. Training scope and methodology

Nowadays, the BSR LNG Competence Centre provides two kinds of training. One of them, called "The Maritime LNG Training", is dedicated for crew of the vessels using gases or other low-flashpoint fuels or personnel involved in the sea sectors. It presents a practice aspects of LNG technology and procedures. The second one "LNG Value Chain Training" is designed for management level of enterprises using LNG technology. It presents exploitation of LNG technologies from a business and a law point of view. The "LNG Value Chain training" gives also possibilities to share experiences, specific knowledge and even to find a business partner.

1.1. Content of Maritime LNG training.

The scope of Maritime LNG training is shaped according to STCW convention (International Convention on Standards of Training, Certification and Watchkeeping) requirements for crew of vessels subjects to IGF code (which uses gases or other low-flashpoint fuels). The convention describes two degrees of such courses: basic and advance. The level of training depends on the responsibilities on board:

- Basic – Required for seafarers responsible for designated safety duties associated with care, use or emergency response to the fuel.
- Advance – *Masters, engineer Officers and all personel with immadiete responsibility for the care and use of fuels and fuel systems.*

Currently only the basic one (which last 1 day) is offered.

The following topics will be explained during this training:

B1. Contribute to the safe operation of a ship subject to the IGF Code

- Design and operational characteristics of ships subject to the IGF Code;
- Basic knowledge of ships subject to the IGF Code, their fuel systems and fuel storage systems:
  - fuels addressed by the IGF Code:
    definition, low flash point liquids, fuel examples, SOLAS regulations
  - types of fuel systems subject to the IGF Code:
    low pressure system, high pressure system, fuel system layout
  - atmospheric, cryogenic or compressed storage of fuels on board ships subject to the IGF Code:
    basic tank types, construction and parameters of atmospheric tanks, construction and parameters of cryogenic tanks, construction and parameters of compressed tanks, tanks protection, LNG storage tanks on board LNG carrier
  - general arrangement of fuel storage systems on board ships subject to the IGF Code:
    bottom tanks, on deck tanks, acceptable location of the fuel tanks, location of fuel piping, fuel preparation room
  - hazard zones and areas:
    definition of hazard zone, definition of hazard area, area classification, hazardous area zones
  - typical fire safety plan:
    specification of fire safety plan, symbols, localizations, regulations
  - monitoring, control and safety systems aboard ships subject to the IGF Code
    required system on IGF ships, level indicators for liquefied gas fuel tanks, temperature monitoring, overflow control, ESD, audible and visual alarms, example of safety systems on board LNG carrier
- Basic knowledge of fuels and fuel storage systems' operations on board ships subject to the IGF Code:
  - Piping systems and valves
  - Atmospheric, compressed or cryogenic storage
  - Relief systems and protection screens:
    pressure relief systems for liquefied gas fuel tanks, sizing of relieving system
  - Basic bunkering operations and bunkering systems:
    bunkering station, bunkering system arrangement, bunkering from barge/small ship, bunkering from shore by truck or pipeline
  - Protection against cryogenic accidents

- Fuel leak monitoring and detection:
  gas detection, gas engine monitoring, gas compressor monitoring

- Basic knowledge of the physical properties of fuels on board ships subject to the IGF Code:
  - Properties and characteristics:
    chemical composition, boiling point, density and specific gravity
  - Pressure and temperature including vapor pressure/temperature relationship
    flammability, ignition and flame temperatures
- Knowledge and understanding of safety requirements and safety management on board ships subject to IGF Code:
  safety management, risk and safety, training

B2. Take precautions to prevent hazards on a ship subject to the IGF Code

- Basic knowledge of the hazards associated with operations on ships subject to the IGF Code:
  - Health hazard:
    methane (emergency procedures in case of : fire, spillage, vapour inhaled, liquid on skin, liquid in eye, effect of liquid, effect of vapour)
    nitrogen (emergency procedures in case of : fire, spillage, vapour inhaled, liquid on skin, liquid in eye, effect of liquid, effect of vapour)
  - Environmental hazard:
    methane, nitrogen
  - reactivity hazards
  - corrosion hazards
  - ignition, explosion and flammability hazards
  - sources of ignition
  - electrostatic hazards
  - toxicity hazards
  - vapor leaks and clouds
  - extremely low temperatures
  - pressure hazards
  - fuel batch differences
- Basic knowledge of hazard controls:
  - emptying, inerting, drying and monitoring techniques
  - anti-static measures
  - ventilation
  - segregation
  - inhibition
  - measures to prevent ignition, fire and explosion
  - atmospheric control
  - gas testing
  - protection against cryogenic damages (LNG)
- Understanding of fuel characteristics on ships subject to the IGF Code as found on a Safety Data Sheet (SDS)

B3. Apply occupational health and safety precautions and measures

- Awareness of function of gas-measuring instruments and similar equipment:
  - Gas testing:
    portable gas detectors, fix gas detectors, gas testing
- Proper use of specialized safety equipment and protective devices:
  - Breathing apparatus
  - Protective clothing
  - Resuscitators

- Rescue and escape equipment
- Basic knowledge of safe working practices and procedures in accordance with legislation and industry guidelines and personal shipboard safety relevant to ships subject to the IGF Code, including:
  - Precaution to be taken before entering hazardous spaces and zones:
    enclosed spaces – definition, enclosed space entry procedures
- Precautions to be taken before and during repair and maintenance work
  - Work permits
    maintenance and repair procedures, inspection/survey plan,
  - Safety measures for hot and cold work
    hot work – definition, cold work – definition, work permits, regulations for hot works
- Basic knowledge of first aid with reference to a Safety Data Sheet (SDS)
  Medical First Aid Guide (MFAG), Material Safety Data Sheet

B4. Carry out firefighting operations on a ship subject to the IGF Code

- Fire organization and action to be taken on ships subject to the IGF Code
- Special hazards associated with fuel systems and fuel handling on ships subject to the IGF Code
- Firefighting agents and methods used to control and extinguish fires in conjunction with the different fuels found on board ships subject to the IGF Code
- Firefighting system operations:
  general requirements with regard to pumps, capacity, area covered etc., regulations for fire main, regulations for water spray system, regulations for dry chemical powder fire-extinguishing system, regulations for fire detection and alarm system

B5. Respond to emergencies

- Basic knowledge of emergency procedures, including emergency shutdown
  - Emergency procedures/ requirements for:
    fire and emergency breakaway, emergency SHUTDOWN (ESD), LNG JETTISON, LNG vapor leakage to barrier, LNG Liquid leakage to barrier, water leakage to barrier, failure of cargo pump, ship to ship transfer

B6. Take precautions to prevent pollution of the environment from the release of fuels found on ships subject to the IGF Code

- Basic knowledge of measures to be taken in the event of leakage/spillage/ venting of the fuels from ships subject to the IGF Code, including the need to:
  - Reporting relevant information to the responsible persons
    contingency plans, communication sources
  - Awareness of shipboard spill/leakage/ venting response procedures
    contingency plans, communication with media and public, post-incident review and investigation
  - Awareness of appropriate personal protection when responding to a spill/ leakage of fuel addressed by the IGF Code:
    breathing apparatus, protective clothing

1.2. Content of LNG Value Chain training

The LNG Value Chain training is dedicated mostly for business management level. It consists of two parts:

- the first part which describes physical and chemical properties of LNG, its storage and transfer systems, threats and safety procedures, proper behaving when dealing with LNG-related accidents.
- the second part is dedicated for sharing experiences, knowledge and presenting study cases.

The Integrated Value Chain training will cover following topics:

VC1. Cryogenic and pressure technologies

- Basic knowledge of ships subject to the IGF Code, their fuel systems and fuel storage systems:
  - fuels addressed by the IGF Code:
    definition, low flash point liquids, fuel examples, SOLAS regulations
  - types of fuel systems subject to the IGF Code:
    low pressure system, high pressure system, fuel system layout
  - atmospheric, cryogenic or compressed storage of fuels on board ships subject to the IGF Code:
    basic tank types, construction and parameters of atmospheric tanks, construction and parameters of cryogenic tanks, construction and parameters of compressed tanks, tanks protection, LNG storage tanks on board LNG carrier
  - general arrangement of fuel storage systems on board ships subject to the IGF Code:
    bottom tanks, on deck tanks, acceptable location of the fuel tanks, location of fuel piping, fuel preparation room
  - hazard zones and areas:
    definition of hazard zone, definition of hazard area, area classification, hazardous area zones
  - typical fire safety plan:
    specification of fire safety plan, symbols, localizations, regulations
  - monitoring, control and safety systems aboard ships subject to the IGF Code
    required system on IGF ships, level indicators for liquefied gas fuel tanks, temperature monitoring, overflow control, ESD, audible and visual alarms, example of safety systems on board LNG carrier

VC2. LNG storage and bunkering operations

- Basic knowledge of fuels and fuel storage systems' operations on board LNG powered ships:
  - Piping systems and valves (as above)
  - Atmospheric, compressed or cryogenic storage (as above)
  - Relief systems and protection screens:
    pressure relief systems for liquefied gas fuel tanks, sizing of relieving system
  - Basic bunkering operations and bunkering systems:
    bunkering station, bunkering system arrangement, bunkering from barge/small ship, bunkering from shore by truck or pipeline
  - Protection against cryogenic accidents
  - Fuel leak monitoring and detection:
    gas detection, gas engine monitoring, gas compressor monitoring
- Basic knowledge of the physical properties of fuels on board ships subject to the IGF Code:
  - Properties and characteristics:
    chemical composition, boiling point, density and specific gravity
  - Pressure and temperature including vapor pressure/temperature relationship
    flammability, ignition and flame temperatures
- Knowledge and understanding of safety requirements and safety management on board ships subject to IGF Code:
  safety management, risk and safety, training

VC3. LNG safety and operations

- Basic knowledge of the hazards associated with LNG operations:
  - Health hazard:
    methane (emergency procedures in case of : fire, spillage, vapour inhaled, liquid on skin, liquid in eye, effect of liquid, effect of vapour)
    nitrogen (emergency procedures in case of : fire, spillage, vapour inhaled, liquid on skin, liquid in eye, effect of liquid, effect of vapour)
  - Environmental hazard:
    methane, nitrogen
  - reactivity hazards
  - corrosion hazards
  - ignition, explosion and flammability hazards
  - sources of ignition
  - electrostatic hazards
  - toxicity hazards
  - vapor leaks and clouds
  - extremely low temperatures
  - pressure hazards
  - fuel batch differences
- Basic knowledge of hazard controls:
  - emptying, inerting, drying and monitoring techniques
  - anti-static measures
  - ventilation
  - segregation
  - inhibition
  - measures to prevent ignition, fire and explosion
  - atmospheric control
  - gas testing
  - protection against cryogenic damages (LNG)
- Understanding of fuel characteristics on ships subject to the IGF Code as found on a Safety Data Sheet (SDS)

VC4. LNG project management, business modelling
VC5. LNG economy purchase, contract management
VC6. LNG for road, rail and inland water transport and industry
VC7. LNG standards and regulation, legal environment

2. LNG training infrastructure

The LNG training infrastructure can be used instead of exercises in real conditions. Especially when such activities could be danger or costly. Members of Competency Centre can make available their research and training LNG oriented infrastructure especially for joint studies and trainings purposes. The infrastructure gathered within the Competence Center allow to provide following exercises:

- Transfer of LNG between ship and shore installations: on both positions terminal and a ship. Bunkering operation.
- Emergency operations during LNG transfer/ storage
- Preparing LNG for use by engines or for distribution by grids
- Firefighting procedures

3. R&D services

In order to allowed a distance learning BSR Competence Centre will prepare materials which will be available on the Internet. They will consist of video lecture presenting the topics of Maritime LNG and LNG Value Chain trainings.
The movies recorded in VR technology (360 degrees) to present procedures and actions which have to be undertaken during bunkering operations and emergency response will be available as well.

4. Certification

BSR LNG Competence Centre issues its own certificates for all participants of Maritime LNG trainings using following template:


BALTIC SEA REGION
LIQUEFIED NATURAL GAS
COMPETENCE CENTRE

Go LNG

Interreg
Baltic Sea Region

CERTIFICATE

No. «No»

«Name»

has attended and successfully completed "The Maritime LNG Training"

in the following scope:

- Contribute to the safe operation of a ship subject to the IGF Code
- Take precautions to prevent hazards on a ship subject to the IGF Code
- Apply occupational health and safety precautions and measures
- Carry out firefighting operations on a ship subject to the IGF Code (without practical exercise)
- Respond to emergencies
- Take precautions to prevent pollution of the environment from the release of fuels found on ships subject to the IGF Code

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coordinator
Baltic Sea Region Liquified Natural Gas Competence Centre

[City], [Date]

1. The certificate consists of:
    a. personal data: name and last name,
    b. certificate number,
    c. place and date of training.
2. Description of main topics which were learned during a training.
3. Logos:

- InterReg BSR programme
- Project Go LNG

In addition, the content of Maritime LNG training can be a base for obtaining a certificate issued by national maritime administration. Every member of the Competence Centre has a right to obtaining the accreditation from appropriate administration.

5. Summary.

The proper training should be chosen taking into account two criteria (Table 1):

- Scope of responsibility on particular position or task
- The amount of LNG which is handled by the given installation.

Table 1 Suggested course/ training according to responsibilities and the LNG amount.

	The amount of LNG		
	Small	Medium	Large
LNG management level	LNG Value Chain	LNG Value Chain	LNG Value Chain
LNG support level	Maritime LNG basic	Maritime LNG basic	Maritime LNG basic
LNG operational level	Maritime LNG basic	Maritime LNG advanced	Maritime LNG advanced

Duration of both, currently available trainings is 1 day.