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Summer 6-27-2017

### Liquefied Natural Gas (LNG) as a Marine Fuel: Optimising the Associated Infrastructure in the Baltic Sea Region

Dimitrios Dalaklis DD

*World Maritime University, dd@wmu.se*

Josefin Madjidian jam

*World Maritime University, jam@wmu.se*

Aykut I. Ölçer AIO

*World Maritime University, aio@wmu.se*

Fabio Ballini FB

*World Maritime University, fb@wmu.se*

Momoko Kitada MK

*World Maritime University, mk@wmu.se*

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# Liquefied Natural Gas (LNG) as a Marine Fuel: Optimising the Associated Infrastructure in the Baltic Sea Region

Dimitrios Dalaklis, Josefin A. Madjidian, Aykut Ölcer,  
Fabio Ballini, Momoko Kitada



WMU's mission is to be the World Centre of excellence in postgraduate maritime and oceans education, professional training, and research, while building global capacity and promoting sustainable development.





***Develops global regulations*** - maintain *safety* and *security* of *international* shipping and to *prevent marine pollution* from ships

***Adopts instruments*** (*legislation*) and *guidelines* at the intergovernmental level

**Member Governments are responsible for**  
***implementing and enforcing*** the adopted regulatory framework



# International Convention on Prevention of Pollution by Ships , **MARPOL 73/78**

**Annex VI** represents the regulatory framework tackling exhaust  
gas emissions from ships

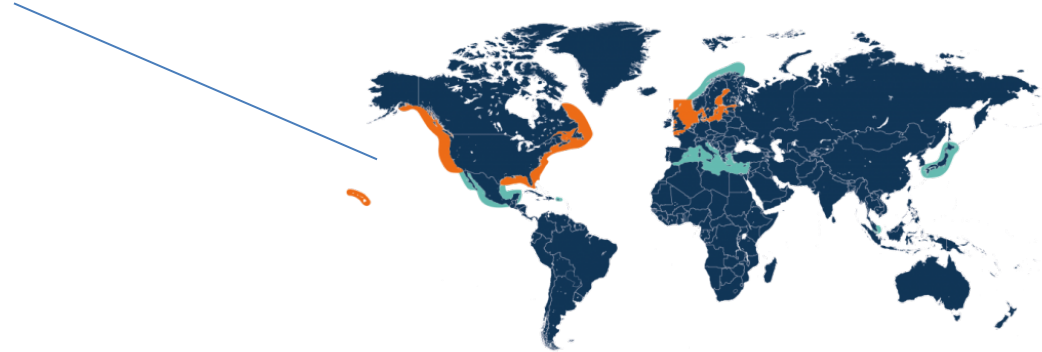
- prohibits deliberate emissions of ozone depleting substances
- sets progressive reductions (tiers) in emissions of sulphur oxides (SO<sub>x</sub>), nitrogen oxides (NO<sub>x</sub>) and particulate matter (PM)
- also introduces designated emission control areas with more stringent standards for above emissions
- ensures an energy efficiency standard for ships: (1) the Energy Efficiency Design Index (EEDI), for new ships, and (2) the Ship Energy Efficiency Management Plan (SEEMP) for all ships

# WHAT ABOUT THE BALTIC SEA REGION?



## The EMISSION CONTROL AREAS

### SECA / NECA



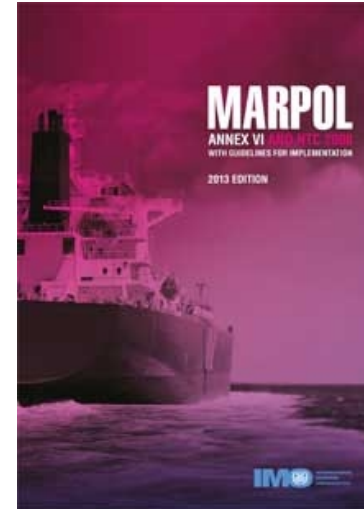
Baltic Sea (SO<sub>x</sub> only)

North Sea (SO<sub>x</sub> only)

North American area (SO<sub>x</sub>, NO<sub>x</sub> and PM)

United States Caribbean Sea area (SO<sub>x</sub>, NO<sub>x</sub> and PM)

In November 2016 IMO designated the North Sea and the Baltic Sea as NECAs, starting 1 January 2021



**These regulations have and will continue to change the shipping industry's demand for alternative fuels!**

**....which in turn affects the fuel prices and the cost effective available technology and infrastructure**



# The alternatives

operations in SECA areas have a choice of

- a) integrating an emission abatement technology (i.e. a scrubber)
- b) using low sulphur -but more expensive- fuel such as MGO (marine gas oil) or MDO (marine diesel oil)
- c) opting for liquefied natural gas (LNG)

# Liquefied Natural Gas

**LNG is the most promising alternative shipping fuel technology in the short to medium term, specially for Short Sea Shipping and inland waterway transport**

**Reaches environmental targets of sulphur, nitrogen and particulate matters emissions in SECAs and NECAs**





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

20 main partners and 50 associated partners

2016-2019



EUROPEAN UNION  
European Regional  
Development Fund





## Directive 2014/94/EU

framework of measures for the **deployment of alternative fuels infrastructure** in EU

setting out **minimum requirements** for e.g. recharging points for electric vehicles and refuelling points for natural gas (LNG and CNG) and hydrogen

*to be implemented by means of Member States' national policy frameworks*

# The obligation to comply with EU infrastructure policy



	Coverage	Timings
<b>LNG at maritime ports</b>	Ports of the TEN-T core network	by end 2025
<b>LNG at inland ports</b>	Ports of the TEN-T core network	by end 2030
<b>LNG for heavy-duty vehicles</b>	Appropriate number of points along the TEN-T core network	by end 2025



BSR LNG  
Business  
Cluster



BSR Blue  
Corridor  
Strategy



BSR LNG  
Competence  
center



LBG in BSR



LNG bunkering  
map





## BSR Blue Corridor Strategy ...



... links transport flows, LNG infrastructure development, and business models into an **efficient LNG distribution strategy for the BSR**

... maps **development patterns** of LNG-related activities and capabilities

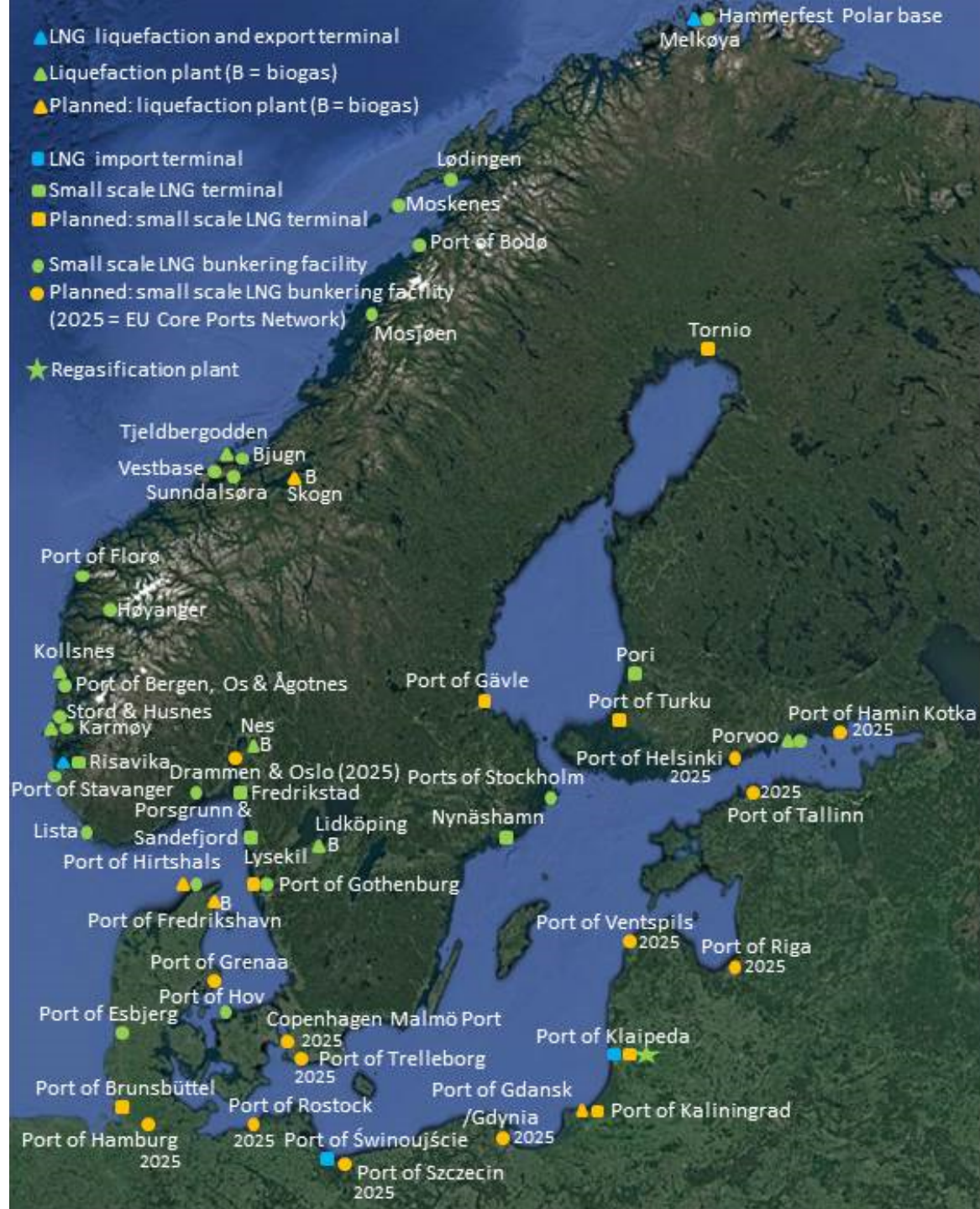
Online:    Toolbox with **regulations and guidelines**  
              LNG **bunkering map**

*Points out the missing links and suggests the ways forward that  
will have a positive effect on both business and technical  
development in the region*

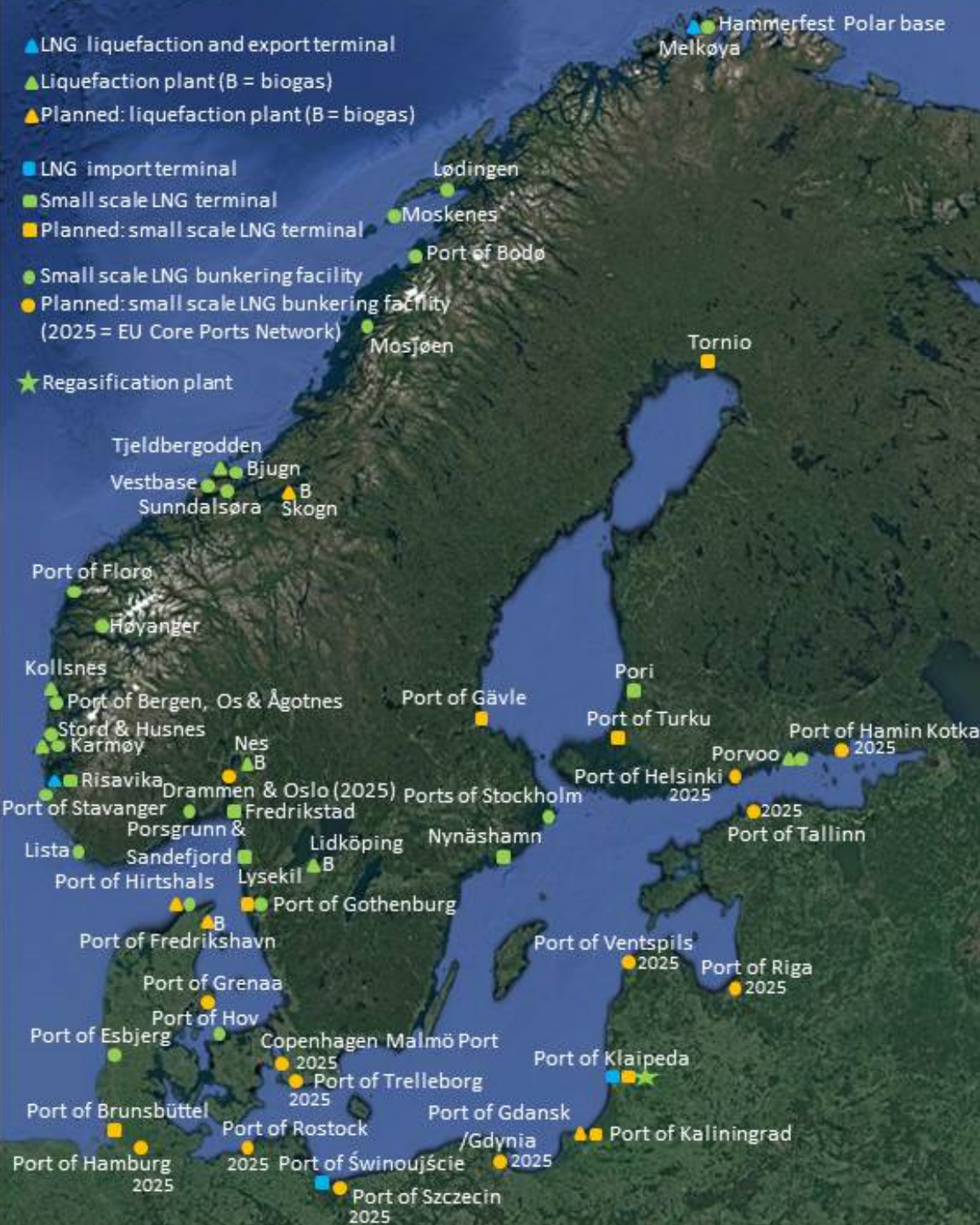


## Widening the LNG VALUE CHAIN → sharing the costs and having more than one user

- Visualize the existing LNG value chain
- Describes the possibility for a wider value chain:
  - incorporating other modalities and industries
  - incorporating biogas into the gas grids







LNG  
bunkering  
stations  
ROAD

EU transport  
corridors  
that include  
the BSR  
region

Major heavy  
industries  
that use LNG  
as main  
energy  
source

Potential  
industries  
using LNG



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



Baltic  
LNG Cluster



BSR Blue  
Corridor Strategy



BSR LNG  
Competence Center



LBG in BSR



LNG  
Bunkering Map



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# BSR BLUE CORRIDOR STRATEGY

LNG infrastructure development and mobilization the critical mass of technology, business partnerships, and regulative implement LNG powered transport networks in BALTIC SEA REGION.

# Thank you very much for your attention!



EUROPEAN UNION  
European Regional  
Development Fund

