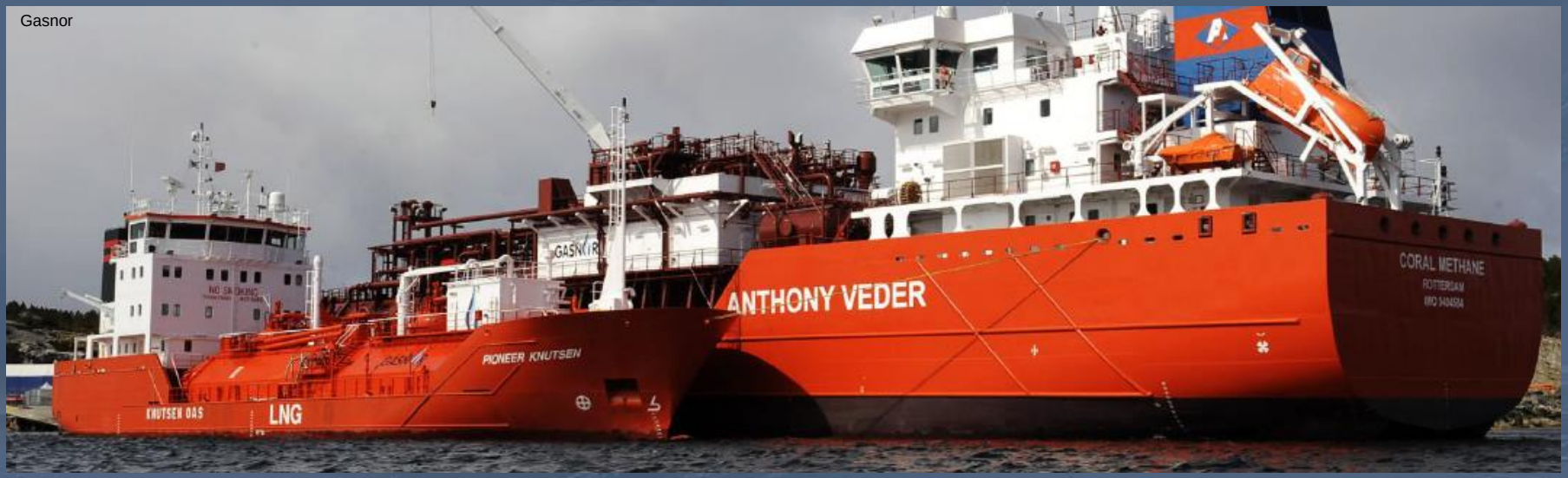
moffatt & nichol

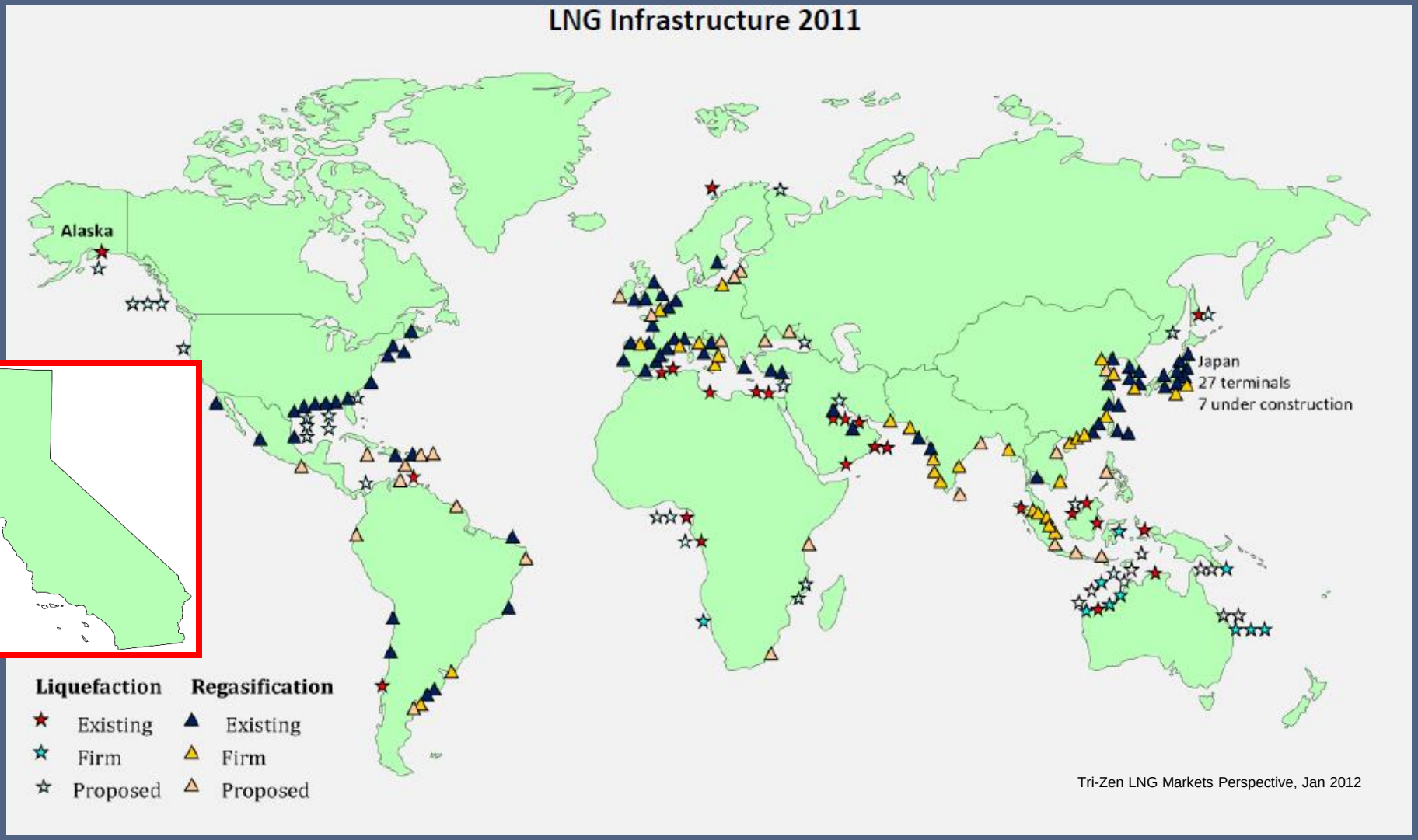


LNG Bunkering Facilities

Marc Percher P.E., Walnut Creek, CA

creative people, practical solutions.

Existing & Planned LNG Terminals (2012)



LNG Terminal

Baltic LNG Bunkering (2011)

Figure 2 Existing and planned production plants and LNG terminals in the SECA
Source: Gas Infrastructure Europe, 2011, AF, 2011, Gasnor, Gazprom.

Danish Maritime Authority

- Function of Landscape (piping difficult)

Components of LNG Bunkering

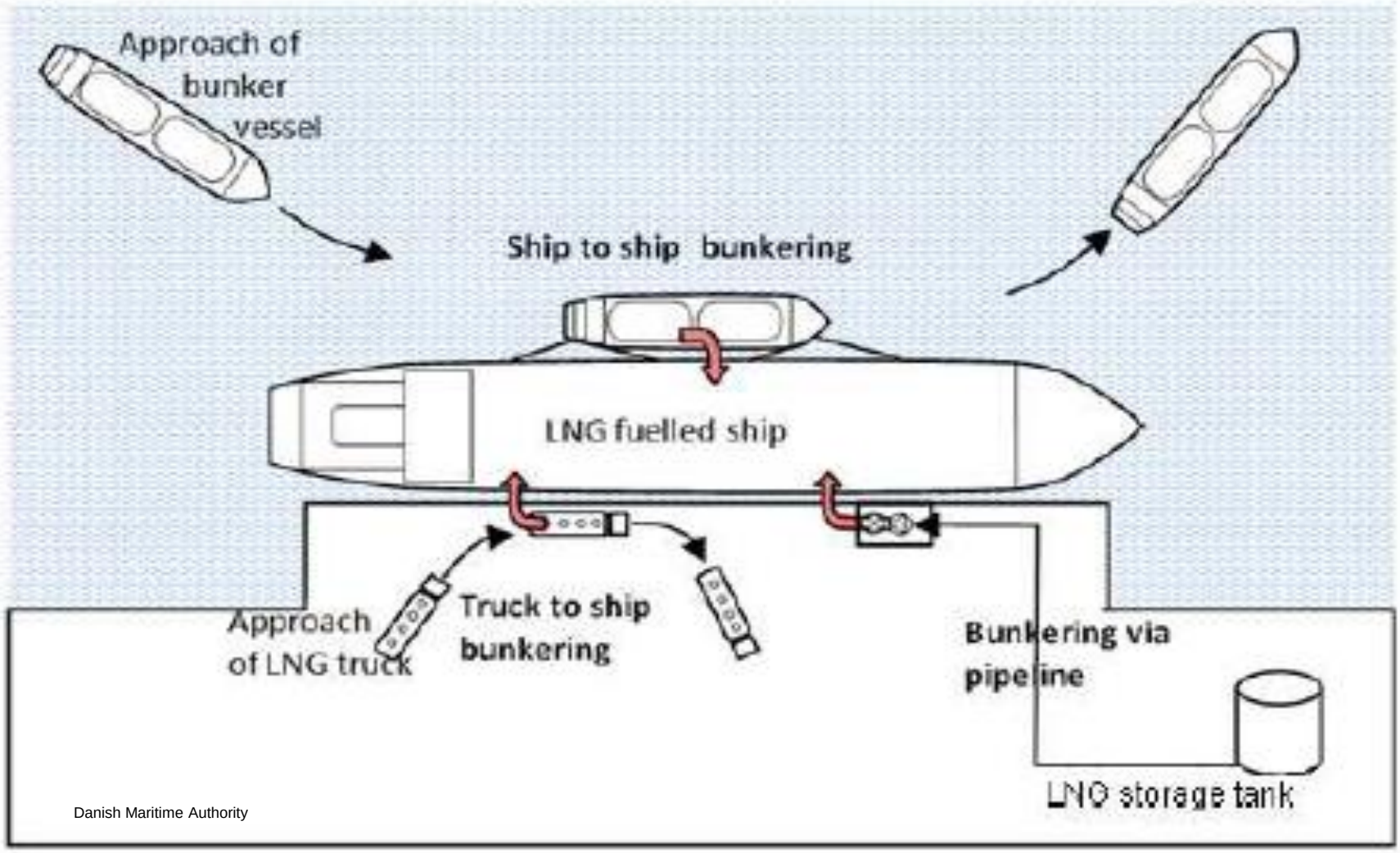
- Storage / Piping
- Support Structure
- Mooring / Berthing Structures*
- Marine Transfer (Hose or Arm)*
- Vessel*

Conventional At Shore

OR

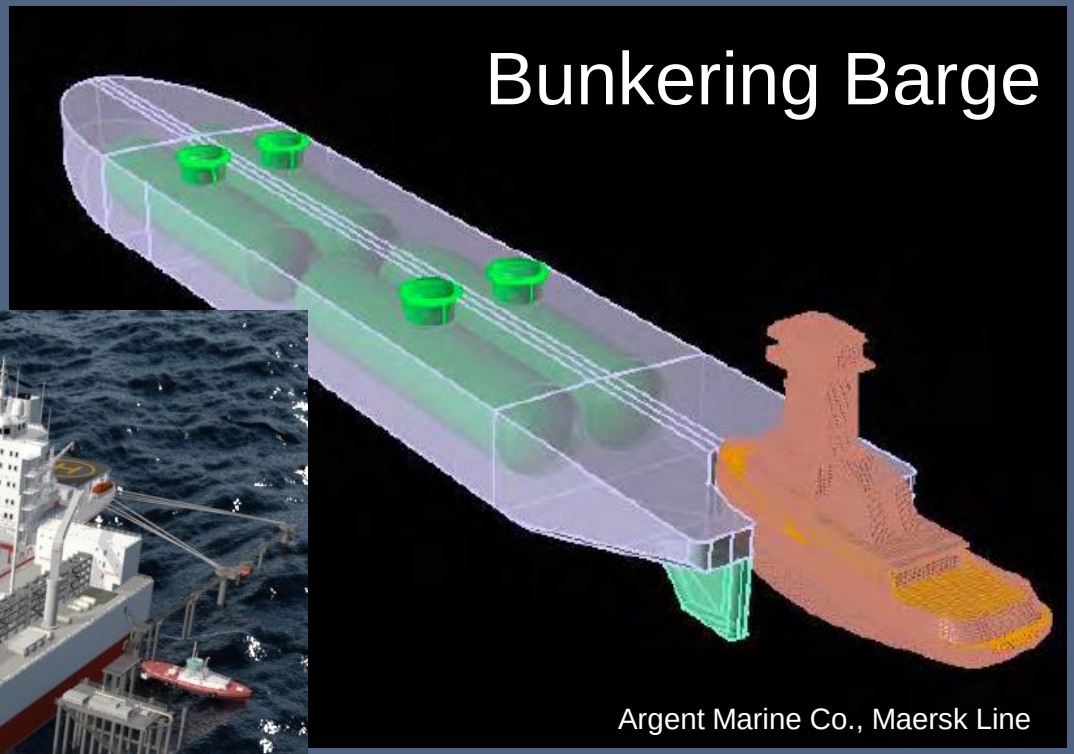
- Floating Operations (need * from above)
  - Can be located offshore (in shallow / protected water)

LNG Bunkering at Shore



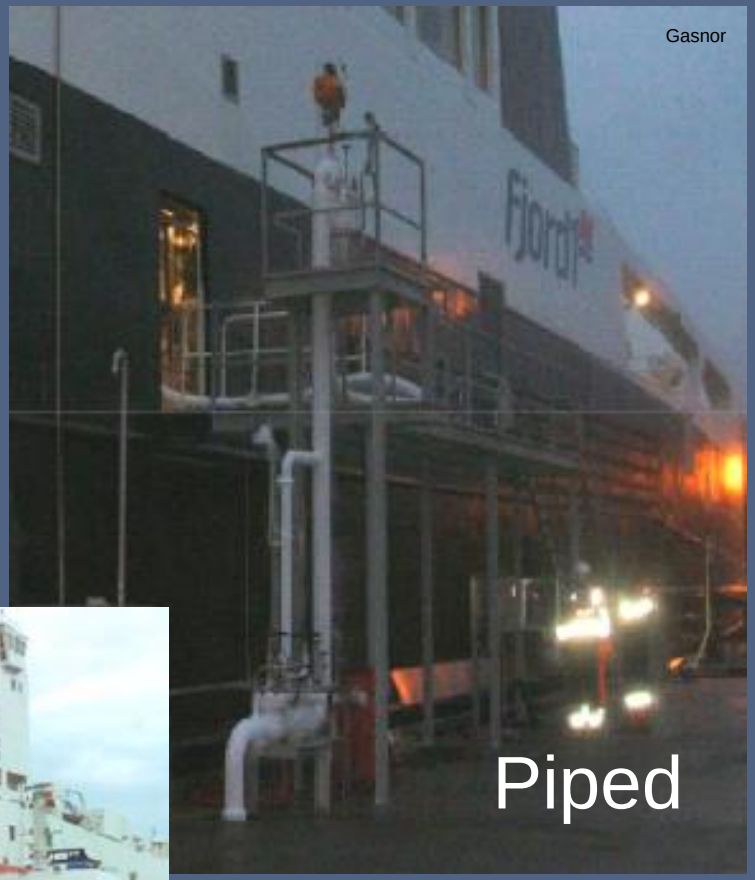
Danish Maritime Authority

Floating LNG Storage / Bunkering Ships

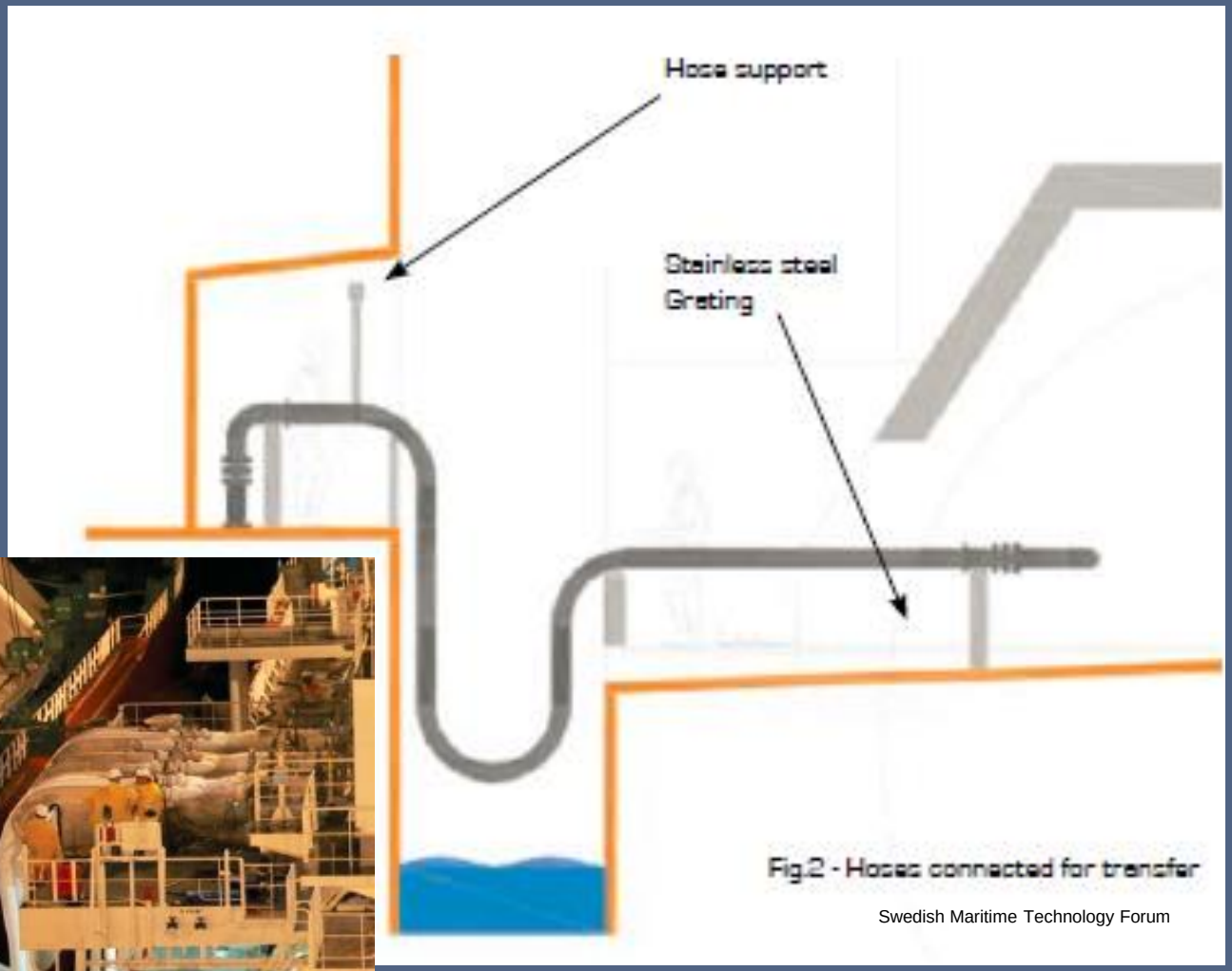


Argent Marine Co., Maersk Line

Marine Transfer - Hoses



Marine Transfer - Ship to Ship Hose



Swedish Maritime Technology Forum

Teekay Corp.

Marine Transfer - Ship to Ship Hose

Danish Maritime Authority

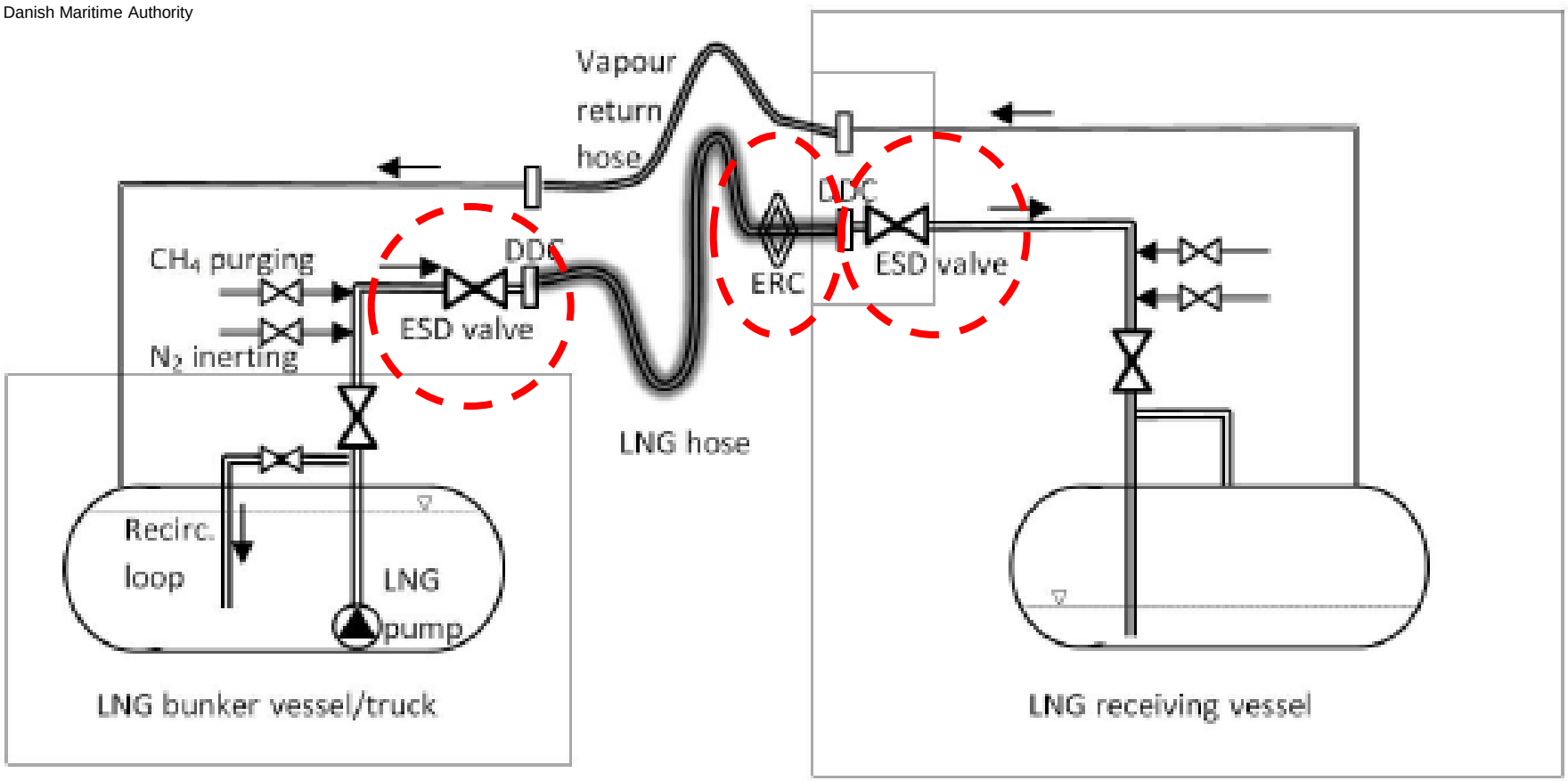
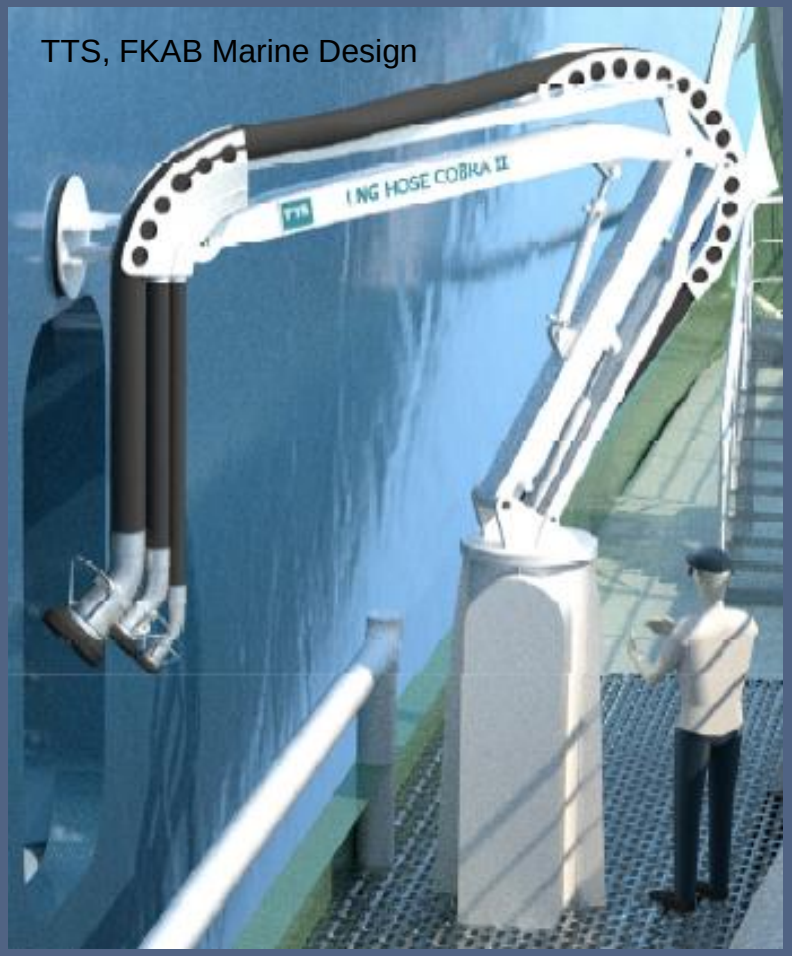


Figure 61 Schematic bunkering concept with LNG flow line, vapour return line and basic system components.

Marine Transfer - Loading Arm



- Large one existing, small to be developed

LNG Risk

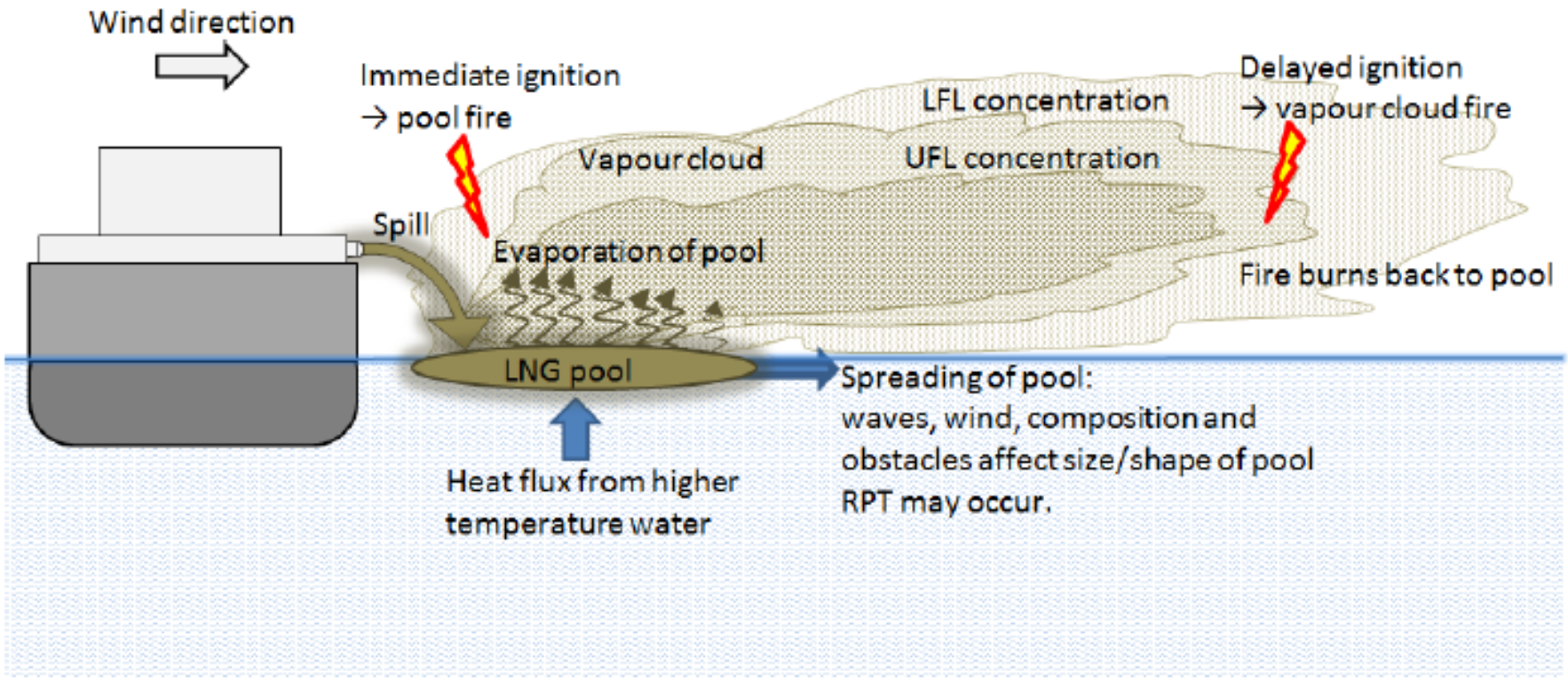


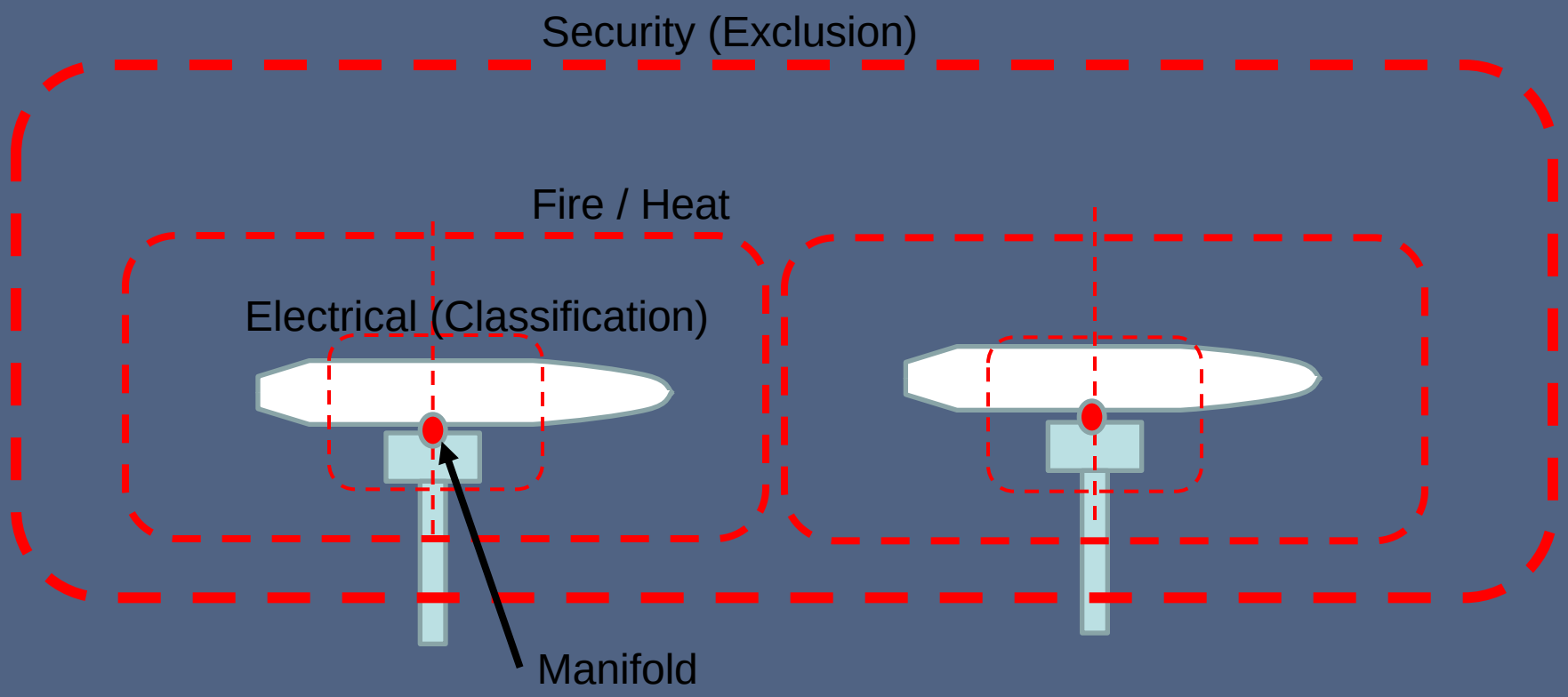
Figure 65 Possible outcome of LNG spill over water.
Source: SSPA (Based on Luketa-Hanlin, 2006).

Danish Maritime Authority

LNG Risk

- Cosmo Oil Chiba Japan, following 2011 Earthquake

LNG Security Zones



Developments for Future Use

- Criteria (LNGTEMS?)
- Regulatory clarity (FERC, CSLC,?)
- Operators willing to construct facilities
- Operators willing to run LNG vessels
- Economic & environmental incentive
  - Expensive oil, Cheap LNG
  - Emission Control Areas (2015 USA)
  - Greenhouse Gas Reduction