



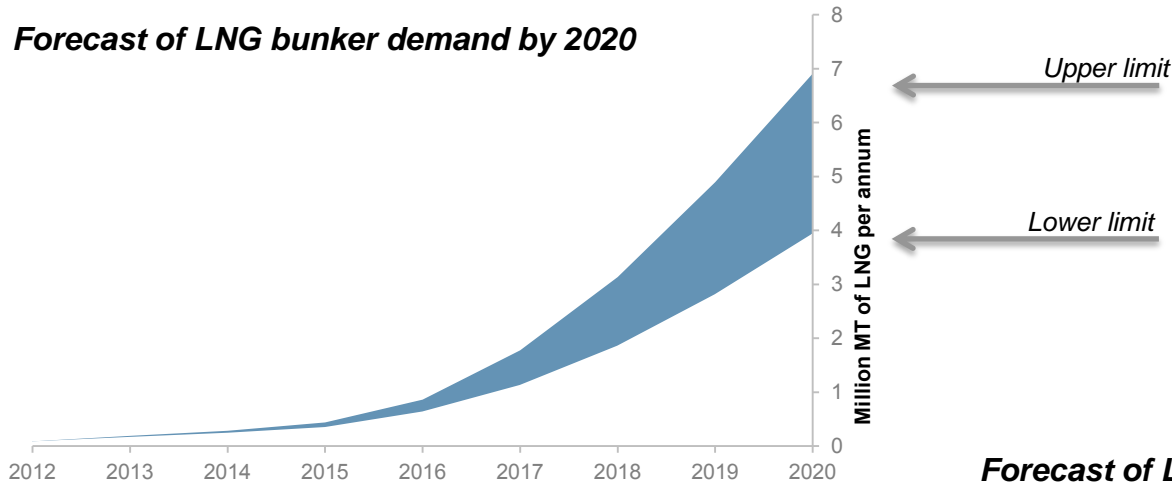
# What infrastructure is needed? What are the demands and what certificates are needed?

Green shipping - using LNG as fuel for vessels conference

Jonathan Abrahams  
Tallinn, 31st October 2012

# LNG bunker demand is expected to experience a significant increase in volume due to stricter emission requirements

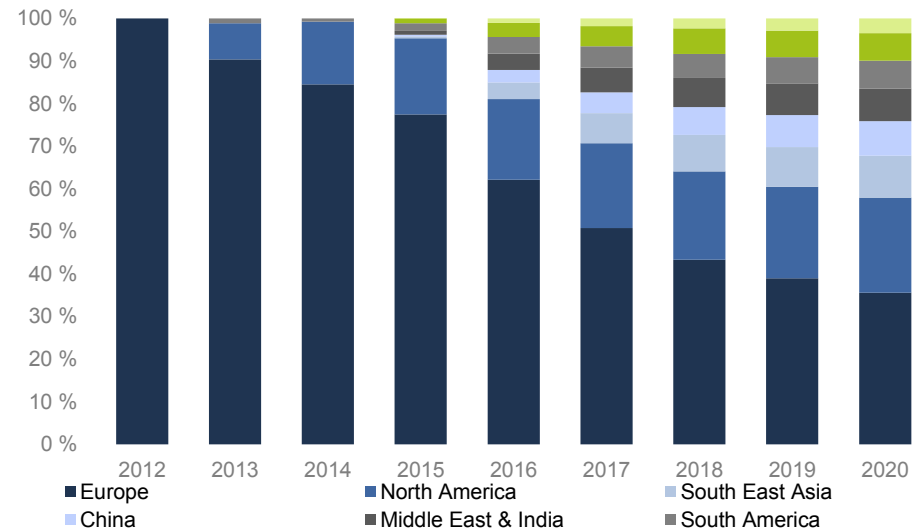
**Forecast of LNG bunker demand by 2020**



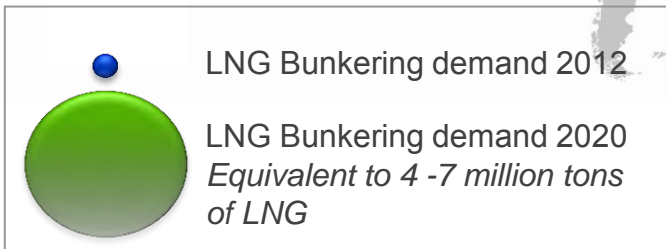
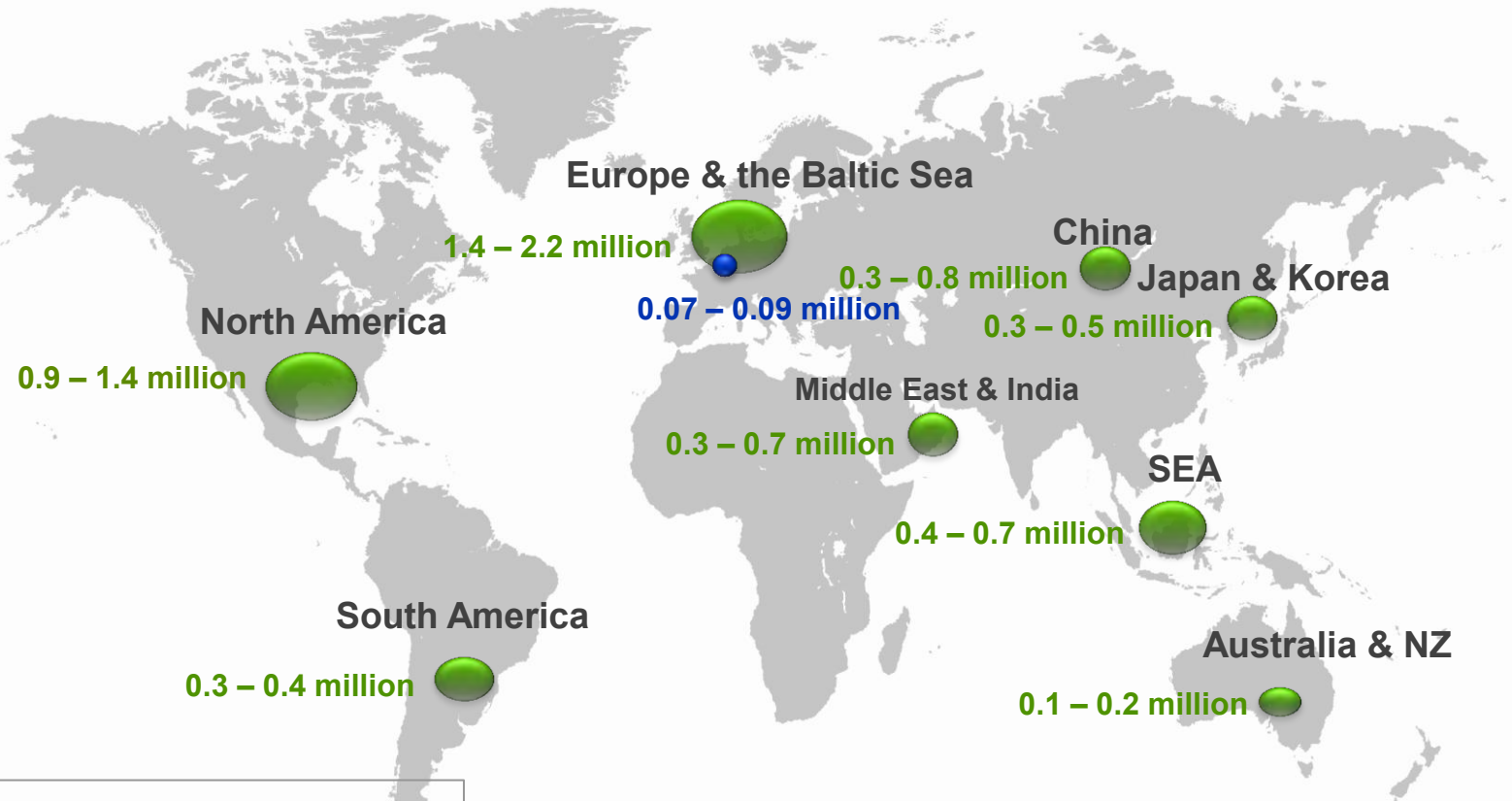
- ECA zones such as Europe and North America will dominate the LNG bunker demand until 2016 due to stricter emission control regulations

- By 2020, there will be more regions with increasing stricter emission controls come into the picture
- Demand of LNG bunker will increase in regions with high shipping traffic such as South East Asia and China

**Forecast of LNG bunker demand per region by 2020**



# Global LNG bunker demand by 2020



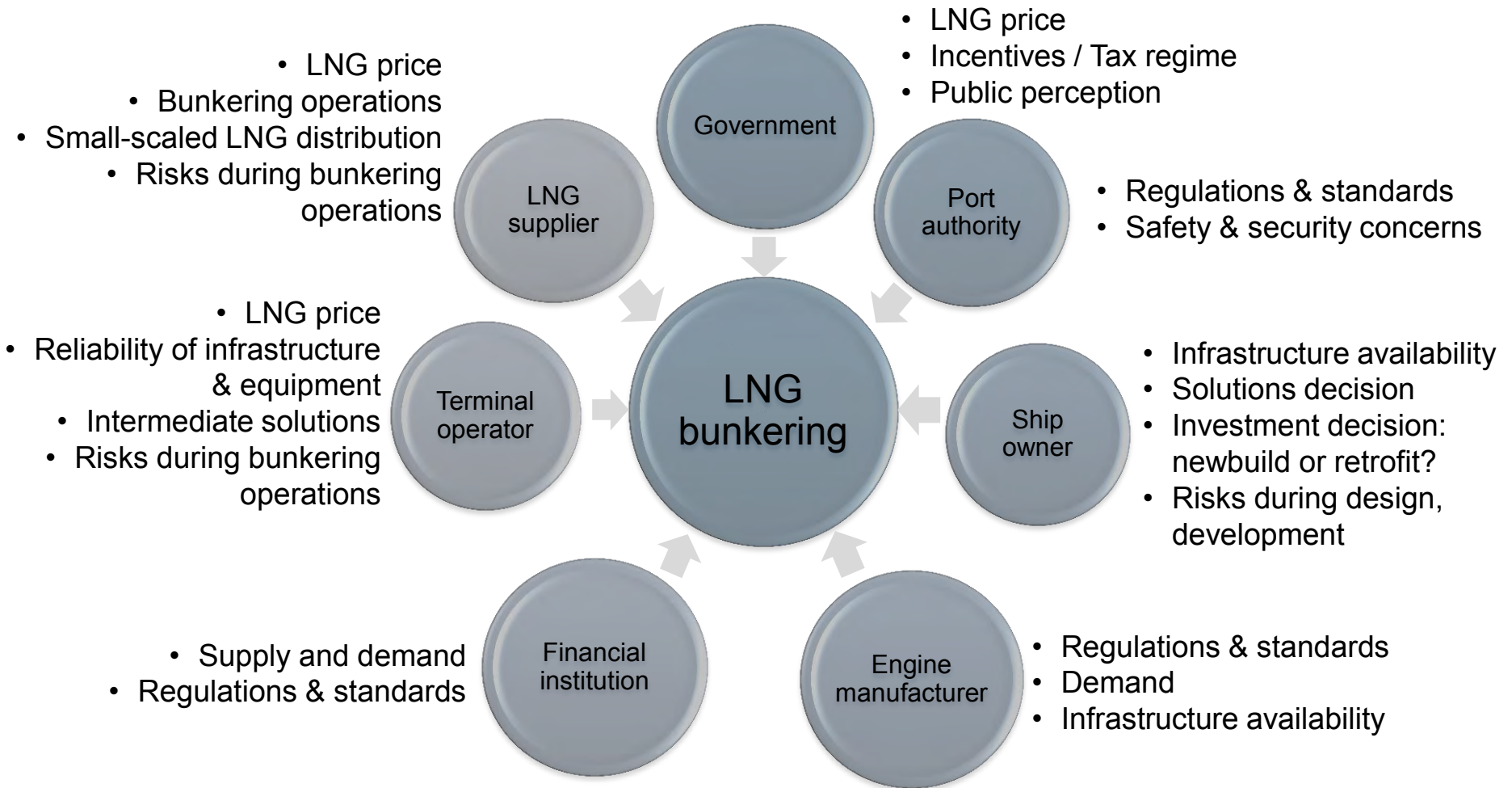
Source: DNV LNG bunkering 2020 study

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Tallinn, 31st October 2012

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# Stakeholders' challenges in the development of LNG as fuel for shipping



Source: DNV LNG bunkering 2020 study

# Current and forecast of global LNG bunkering infrastructure by 2020



Existing Planned (*Feasibility study, risk study, proposed locations, pending approval*)

Proposed (*currently being discussed*)

Source: DNV LNG bunkering 2020 study

\* See detailed map

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# LNG Bunkering grid in Europe by 2020

## Existing

1. Florø
2. CCB
3. Halhjem
4. Snurrevarden
5. Risavika

## Proposed

22. Gothenborg
23. Pori
24. Turku
25. Sillamäe
26. Helsinki
27. Paldiski
28. Riga
29. Swinoujscie
30. Lubeck
31. Rostock
32. Helsingborg
33. Copenhagen
34. Aarhus
35. Aberdeen
36. Dunkerque
37. Marseilles
38. Barcelona
39. Algeciras

## Planned

6. Bodø
7. Mongstad
8. Øra
9. Lysekil
10. Porvoo
11. Stockholm
12. Tallin
13. Klapeida
14. Hirtshals
15. Brunsbüttel
16. Hamburg
17. Rotterdam
18. Antwerp
19. Zeebrugge
20. Ghent
21. Vestbase



Existing



Planned (Feasibility study, risk study, proposed locations, pending approval)



Proposed (currently being discussed)

Source: DNV LNG bunkering 2020 study

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# The framework for introducing LNG as fuel

- IMO Interim Guidelines for gas as ship fuel (MSC.285(86))
- IMO - IGF Code → under development
  - Rules for the receiving ship, the ship using LNG as fuel
- IMO - IGC Code → Liquefied gas carriers
  - Rules for the bunker boat, which is a small LNG carrier
- ISO/TC 67/WG 10 PT1 → under development by IMO
- SIGGTO, OCIMF
  - Guidelines for LNG transfer and Port Operation
  - Guidelines for oil transfer, ship-to-ship oil bunker procedures
- Port regulations
  - USCG, “Green bunkering” for Port of Gotenborg
- Onshore regulations
  - EU, NFPA, FERC, DBS



# International initiatives on LNG bunkering guidelines

- LNG ship-to-ship bunkering procedure
- Shell LNG bunkering installation guidelines
- ISO/TC 67/WG 10 PT1
- BunGas Joint Industry Project
- SIGGTO Natural Gas marine Fuel Safety Advisory
- WPCI (World Ports Climate Initiatives) LNG Working Group



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