

Challenges of developing new Small Scale LNG infrastructure



Source: Gate terminal

**Presentation to UNECE
Geneva, 20 January 2015**

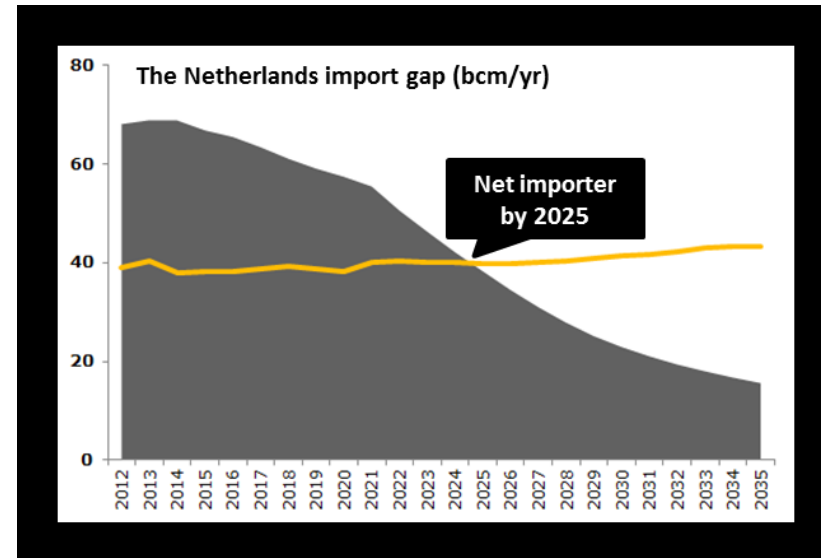
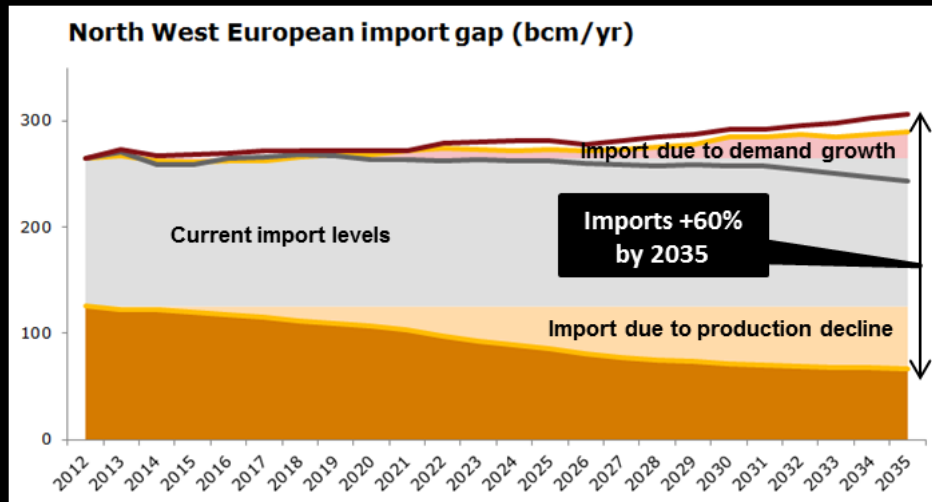
By: D.A. van Slooten

LNG new trends



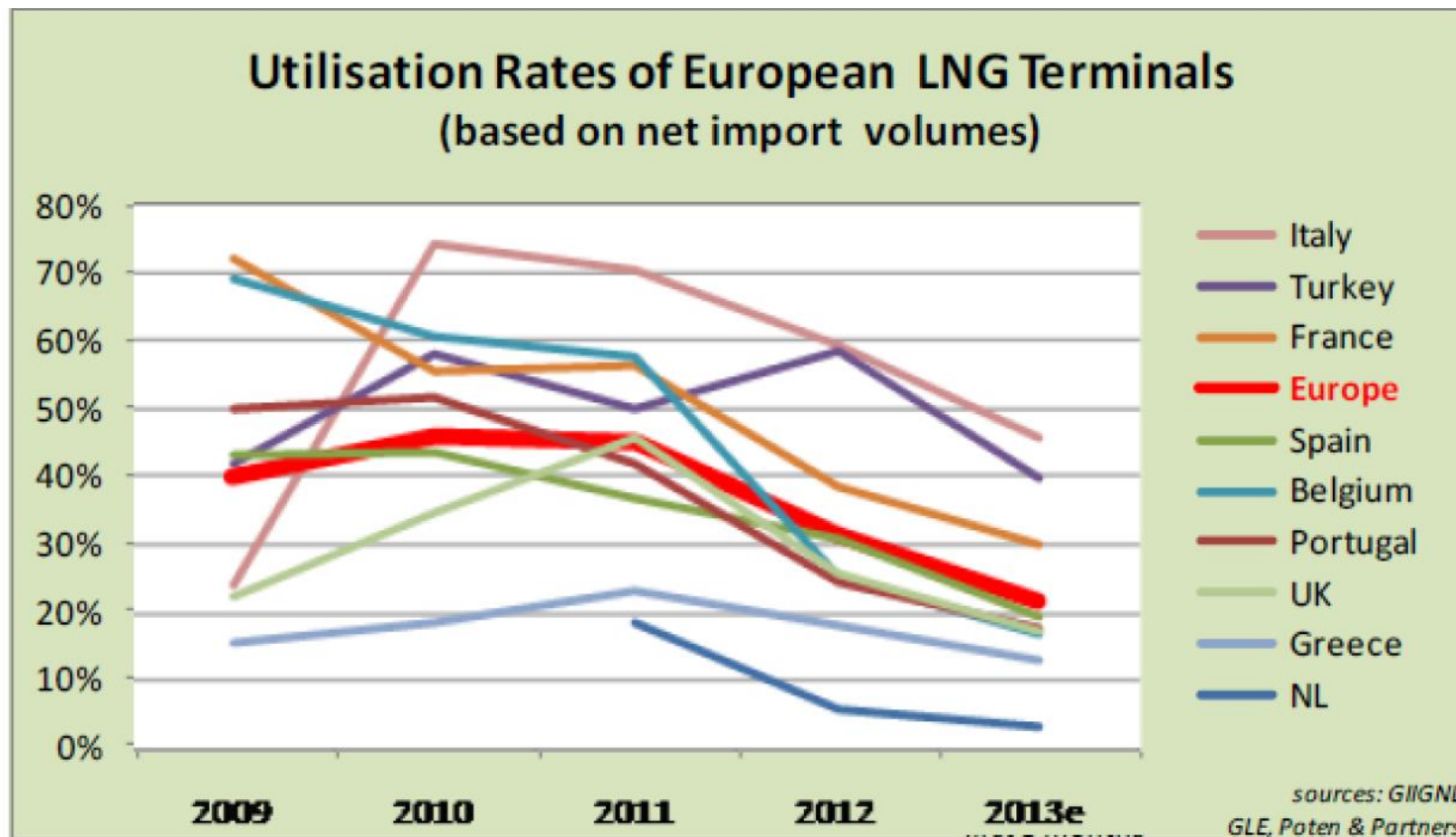
- **Offshore LNG:**
 - Floating production (FPU), Floating storage (FSU), Floating production & storage unit (FPSU), Single-mooring (gas) buoys, etc
- **Onshore LNG:**
 - Gravity based Receiving terminals, Cryogenic caverns
- **Small Scale LNG:**
 - Satellite terminals, LNG Transport trucks, Tankcontainers, Filling stations
- **LNG as Fuel:**
 - Fuel: Trucks, trains, inland barges, port vessels, filling stations
 - Bunkers: bunker stations, bunker barges

Importance of LNG in NW Europe

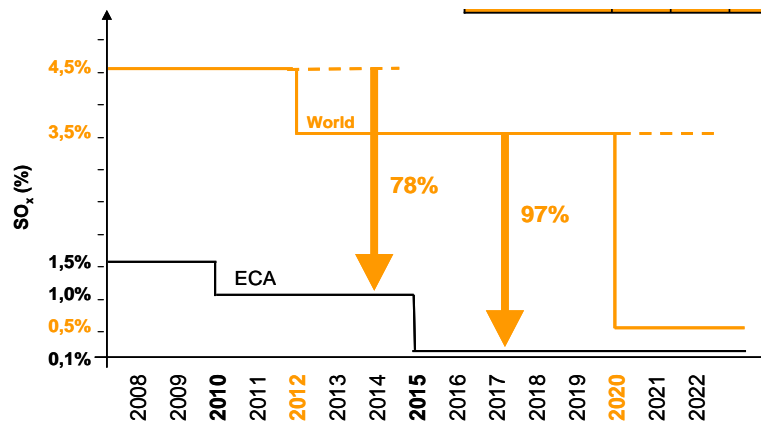
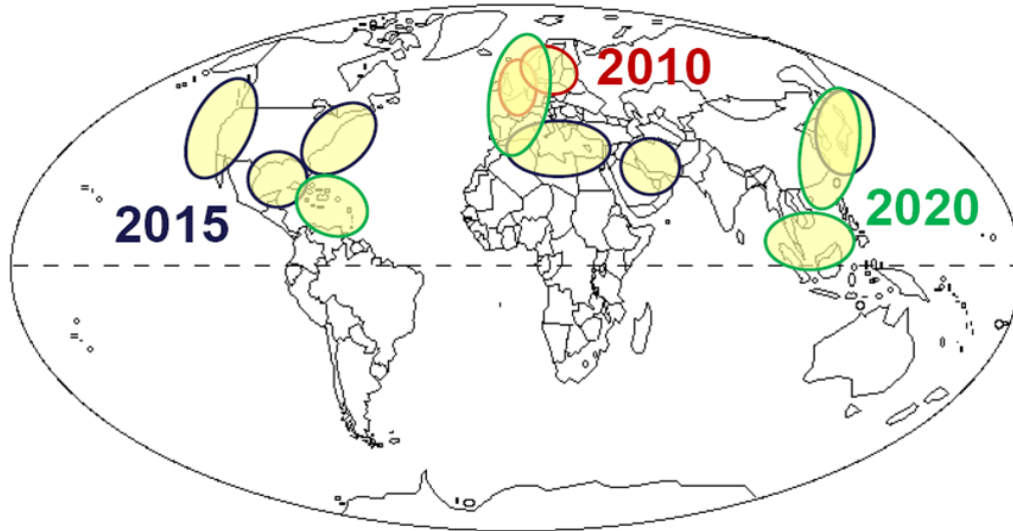


1. Declining domestic production is replaced by imports
2. LNG offers increased security of supply
3. Gas for transport offers growth opportunities

European traditional import model in Jeopardy

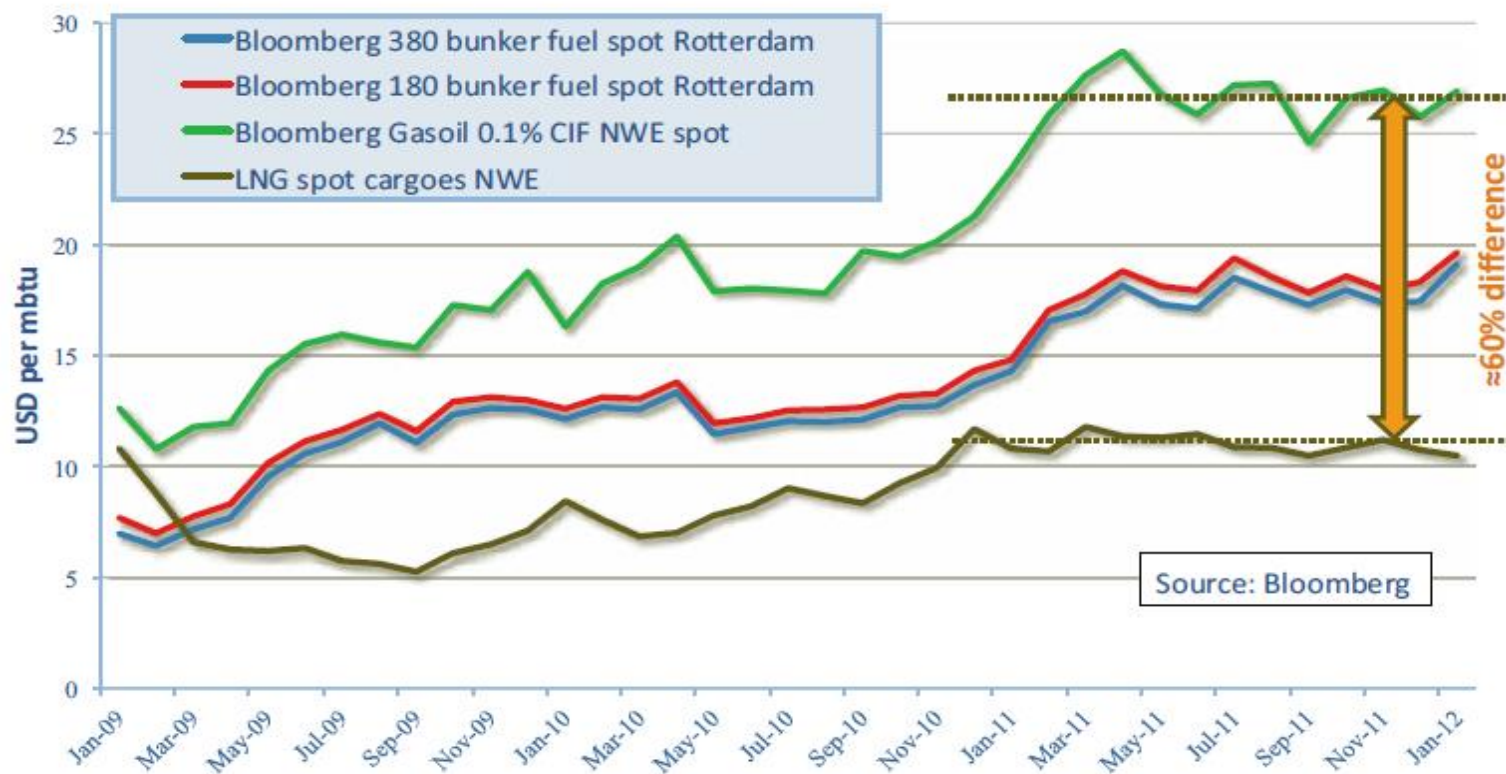


IMO: Emission control area's: ECA's



**EU Directives:
Reduction of emissions from
the transportation industry**

LNG Fuel price differential



Challenges ahead for downstream market penetration:

- Standard legislation and equipment standardisation;
- Safety training on how to handle liquid gasses to maintain safety record;
- Engine management technology development;
- Incremental investments in port infra
- Incremental investments in engine rooms of vessels;
- Multiple of LNG operators requires extra Safety.

Future: Hub- and Satellite terminals



LNG's future:

Similar infrastructure as downstream Oil products:

- Fuel supplies
- Fuel stations
- Bunker stations

AND

- Local gasdistribution in local grid



Hub terminal:

- Break Bulk & Re-export (Ship, Truck)
- Bunker & Fuel supply

Satellite terminal:

- Redistribution in local gasgrid
- Bunker & Fuel supply

New small scale LNG Carriers

PRODUCTION

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TERMINALS

SHIPPING
TECHNOLOGIES

LNG RECEIVING
TERMINALS

Small Scale
& Fuel



Remarks:

- facilitators for downstream market penetration of LNG to satellite terminals
- carrier capacity: 1,250 m³ - 16,000 m³ – initial small carriers since 2005
- tank type: semi pressurized / bullet-type (example by Kawasaki Shipbuilding.Co.)
- propulsion: diesel engine or dual fuel gas/diesel

Typical small satellite

(Onada – Yamaguchi Godo Gas)

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**Small Scale
& Fuel**



Capacity	7,400 ton pa
Site area	3,200 m ²
Storage capacity	3 x 100 m ³
Send-out capacity	4 x 1 ton/hr

Dedicated Bunkerships is the future

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LNG bunkering in Sweden

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Ferry on LNG in port of Stockholm 2014

LNG truckloads for NW Europe

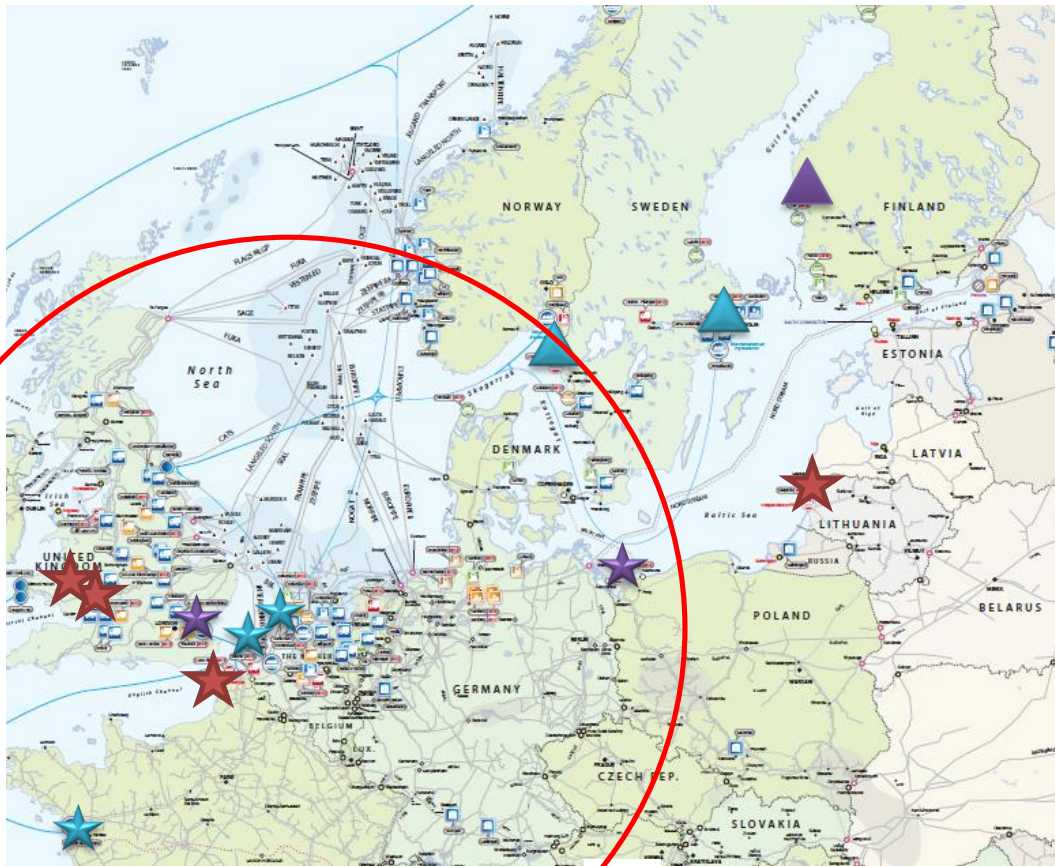
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Terminals reacted relatively fast on market demand for truckloading

1. replicate Norwegian story for marine
2. Truckfilling and offgrid (Spain)
3. New facilities in Zeebrugge and Rotterdam

The volume of future small scale LNG? A big question!

First movers are active!

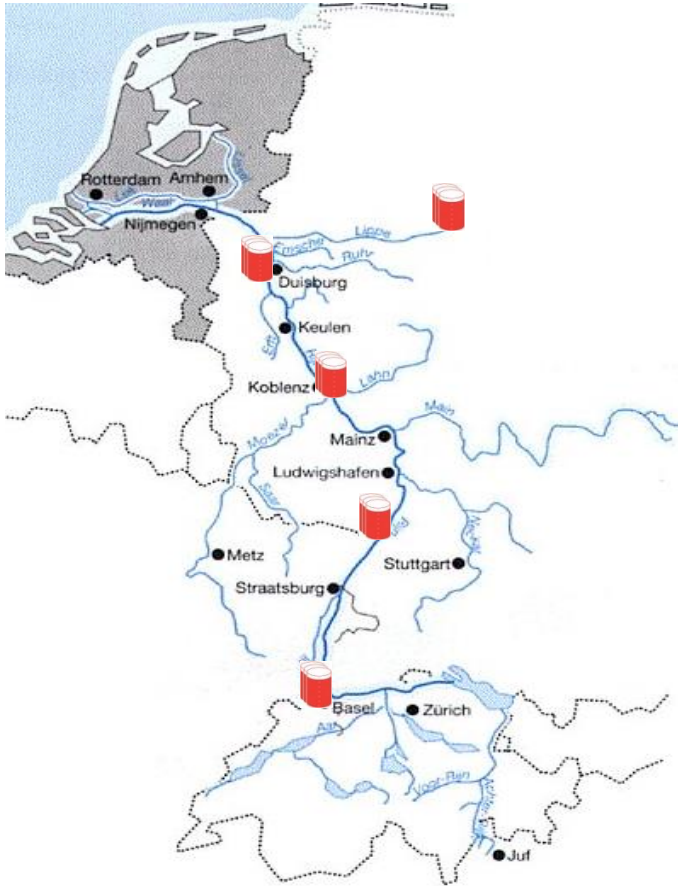


LNG truck fuelling station Zwolle, Netherlands



Dual fuel LNG propulsion in operation

“Green River” initiative 2012



Green Deal:
LNG Rijn en Wadden
Signed on the 5th of July 2012

Challenges for small scale LNG:

- Design of bunker barges;
- Design of river barges;
- Design of small LNG depots
- Modal split between water- and road transport of LNG

LNG Inland viable?



Terminal experience end 2014:

- **Shortsea** hub logistics up and running @ 5.000-20.000 m3 parcels
- **Truckloading** hub logistics up and running @ 50/100 m3 parcels
- Meaning:
 - Physical available
 - Robust: multiple physical assets
 - Choice: multiple suppliers
 - Competitive
- **Bunkering** hub logistics @ 100-5.000 m3 parcels under development
- LNG logistics is improving. Infrastructure still limited
- LNG is a great product but oil logistics are well established (competition)
- Still many safety, standardisation & technical compatibility issues

Questions?



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Thank you



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