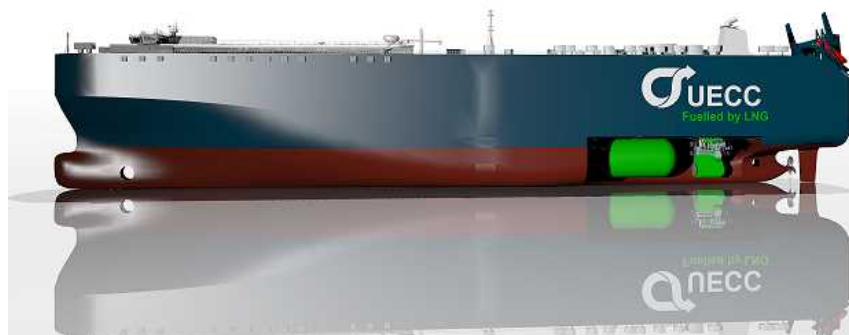


LNG Producer-Consumer Conference 2015

New LNG demand, Natural Gas as fuel

16th Sep 2015



Nippon Yusen Kabushiki Kaisha
President Tadaaki Naito

Bringing value to life.

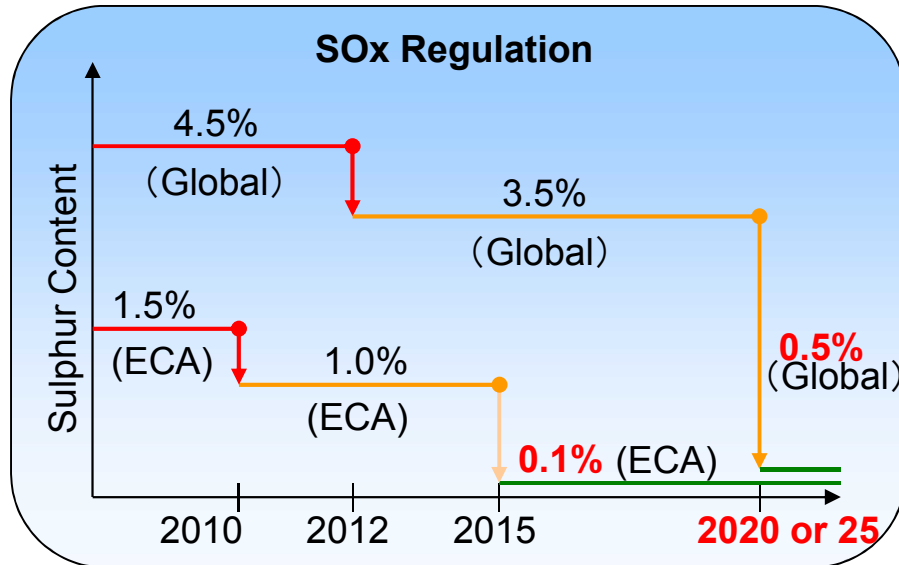
Incorporating LNG in the Shipping Fuel Mix

- Environmental Regulations
 - Fuel Alternatives & Technical Measures
- LNG as Marine Fuel
 - Demand Estimation & Required Infrastructure
- NYK's Projects

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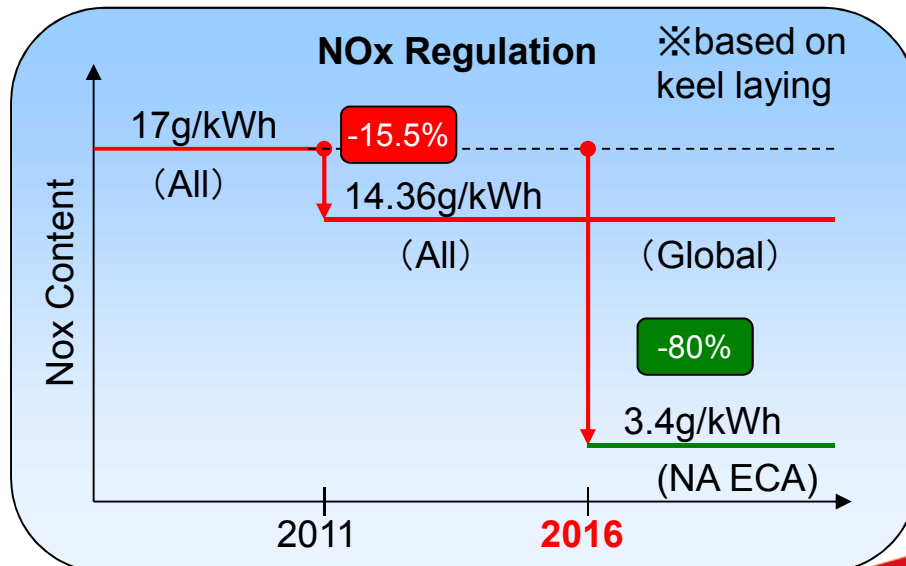


Emission Regulations



Options to SOx

1. LSMGO (or ULSFO)
2. HFO + Scrubber
3. **LNG as fuel**



Options to NOx (Tier III)

1. SCR (Selective Catalytic Reduction)
2. EGR (Exhaust Gas Recirculation)
3. Lean Burn Gas Engine

Pros/Cons of Fuel

	Pros	Cons
LSMGO	Sox Compliant	High Fuel Price
HFO	Low Fuel Price Established supply	Not Sox Compliant ⇒ Capital Investment for Scrubber ⇒ Sludge Disposal (washwater drainage regulation ?)
LNG	Sox Compliant	Immature Supply Infrastructure Capital Investment for LNG Fueled Engine Fuel Tank Space

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Estimate of LNG Demand



THE BOSTON CONSULTING GROUP

(2015):

“LNG’s market penetration in 2025 could range from 5 to 27 percent.”



Lloyd's
Register

(2014):

“LNG will reach a maximum 11% share by 2030 in Status Quo.”



DNV·GL

(2014):

“LNG uptake is expected to grow fast in the next 5 to 10 years”



(2011):

“Ongoing LNG infrastructure development will continue to enable in certain sectors, representing abt. 8% of global bunker demand by 2030.”

Remark: Global Bunker Demand 240 million MT x 10% = 24 million

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LNG Supply Method

Truck to Ship



* 出典 : GASNOR

Shore to Ship



* 出典 : GASNOR

Ship to Ship



- **Truck to Ship: Small Lot**
- **Shore to Ship: for routine service**
- **Ship to Ship: Flexible**

LNG-Fueled Tugboat & PCTC

★ Japan's 1st LNG-Fueled Ship



- Subsidy from Japanese Government
- Delivery: Summer 2015
- Engine: Dual Fuel (MDO + LNG)
- Operation area: Yokohama, Kawasaki

★ World's 1st LNG-Fueled PCTC



- Owner: United European Car Carrier (NYK Subsidiary)
- Shipbuilder: Kawasaki Heavy Industries
- Shipyard: NACKS (Nantong COSCO KHI Ship Engineering)
- Delivery: 2H 2016 (2 vessels)
- Operation area: Baltic, North Sea

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LNG Bunkering Project

* from Google Map

Port of Zeebrugge – LNG Bunkering Vessel

Builder: Hanjin Heavy Industries & Construction Co. Ltd.,
Yeongdo Shipyard (Busan, Korea)

Delivery: 2016

Operation area: In Zeebrugge port, North Sea

LNG tank capacity : 5,100m³ (Type-C)

Engine: Dual Fuel (LNG + MGO)

Ship management: NYK Energy Transport (Atlantic) Ltd.



World's First LNG Bunkering Vessel

Thank you
ありがとうございました

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