

# Maritime Cyprus 2017 Conference

Panel: The cost of the smoke

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Fuelling the future



1. Environmental regulations
2. Why LNG as fuel ?
3. LNG bunker vessels



# Environmental Regulations



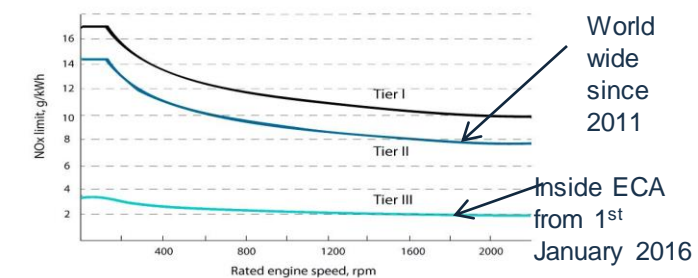
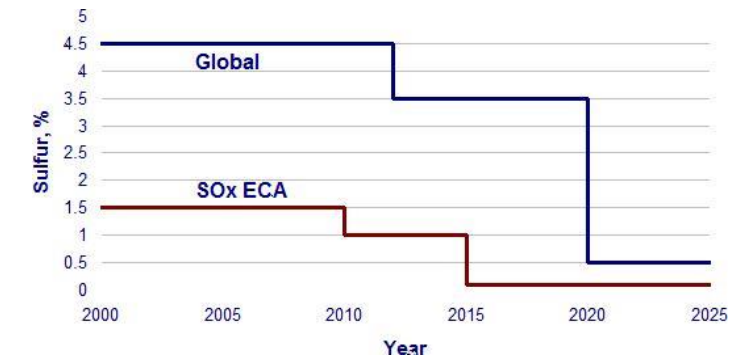
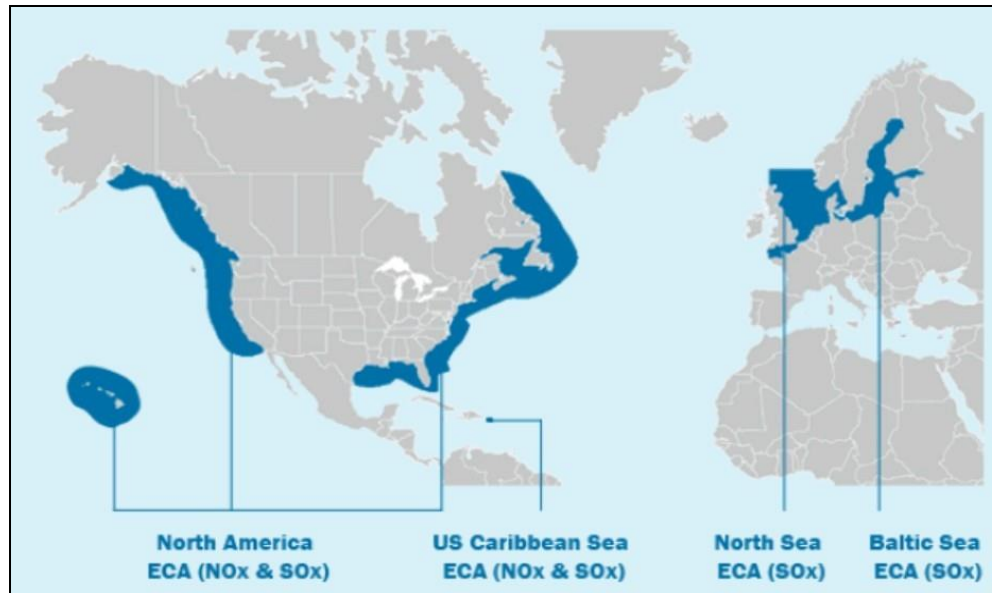
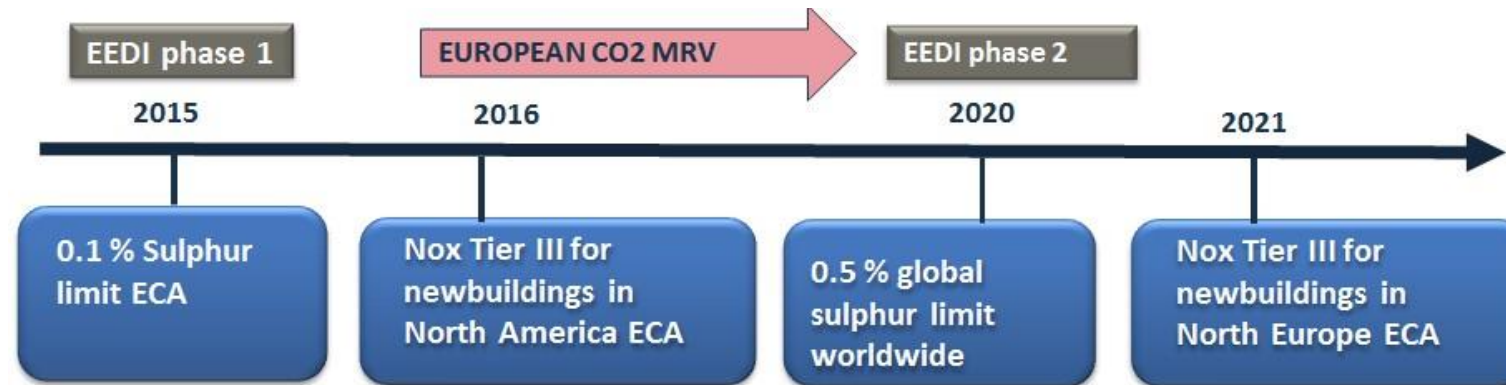
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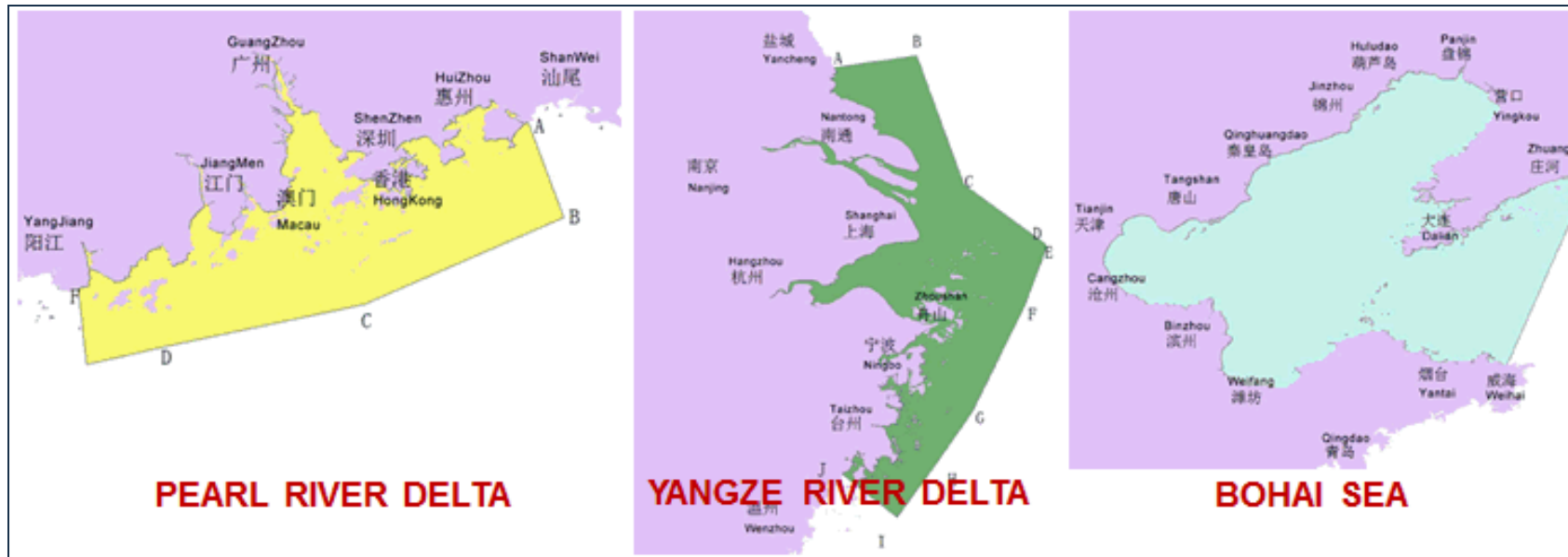
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# Global environmental regulation fosters clean fuels



# China – 3 emissions control areas



From 1/1/2016: 3.5% m/m max (possible request from core ports for max 0.5% during berthing)

From 1/1/2017: 0.5% m/m max during berthing excluding 1h after arrival at and 1h before departure from core port

From 1/1/2018: 0.5% m/m max during berthing at core ports

From 1/1/2019: 0.5% m/m max when entering core ports

From 1/1/2020: 0.1% m/m max during berthing at core ports

To comply with the new requirements, vessels use fuel oil with a sulphur content of no more than 0.5% m/m, or other equivalent measures to reduce emissions including exhaust gas scrubbing, alternative clean fuels and shore power (cold ironing).

# Ordering a new ship today: which type of fuel ?

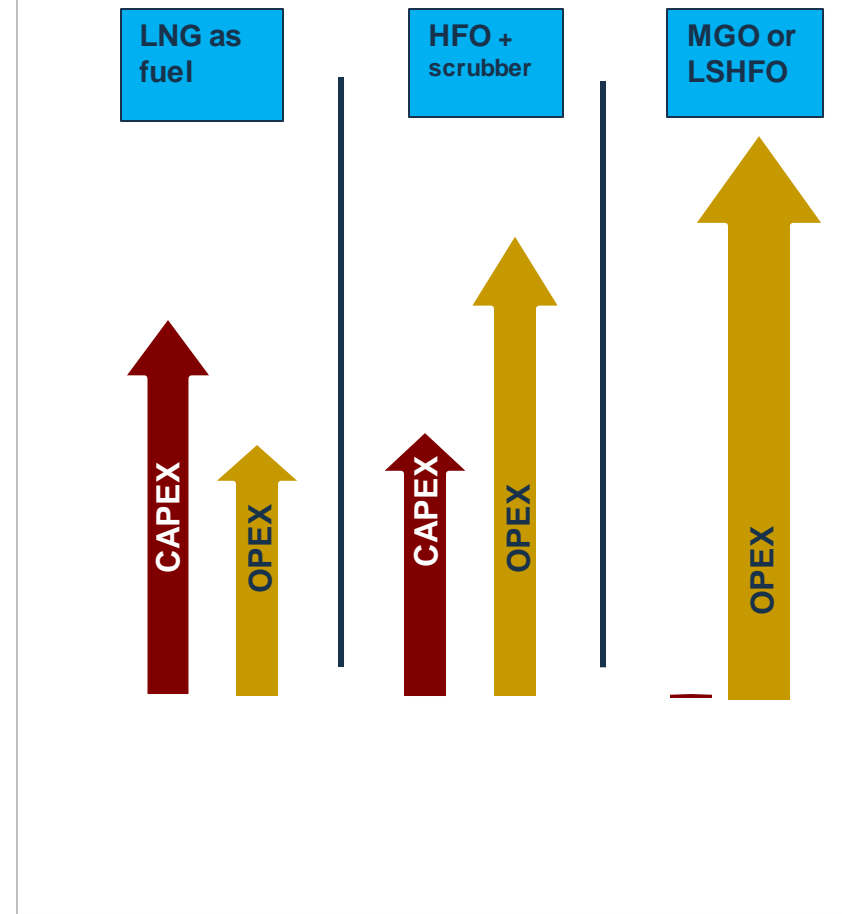
## Three options

- HFO fuel (3.5% sulphur) with exhaust gas treatment units switchable (Scrubbers)
- Using low-sulphur HFO (0.5%) and treatment units in EU ports and (S)ECAs for 0.1% compliance (or Marine Gas Oil)
- LNG as fuel



**Feasibility of LNG as fuel is made credible thanks to recent global development in LNG fuel bunkering logistic**

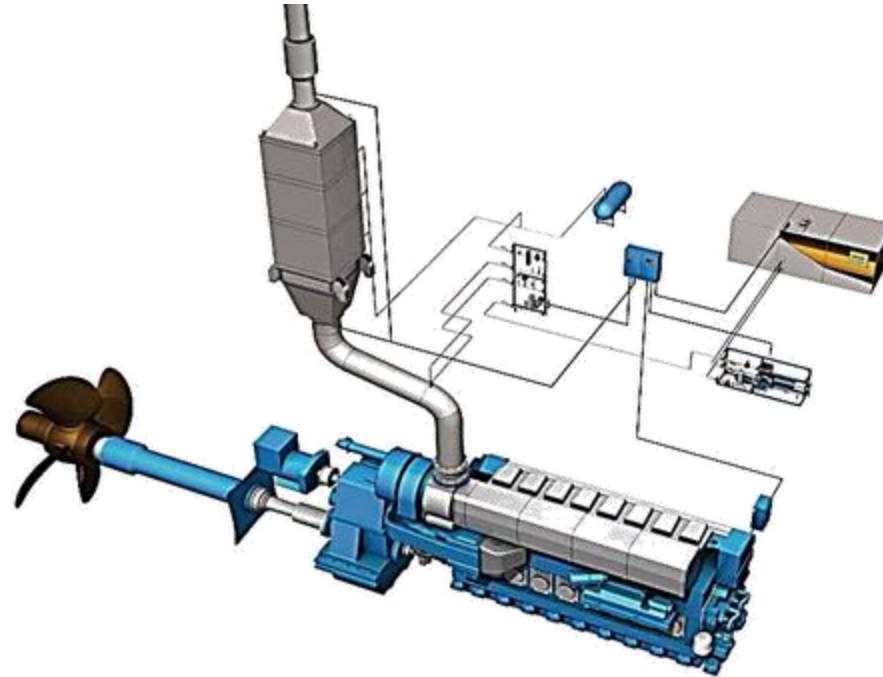
## Feasibility





## *Tier III*

- Gas only or dual fuel engines with Otto cycle
- External exhaust gas after treatment units such as SCR (Selective Catalyst Reactor). These units use urea or ammonia and work at high temperature
- Exhaust Gas Recirculation systems (EGR) enable compliance with Tier III, associated with dual fuel 2 stroke (MAN MEGI) or liquid fuel engines



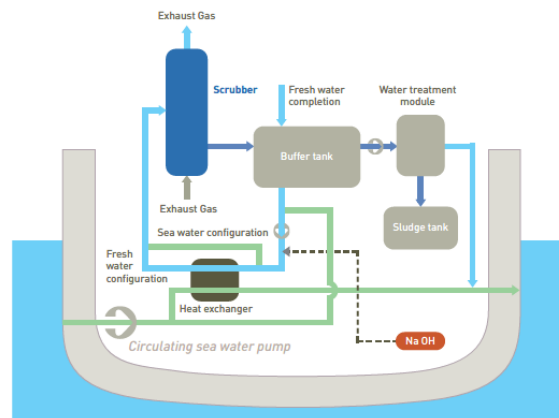
## Scrubbers

- **Air pollution: continuous measurement of effluents SO<sub>x</sub> content**
- **Water pollution (washwater discharge)**
- **Caustic soda used in closed loop systems (up to 5 % of fuel consumption)**

**Exhaust Scrubbers**  
*What you need to know*

*Move Forward with Confidence*

**IMO**  
**REDSHIP**

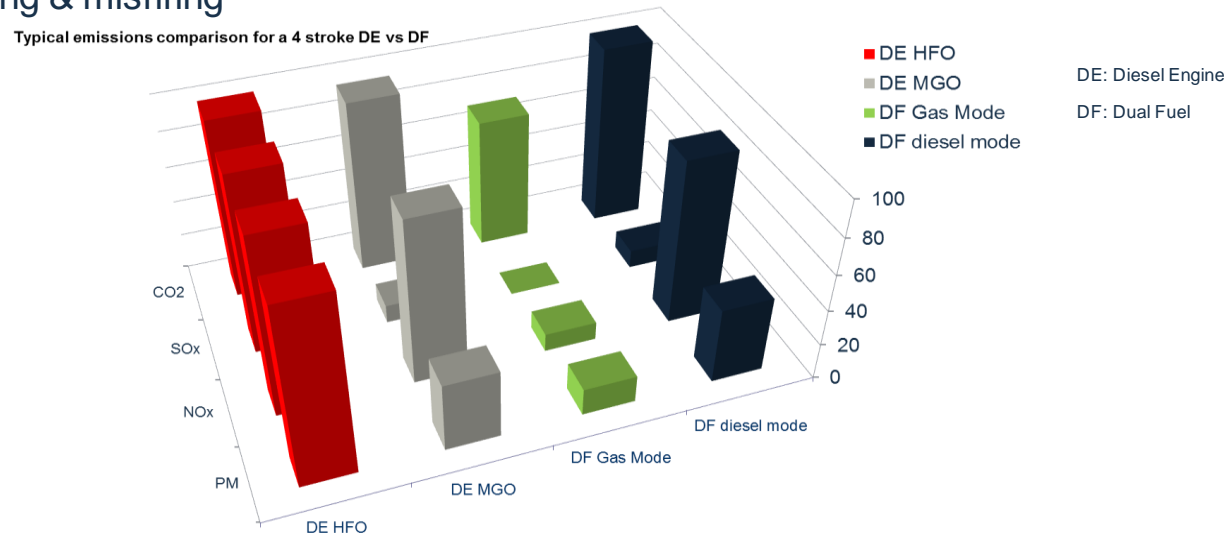




## *LNG as fuel reduces significantly air emissions (SOx, NOx, CO2, PM).*

However some concerns are still to be considered:

- NOx Tier III compliance with high-pressure gas diesel engines (needs SCR or EGR)
- Methane slip
- Knocking & misfiring



Note: However methane slip which aggregate unburned methane specifically in Otto cycle and possible limited gas vent after engine stop should be taken into account as it might reduce significantly the CO2 reduction advantage.

# Why LNG as fuel?





- 90,000 cargo voyages since early 60's without serious damages
- World fleet:
  - More than 500 launched LNGc + 25 FSRU + 13 New orders
- BV class:
  - 88 LNGc & FSRUs + 2 FLNG built with since 1995





*Seatrade, 31 May 2017*

## MSC Cruises reveals novel look of its LNG World-class newbuilds



One year after they were **first announced**, MSC Cruises confirmed the order for up to four LNG-powered cruise ships of 200,000gt at STX France and released the first rendering of their novel design.

*TradeWinds, 23 June 2017*



# LNG Bunker vessels



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# Small Scale LNG & LNG Bunker vessels



Small Scale LNGc (<40k)	BV	World	BV share
LNG carrier fleet in service	8	29	27.6%



# Thank you for your attention !



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SEASPAN Ferries courtesy