Sulphur Cap 2020

Technical Support Team

KOREAN REGISTER

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MY VIEW

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KR says delay in IMO 2020 sulphur regulation implausible

01 Mar 2018 | NEWS

Convention to be Postponed?

○ Reason for postponement

- Long queue for installation of Scrubber -> Use of MGO/LSFO
- MGO/LSFO Shortage -> Permission given for HFO usage
- Reliability of scrubber -> 400 ships with scrubber

➡ Insufficient Reason for postponement

○ IMO

- No postponement after BWM convention postponement
- Long-term process (6 + 16 months)

○ Administrations

- Strong drive by Developed Countries
- Following the Schedule with exemptions

○ Two unsuccessful tries for postponement

- During last 2 meetings in IMO (PPR4, MEPC71), discussions ruled out

Low possibility for Postponement

Refinery

○ Uncertainty for Profitability, Only 15% in preparation (2017.7, KBC)

○ Announcements in 2nd half of 2017

- (Aug.) Shell, Under examination for investment
- (Sep.) Cepsa, has plans for investment
- (Sep.) BP, 'Ready to respond to 2020 Sulphur cap'
- (Nov.) Korean Refineries
  . S-OIL: $4.3 billion by 2018
  . SK Energy: $0.9 billion, Desulphurization unit by 2020
  . Hyundai Oilbank: heavy oil upgrading facility by 2018

○ Specification of New Fuels

- Shell, ExxonMobil, BP, Total, etc.: Under developing, release the spec. in 2019
- ISO, 'New standard' not available until 2022
  'Publicly available standard'(PAS) available before 2019

TREND

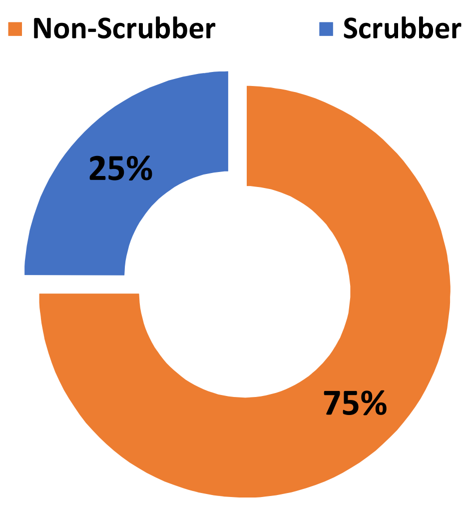
Shipyards

○ 25% of newbuilding orders with scrubber installation

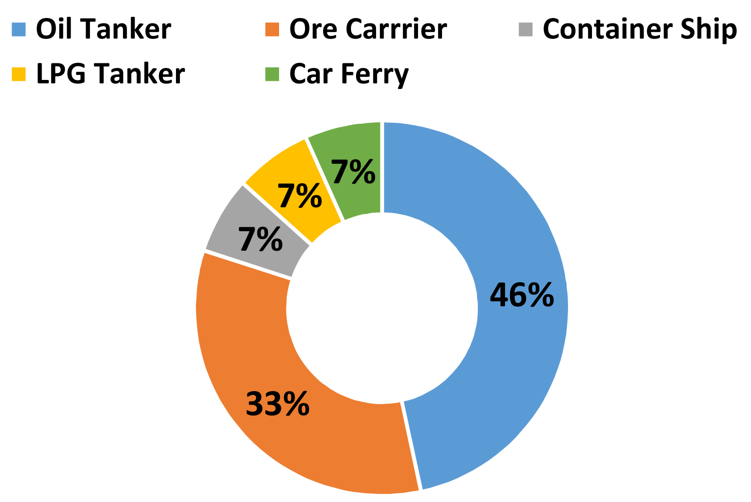
○ Scrubber Ready Ship

- Full installation except main body
- MR Tanker: Additional cost of $2~3 million required for scrubber installation

  Additional cost of $0.2~0.3 million required for scrubber ready ship



※ Order with Scrubber in Korean Shipyards(2016~2017)



※ Based on 2016~ 2017 Order book excluding LNG carrier

Shipping Companies

- ○ CE Delft estimate (2016): 3,800 ships installed scrubber by 2020
- ○ Scrubber installed ships: Approx. 400 ships => Wait and See
- ○ Existing ships
  - ✓ MGO/LSFO: Maersk, Hapag Lloyds, Intertanko, …..
  - ✓ SOx Scrubber: MSC, CMA CGM, DFDS, ….

Most of Korean Shipping Companies

Pollution Prevention and Response(PPR) 5th meeting

○ Prohibition on HFO carriage

- Out of monitoring on the high seas

  -> To ban the carriage of HFO on ships without SOx Scrubber

○ No complaint fuel oil is available

- Regulation 18.2 would apply

  'The ship should not be required to deviate from its intended voyage or to delay unduly the voyage in order to achieve compliance.'

Pollution Prevention and Response(PPR) 5th meeting

○ Accidental breakdown of the EGCS

- Changeover to complaint fuel oil. If it is not enough,

  -> To permit to complete the current voyage with HFO

○ Transitory non-compliance

- Significant load change => Temporary exceedance of emission ratio
- Common behavior of machinery
- Discharge of washwater

Black Carbon (BC)

○ IMO

- To be implemented likely from 2022~2023 for ships navigating Arctic area

  => Expanding Globally?

○ Reduction ratio

- SOx Scrubber: Approx. 80% BC reduction compared to using HFO
- MGO/LSFO: Approx. 20% BC reduction compared to using HFO

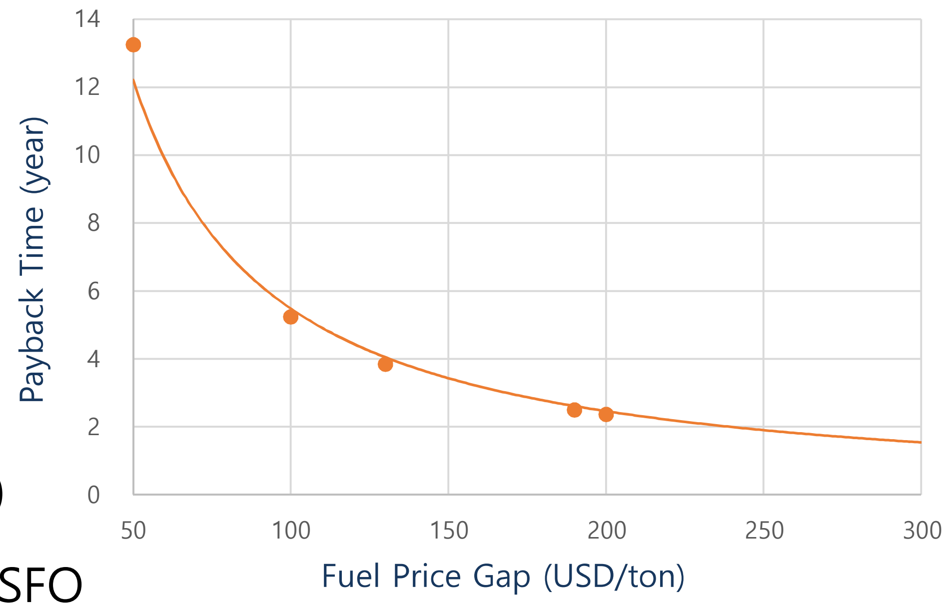
  => Possibly need additional equipment

MARKET OVERVIEW

Scrubber Installation

○ Installation of Scrubber

- Approx. 400 ships
- Advantages
  . Economic benefit
  (Less than 2 years payback time)
  . Less problem than using MGO/LSFO
- Expected to install from 2nd half of 2018 together with BWMS
- Max. 2,000 ships by 2020, 30% of global fleet by 2030 (2017.12, Foreship)



MARKET OVERVIEW

Fuel Availability

○ Supply of LSFO

- Initial Stage:
  . Shortage by region (CE Delft)
  Oversupply: EU, Mid-east, S-America
  Shortfall: Asia, N-America, Africa
  . Exemptions in MGO/LSFO Shortage areas
  . 107 of Non-ratified countries

Up to 30% of ships are expected to use HFO without Scrubber (IBIA)

- 2023 ~ 2025, Proper implementation is expected (IBIA)

Fuel Price Gap

○ Expected price gap between HFO and MGO/LSFO in 2020

- (2016) CE Delft estimate: $129, Ensys estimate: $190 ~ 380
- At present: $200 ~ 250
- "MGO price will increase more than 20% at 2020" (IEA, 2018.3)
- 2020: (Likely) To be wider

○ 2020 ~ mid-2020s

=> Gradual decrease of the price gap

✓ Increase of no. of scrubber ships

✓ Refinery's investment (supply)

-> Increase of MGO/LSFO, Decrease of HFO

MARKET OVERVIEW

○ Mid-2020s ~

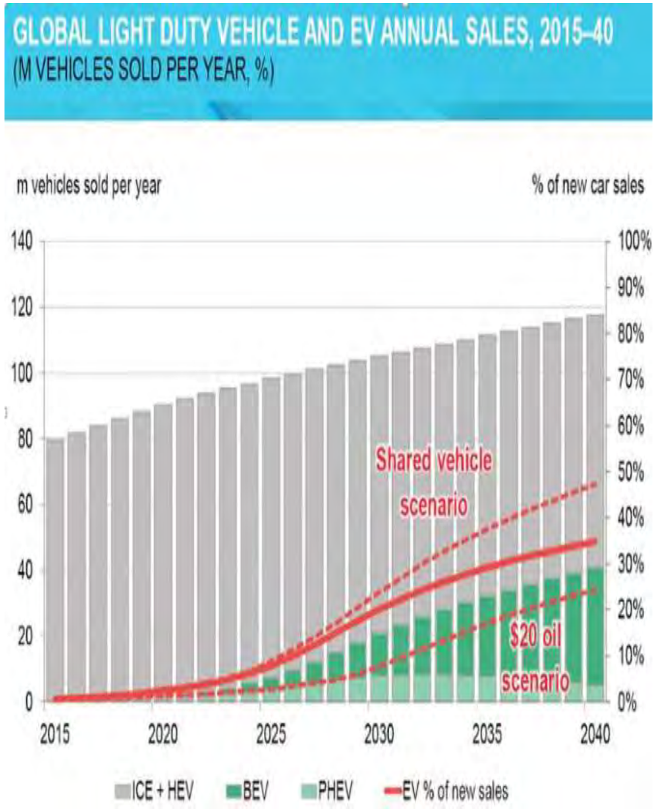
=> Steeper decrease of the gap

1. Increase of LSFO provision from Cars

✓ Explosive demand for electric cars

- China, India, EU: Strong support from Government
- China: 7~8% of new cars in 2017 were electric cars
- India: From 2030, to register only emission free cars
- Norway: More than 50% of new cars in 2017 were electric car
  From 2025, to register only emission free cars

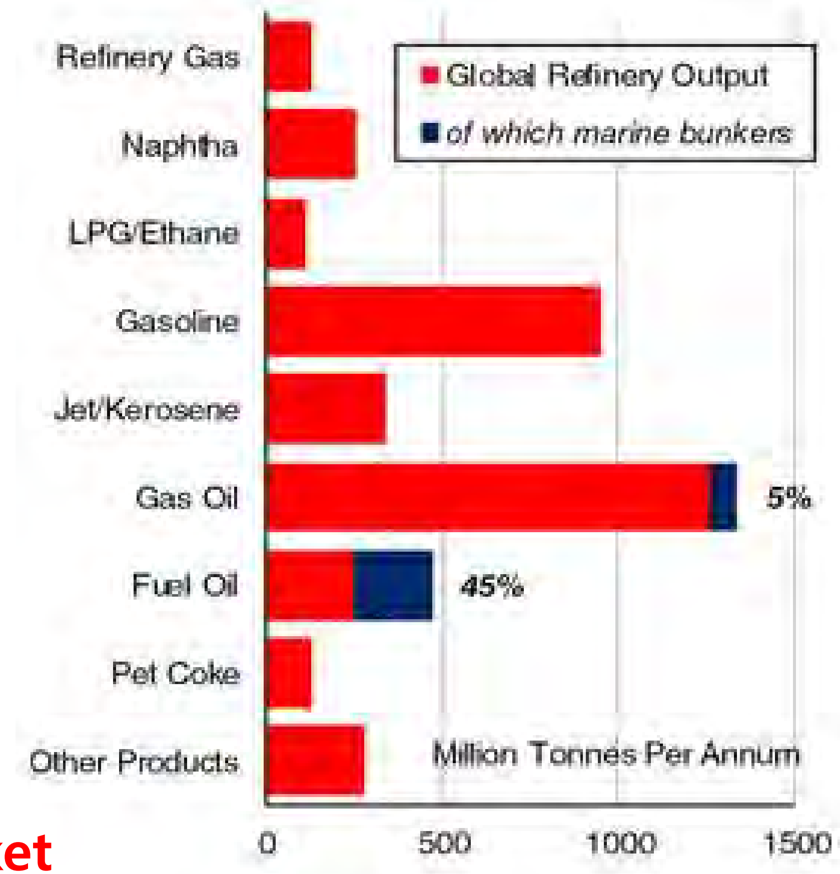
✓ 10% of new cars to be electric cars by mid-2020s



MARKET OVERVIEW

✓ Strengthened regulations for diesel cars

- Stricter regulations for diesel cars
  - "No diesel cars" - in Paris, Rome, etc.
  - "Tax increase for diesel cars" - UK, etc.
  - "No diesel cars production"
    - Renault, Chrysler, etc.
- Gas oil: 1.35 Billion ton / year
- Marine Bunker: 220 Million ton of HFO



Source : Clarksons Research

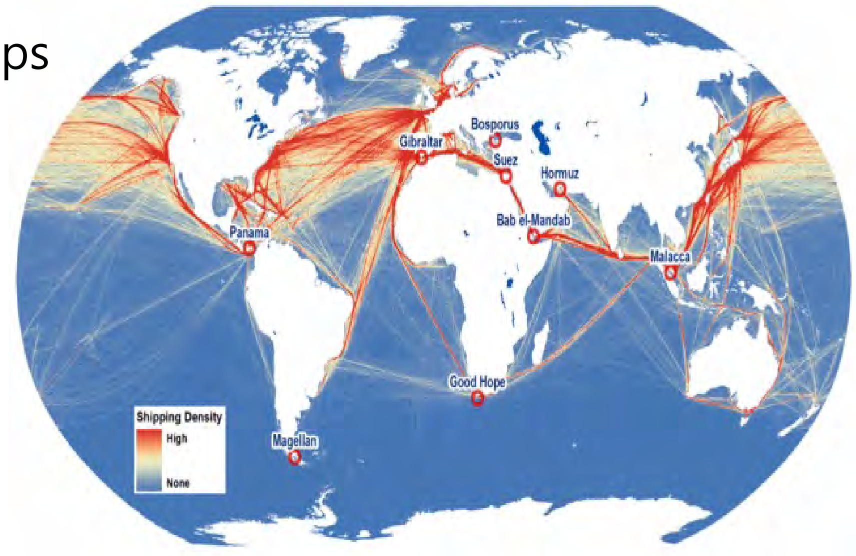
Fuels used by cars

-> Marine Bunkering Market

MARKET OVERVIEW

2. Decrease of MGO/LSFO Demand

- Increase of No. of Alternative fueled ships
  - ✓ EEDI Phase III (from 2025.1.1)
  - ✓ Improvement of Insufficient tech., reasonable track record
    => the no. to be increased
  - ✓ Bunkering station?
    => Large ships (6% of world fleet) use 30% of world marine bunker
    => LNG Bunkering stations in several major ports would be enough



MARKET OVERVIEW

- No CAPEX
- First a few years
  . Not tight inspection
  . 107 Non-ratified Countries
  . Exemption for Non-availability of LSFO
- "The price gap may be decreased earlier than expectation"
- "EGCS has economic benefit only for less than 1~2 years"
- "Maybe the regulation to be delayed"

- What if price gap is bigger and maintain longer?
- Operational problems? Explosion Accidents.. Waxing..
- Various properties in LSFO

- Economic benefit
- Better risk management
- Prohibition of wash water discharge, but "only coastal areas"

- CAPEX.. ?
- Split Incentive.. ?

Thank You

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