The Operational Strategy of Alternative Maritime Power at YGPA's container port in South Korea

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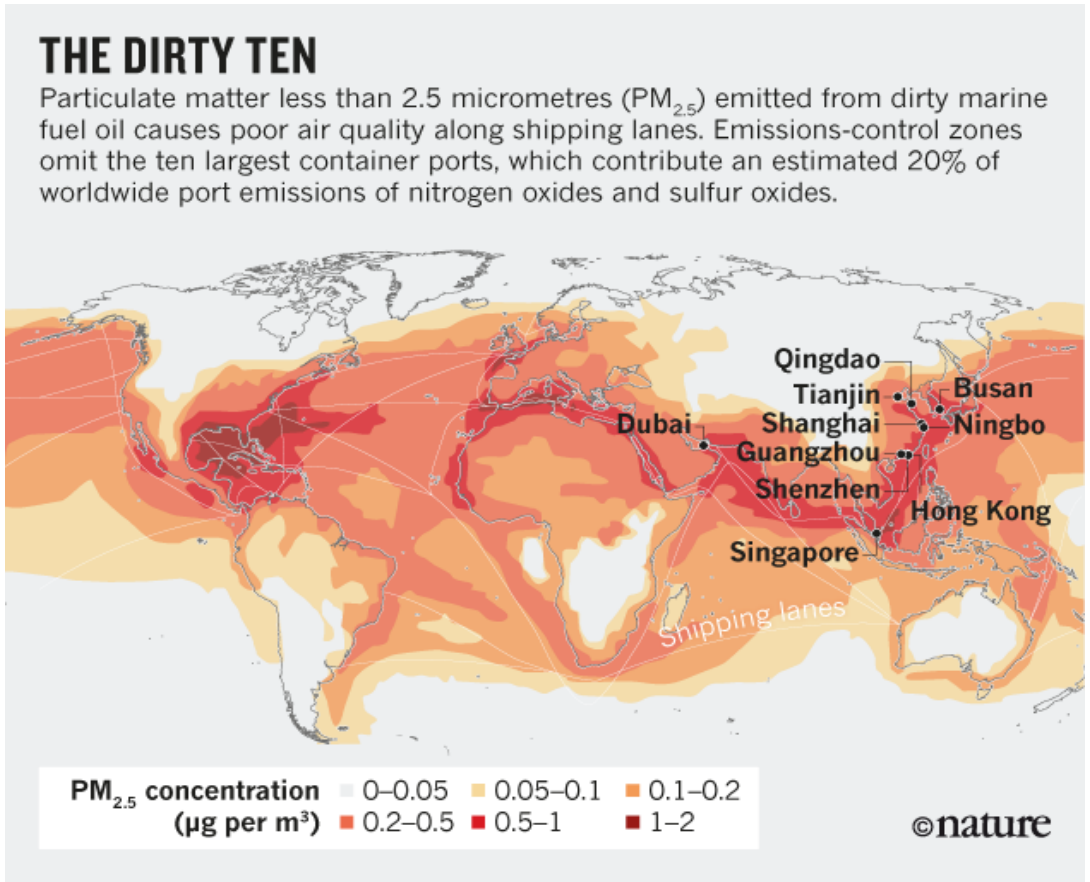
Contents

1) Background

❖ Nature(2016) estimate that these ten ports contribute 20% of port emissions worldwide.

Source: JTBC Newsroom (Jun-5, 2018)

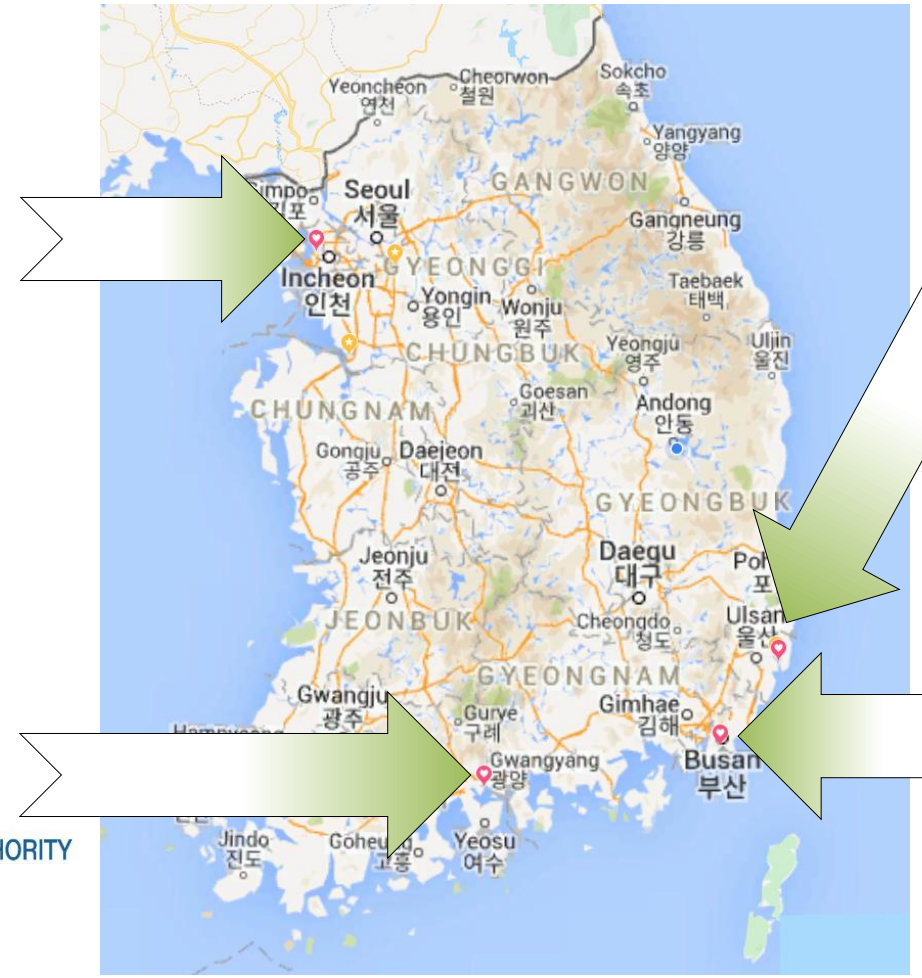


Source:
https://www.nature.com/news/pollution-three-steps-to-a-green-shipping-industry-1.19369#/ten (Apr-19, 2016)

2) Challenging New Environmental Protection Measure in Korea

❖ In an effort to reduce air pollution, the S. Korea 4 port authorities **(Busan, Incheon, Ulsan and Yeosu Gwangyang)** are set to install AMP. (Ship & Bunker, 2017)

INCHEON PORT AUTHORITY
THE FIRST PORT TO SUCCESS



UPA
ULSAN PORT AUTHORITY

YGPA
YEOSU GWANGYANG PORT AUTHORITY

BPA | BUSAN PORT AUTHORITY

3) Emerging New electric vessels

❖ Nicknamed the "Tesla ship", the emission-free boats are the latest offerings in a fleet of new electric vessel in Europe.

❖ Company : Port-Liner (Dutch Company)

❖ Barges spec.

- all-electric barges
- 52 metres(Length) and 6.7m(Width)
- to carry 280 containers
- to serve 17 inland terminals in the Northwest Europe region.

Source: https://www.dw.com/en/are-electric-vessels-the-wave-of-the-future-in-shipping/a-43046309

2) Objectives

- ❖ Meanwhile, ports are in competition with one another, especially in Northeast Asia.
- ❖ Deutsche Welle(2018) said, "These intense competition makes them resistant to press ahead with green port schemes.
- ❖ Nonetheless, South Korea's government (MOF) has been enacting rules and measures such as ECA(Emission Control Area), AMP(Alternative Maritime Power).
- ❖ **Research Question 1**

- **How are AMP facilities operated in YGPA's container port?**

- ❖ **Research Question 2**

- **What is AMP operational performance?**

1. Chen et. al. (2019), Alternative Maritime Power application as a green port strategy: Barriers in China

- ❖ Ships using power generators when hoteling can cause serious air pollution and thus pose a threat to port community.

2. LAHD (2016), San Pedro Waterfront Project EIS/EIR

- ❖ When in port, ships burns marine diesel in on-board generators to produce electricity.
- ❖ Those activities are significant contributors to poor local and regional air quality.
- ❖ 100% tugboats shall use AMP while hoteling at the LA Port since 2014.

3. Cannon (2008), U.S. Container Ports and Air Pollution: A Perfect Storm

- ❖ More than 10,000 visits to ports in the U.S from around the world each.
- ❖ Burning diesel fuel releases health threatening toxic air contaminants, smog forming air pollutions, and climate changing greenhouse gases.

1. Yeosu-Gwangyang Port Authority(YGPA) Facilities

Port of Yeosu

Port of Gwangyang

Source: Google map (http://maps.google.com)

2. AMP for Tugboat

❖ In S. Korea's ports have been operating low voltage AMP for tugboats.

- 51 tugboats

- 56 panel board

Power Outlet
On board

Panel Board
Shore side

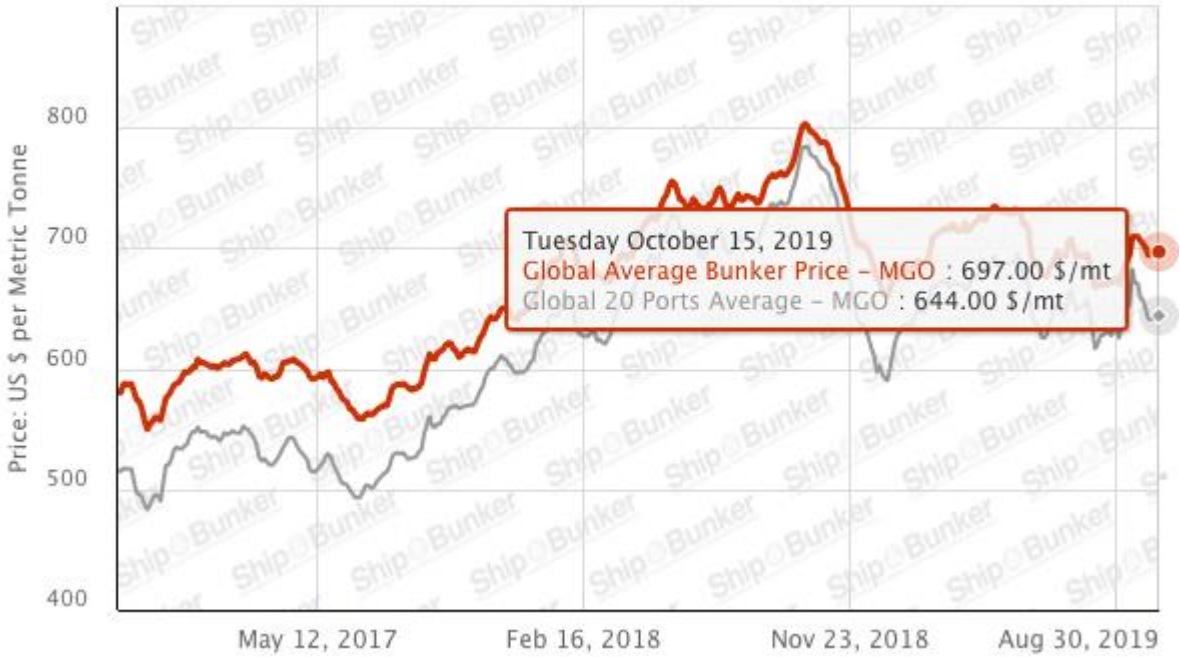
Ship to Ship connection
Berth

1. Economic Value

- Basically, the electric rate is stable than the bunker price. Whereas, the oil price is highly volatile.
- The former is related to AMP cost and the latter is linked with MGO.
- Economic Value (4yrs)
  - Total AMP $447K vs. Total MGO $2.6M
  - Shipowners's savings : about $2.1M

Cost (US$)	2016	2017	2018	2019*
AMP** (A)	87,756.02	112,127.96	144,402.78	102,881.18
MGO*** (B)	370,283.38	507,043.21	712,905.51	1,044,801.17
Economic Value (B-A)	282,527.36	394,915.25	568,502.74	941,919.99

* : 2019 Present
** : Invoice amount
*** : Estimation [Avg. MGO consumption(ton/day) x total tugboats x 365 days x Global 20 ports Avg. MGO price (ton)]
Source: YGPA, Ship & Bunker (http://www.shipandbunker.com)



Source: Ship & Bunker (http://www.shipandbunker.com)

2. Social Value

❖ It is linked to pollutants. (such as O_3, CO, NO_2, SO_2, $PM_{2.5}$, PM_{10})

❖ Social Value (4yrs)

- Total carbon emission 2,032 ton from AMP but MGO is 9,146 ton. AMP emits less carbon than MGO: 7,114 ton

- Decreasing noise and oscillation when the tugboats hotel at the berth. Increasing welfare for seaman.

Carbon emission (ton)	2016	2017	2018	2019*
AMP** (A)	360.8	526.6	651.8	493.0
MGO*** (B)	1,662.9	1,995.5	2,494.4	2,993.3
Social Value (B-A)	1,302.2	1,468.9	1,842.6	2,500.2

* : 2019 Present
** : Invoice amount
*** : Estimation [Avg. carbon emission(ton) x Avg. MGO consumption(ton) x 365 days]
Source: YGPA

Source: Google Images

V. Conclusion

❖ Though it makes an additional investment between terminal operators and shipping companies, in various efforts to reduce air pollutants nearby port community are getting more important.

❖ Inter alia, AMP facility is one of proper alternatives.

❖ the S. Korea 4 port authorities had been operating AMP for tugboats only.

❖ The benefits of the operating AMP generated a huge economic and social value.

❖ For 4yrs, the economic value of tugboat's ship-owners is $2.2M.

- Ship-owners can expect their expenditure for the electrical fare, they also can escape the volatile of MGO price.

❖ In the social value, after the introduction of AMP, tugboats reduced the carbon exhaust 7.1K ton for 4yrs.

- In addition to, the stress of seaman was improved whereas they await at the berth for a few hours.

❖ Thus, the invests for protecting environment bring about the economic performance and the social benefits.

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THANK YOU

FOR YOUR ATTENTION

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