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Research Article

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Economic Analysis of Vessel SOx Emission Reduction Measures in the Context of China

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Abstract With the rapid development of the world trade, the shipping industry is experiencing a rapid increase. Yet, there is an urgent issue deserving much attention. Ships produce substances that cause air pollution. For example, the flue produces NOx, COx, especially SOx. The impact of the massive emissions of these substances to the atmosphere is increasing.

In the context of IMO, the MARPOL Convention was implemented in January 2020. As I know, MARPOL Annex VI lowered the global sulfur emission standard from 3.5% to 0.5%. It focuses on no marine pollution but air pollution not only in China, but also in the world. Normally, there are two measures for controlling SOx emission,one is using low sulphur bunker, another one is Scrubber. This project comprehensively analyzes the current status and problems of ship's air pollution emissions, analyzes the main emission reduction measures to reduce ship's atmospheric emissions, and conducts economic analysis of emission reduction measures. I will apply both Quantitative and Qualitative methods to select which way is much better to control SOx emissions, so as to provide decision supports for the formulation and implementation of emission reduction measures in China.

Keywords Air pollution, MARPOL, Control emission, Reduction measure, Scrubber, Low-sulphur bunker

Introduction

According to the information provided by Norway to IMO[1], Norwegian ships emit NOx 6.02 million tons per year, which accounts for 7% of the world's total emissions; SOx 6.34 million tons, accounting for 4% of the world's total emissions; COx annual emissions approximately 1.24 million tons, accounting for 2% of the world's total emissions; VOC380,000 tons (Christer Ågren AirClim 2019). The polluted atmosphere can affect the climatic and coastal countries beyond 1000 km away. Among the pollutants, SO2 and SO3 in SOx are the culprit of acid rain.

The 70th MEPC[2] meeting held in October 2016 lowered the global sulfur emission standard from 3.5% to 0.5%, and the MEPC decided to start implementation of MARPOL[3] on January 1, 2020.

The policy of controlling sulfur emissions in the European Union and North America is also very strict. The EU in advance implemented the sulfur oxide emission standard in MARPOL 73/78 Annex VI before 2020, and gradually expanded the scope of application of the sulfur emission standard. North America has also advanced the implementation time of sulfur emission control standards. From this, it can be seen that the international community is accelerating the legislative process and continuously strengthening the control of ship sulfur emissions in China.

[1]IMO: International Maritime Organization
[2]MEPC: Maritime Environment Protection Committee
[3]MARPOL: Maritime Agreement Regarding Oil Pollution of Liability

China is a major country in international trade, and the issue of shipping emissions control is quite important. This article analyzes the current status of air emissions from ships, and analyzes the main measures for controlling ships' SOx emissions, and the economic analysis of emission reduction measures provides decision supports for the formulation and implementation of emission reduction measures for shipping companies in China.

In this research, research questions narrow the purpose down into specific questions that the researcher would like to answer or address in the study. I will ask, "which way is better for control SOx emission in China? --Scrubber? --Low sulphur bunker?

Materials and Methods

1. Quantitative research

In this case the subject of study is a container ship operating between ports of Mainland China and Taiwan. The basic information, including information about engine, bunkers and shifts is provided by the shipping company (Table 1). The ship uses Tier II middle speed diesel engine (MSD).

Ship information:			
Type	TEU	**Main power（KW）**	7980
Speed (knot)	18	**Host speed (r / min)**	148
Year of manufacture	2014	**Engine type**	MSD
The maximum load (ton)	12613	**Engine standard**	TierI
Capability（TEU）	831	**Engine fuel type**	HFO
Length(m)	144.83	**High sulphur fuel sulfur**	2.2
Maximum draft(m)	8.2	**Low sulfur oil fuel type**	MGO
Auxiliary power(KW)	1680	**Diesel sulfur content%**	0.118

Note: MSD[4] (Middle Speed Diesel) means medium-speed diesel engine; HFO[5] means heavy bunker oil; MGO[6] means marine gas oil; Tier I, II and III represents engines manufactured in 2000-2010, 2011-2015 and after 2016, respectively. Tier III engines are mainly used in nitrogen emission control zones in the United States.

The time frame of this study is September 6 – 13, 2019. The ship carries out approximately 44 voyages a year; each lasts 8 days and thus the total days in service is 352 days. I will comprehensively consider the ship's current status of emission and how installing a scrubber and using LSFO[7] would affect energy consumption and emission. Starting from October 1, 2018, ships bound for the port of Ningbo-Zhoushan that have entered the Ship Emission Control Area in Waters of Yangtze River Delta (SECAWYRD) shall use LSFO with sulfur content ≤ 0.5% m/m.

There are three options below to analyze the different scenarios of using low sulfur fuel and scrubber. Through comparing them, we could find out which way is more cost-effective.

1.	High-sulfur oil	No emission reduction measures and use the high sulphur bunker
2.	0.5%+0.5%(sulphur emission control area)	0.5% diesel elsewhere (global and SECAWYRD standard)
3	Exhaust gas processing device	HFO for main and auxiliary engines and reach 0.5%

The first scheme is the current status of the ship – that is, no emission reduction measures have been applied. The ship now uses diesel only at berths in the SECAWYRD (emission control zone of the Yangtze River Delta), while in other places 2.2% high sulphur bunker (HFO) is allowed. According to survey data, HFO contains 2.2% of sulfur while diesel contains only 0.1%.

[4]MSD: Middle Speed Diesel
[5]HFO:Heavy FuelOil
[6]MGO: Marine Gas Oil
[7]LSFO: Low Sulphur Fuel Oil

The second scheme is that the ship uses low sulphur bunker with 0.5% sulfur content (hereinafter 0.5% low sulphur fuel oil) in and outside the SCARWYRD. This scheme would be executed if in 2020 0.5% Low sulphur fuel oil and above is allowed in non-emission-control areas worldwide, and in the SECAWYRD 0.5% low sulphur fuel oils is allowed.

The third scheme assumes that a closed-loop exhaust gas processing device is applied. Both main and auxiliary engines still use 2.2% HFO, and thus the device shall process sulfides to meet the 0.1% cap in the SECAWYRD and the 0.5% standard worldwide.

The following table is calculation about the normal bunker NPV and IRR, and I also following the same method to calculate others plan.

Data collection:					1	variable cost	15897409.2	RMB					
	Total start-up fund	412,538	USD		1.1	Fuel	8906400.198	RMB					
	Loan percent	0.8			1.2	Light oil	621000	RMB					
	Loan amount	330,030	USD		1.3	Engine oil	108000	RMB					
	Ballon payment	-	USD		1.4	Maintenance cost	3100000	RMB					
	Libor	1.92%			1.5	Port fee	660000	RMB					
	Margin	2.68%			1.6	Marketing fee	693000	RMB					
	Operating Days	352	days		1.7	administration fee	270000	RMB					
	Facility term	5	years		1.8	crew wage	1539000	RMB					
	Daily OPEX	6875.63	USD		2	Fixed cost	6036150	RMB					
	Annual increase	2.0%			2.1	Manager wage	342000	RMB					
	T/C rates	8863.64	USD		2.2	Depreciation	4350000	RMB					
	Interest	4.601%			2.3	Insurance	1344150	RMB					
	Install tower time	0	days		3	Account fee	2458381	RMB					
	Voyage income	78000	$		4	Total cost	24391940.2	RMB					
	Desulfurization tower	0	RMB		5	Operating cost	17583550.2	RMB					
		0.5			6	Year OPEX handy	2509606.679	$					
	Exchange rate	7.0065			7	Operation cost for		RMB					
	Fuel Consume	7.2	tone/day					$					
	Total fuel	2534.4	tone		8	Total cost	6875.634738	$					
Financial cost and Operating cost	YEAR	Year 1		Year 2		Year 3		Year 4		Year 5		Year 6	
		HALF1	HALF2	HALF1	HALF2	HALF1	HALF2	HALF1	HALF2	HALF1	HALF2	HALF1	HALF2
	Loan at the beginning	330,030	297,027	264,024	231,021	198,018	165,015	132,012	99,009	66,006	33,003	-	(33,003)
	Interest	7,592	6,833	6,074	5,315	4,555	3,796	3,037	2,278	1,518	759	-	(759)
	Capital	33,003	33,003	33,003	33,003	33,003	33,003	33,003	33,003	33,003	33,003	33,003	33,003
	Total instalment(C+I)	40,595	39,836	39,077	38,318	37,558	36,799	36,040	35,281	34,522	33,762	33,003	32,244
	Loan amount remain after the half year	297,027	264,024	231,021	198,018	165,015	132,012	99,009	66,006	33,003	-	(33,003)	(66,006)
	Number of Operating days	176.00	176.00	176.00	176.00	176.00	176.00	176.00	176.00	176.00	176.00	176.00	176.00
	financial break even per day	231	226	222	218	213	209	205	200	196	192	188	183
	Balloon Payment										-		
	Operating Expenses												
	Daily Expenses	6,876	6,876	7,013	7,013	7,013	7,013	7,013	7,013	7,013	7,013	7,013	7,013
	Number of Days (Operating Expenses)	182.50	182.50	182.50	182.50	182.50	182.50	182.50	182.50	182.50	182.50	182.50	182.50
	Total OPEX per half year	1,254,803	1,254,803	1,279,899	1,279,899	1,279,899	1,279,899	1,279,899	1,279,899	1,279,899	1,279,899	1,279,899	1,279,899
	Equivalent OPEX per day (350days of employment)	7,130	7,130	7,272	7,272	7,272	7,272	7,272	7,272	7,272	7,272	7,272	7,272
	Torsl Expenses (CAPEX + OPEX) per equivalent earning days	7,360	7,356	7,404	7,400	7,466	7,461	7,477	7,473	7,468	7,464	7,460	7,457
Capital process:	YEAR	Year 1		Year 2		Year 3		Year 4		Year 5		Year 6	
	half year	HALF1	HALF2	HALF1	HALF2	HALF1	HALF2	HALF1	HALF2	HALF1	HALF2	HALF1	HALF2
	Operating days	176.00	176.00	176.00	176.00	176.00	176.00	176.00	176.00	176.00	176.00	176.00	176.00
	Daily T/C rates	8,864	8,864	8,864	8,864	8,864	8,864	8,864	8,864	8,864	8,864	8,864	8,864
	Operating revenue	1,560,000	1,560,000	1,560,000	1,560,000	1,560,000	1,560,000	1,560,000	1,560,000	1,560,000	1,560,000	1,560,000	1,560,000
	Operating Expenses	(1,254,803)	(1,254,803)	(1,279,899)	(1,279,899)	(1,279,899)	(1,279,899)	(1,279,899)	(1,279,899)	(1,279,899)	(1,279,899)	(1,279,899)	(1,279,899)
	Gross Revenue	305,197	305,197	280,101	280,101	280,101	280,101	280,101	280,101	280,101	280,101	280,101	280,101
	Capital Payment	(33,003)	(33,003)	(33,003)	(33,003)	(33,003)	(33,003)	(33,003)	(33,003)	(33,003)	(33,003)	(33,003)	(33,003)
	Interest Payment	(7,592)	(6,833)	(6,074)	(5,315)	(4,555)	(3,796)	(3,037)	(2,278)	(1,518)	(759)	-	759
	Net Cash Flow	264,601	265,360	241,024	241,783	242,542	243,301	244,061	244,820	245,579	246,338	247,098	247,857
	Accumulated Cash Flow	264,601	529,962	770,985	1,012,768	1,255,310	1,498,612	1,742,672	1,987,492	2,233,071	2,479,410	2,726,507	2,974,364
	Balloon Payment										-		
	Estimated Sale of the vessel										-		
	Total Net Cash Flow	264,601	265,360	241,024	241,783	242,542	243,301	244,061	244,820	245,579	246,338	247,098	247,857
	YEAR	Year 1		Year 2		Year 3		Year 4		Year 5		Year 6	
	half year	HALF1	HALF2	HALF1	HALF2	HALF1	HALF2	HALF1	HALF2	HALF1	HALF2	HALF1	HALF2
	Tower Projection FMV	371,284	330,030	288,777	247,523	206,269	165,015	123,761	82,508	41,254	(0)	(41,254)	(82,508)
	Loan FACILITY ENDING BALANCE	297,027	264,024	231,021	198,018	165,015	132,012	99,009	66,006	33,003	-	(33,003)	(66,006)
	Security Cover	125.00%	125.00%	125.00%	125%	125%	125%	125%	125%	125%	#DIV/0!	125%	125%
IRR CACULATION:													
Year	YEAR 0	Year 1		Year 2		Year 3		Year 4		Year 5		Year 6	
half year	YEAR 0	HALF1	HALF2	HALF1	HALF2	HALF1	HALF2	HALF1	HALF2	HALF1	HALF2	HALF1	HALF2
Total Net Cash Flow	-82507.61685	264,601	265,360	241,024	241,783	242,542	243,301	244,061	244,820	245,579	246,338	247,098	247,857
Total a year	-82507.61685	529961.7606		482806.5674		485843.5077		488880.4481		491917.3885		494954.3288	
IRR	635%												
NPV	2518752.81												
Total profit	2,479,410												

2. Qualitative research

From above cash-flow calculation, we got the cost situation and profit situation due to both two methods. Aiming to understand the situation of in the real world of the shipping company how to control SOx emission, I design a interview to analyse advantages and disadvantages of scrubber and Low sulphur bunker. The first step is that we need to determine the final number of interview people (Hunter, 2002). I select 20 people， who are working in shipping industry to join this interview. Different from a survey, an interview needs to respect the interviewees by using expressions as close as possible to the interviewees and their expressions, so as to avoid some unnecessary misunderstandings and resonate with the interviewees (Sharma, 2009). For example, most of the interviewees are shipping industry staff in this Interview, and try to make them understand in straightforward language. As for face-to-face interviewees, I will try to take a recording after the interviewees agree so that I can analyze the results later. If any interviewee is unable to conduct a face-to-face interview, as said in the above survey, Facebook and WeChat are also acceptable. The interview questions are in both Chinese and English for recording.

Different from a survey, an interview may encounter communication problems: (1) the respondents refuse to answer (2) the interview location is highly disturbed (3) the respondents are impatient during the interview, etc. My way of dealing with them is not to offend the taboos of the interviewees but keep the conversation harmonious, and leave controversial issues to the end. It is also important for interviewees to express their ideas as freely as possible (Sharma, 2009). the following is the table of interview form.

No.		Time		Location	
Interviewee		Position		Company of the Interviewee	
Email		Questioner		Note-keeper	

Interview opening:

Hello, I am a master student of International Maritime University (ITL). Since the IMO is about to implement MARPOL convention worldwide to limit sulfur emissions from ships and reduce environmental pollution from ships. I am currently conducting an interview on whether shipping companies choose to install desulfurization scrubber to reduce sulfur emissions or use low-sulfur oil to reduce sulfur emissions. So if I may, take you a few precious minutes to complete this interview. This interview is mainly conducted in the form of Q & A. The interview content will be kept strictly confidential! To ensure the effectiveness of the interview, please answer each question truthfully. The interview will take approximately 15-20 minutes to complete. If there is no doubt, let's get started!

Contents:

Q: Please briefly describe the scope and content of your work.

A:

Q: Are your company still using scrubber for control SOx emission and your company also using Low sulphur bunker or not?

A:

Q: Which kind scale of your company?

A:

Q: Is your company still using scrubber to control SOx emissions and is your company also using Low sulphur bunker?

A:

Q: What is the disadvantage of using scrubber that your company cannot accept?

A:

Q: What is the disadvantage of using Low sulphur bunker that your company cannot accept?

A:

Q: Will oil prices affect your company's decision making?

A:

Q: What do you think is the first thing to consider when choosing to give up using scrubber or use low-sulfur oil?

A:

Q: Why your company consider this factor in the first place?

A:

Q: Is there any new policy afflicting your company's make choice?

A:

Steps of Interview: (1) Observe the interview site; (2) Draw subjects; (3) Start the interview and record (4) Reflect and evaluate the interview

Privacy statement:

1. This survey does not involve any personal privacy and business confidential information.
2. All survey related information will be encrypted and saved in the computer and destroyed after the study.

Results & Discussion

1. Quantitative research result

	IRR	NPV
High sulphur+0.1%	635%	2518752.807
0.5%+MGO(sulphur emission control area)	331%	1333492.299
Desulfurization tower	204%	1824119.260

As is shown in the chart: to compare with the IRR and NPV from plan1 to plan 3. In the first chart (to compare with the IRR), the largest number of IRR is using the normal high sulphur bunker, without any solution for controlling sulphur emission, accounting for 635%. The next largest one is using 0.5% low sulphur fuel oil, being 331%, which is 204% lower than the former using high sulphur bunker and using 0.5% bunker.By way of contrast, the least IRR for using scrubber and this figure is only 204%.

In the second part of the chart related to NPV. Clearly, differentfrom IRR, using the normal high sulphur bunker has the highest number of NPV, it is about 2.5million. Using scrubber comprises the next largest NPV (1.8 million). By contrast, using 0.5 % low sulphur fuel oil is the smallest number of NPV, which is only 1.3million.

	IRR	NPV
High sulphur+MGO	2644%	6201486.88
0.5%+MGO(sulphur emission control area)	2173%	5520220.83
Desulfurization tower	1445%	5768753.37

In order to ensure the accuracy of the results, I have selected another set of shipping bunker data from Japanese to calculate and analyze. I selected a set of data on May 4th 2020. The high sulphur bunker price is138.64$, and 0.5 low sulphur fuel oil is 215.5$. The above is the result of the IRR and NPV in each plan. From the above table, we can find that the IRR have the same situation with the bunker used in shanghai:
IRR (High sulphur bunker) >IRR (0.5% Low sulphur bunker) > IRR (scrubber).
And the NPV also has the same situation:
NPV (High sulphur bunker) > NPV (scrubber)>NPV (0.5% Low sulphur bunker).
However, further analyses of the costs of emission reduction measures show that low sulphur fuel oil are better than scrubber, from a cost-effective perspective (Arof, A. 2018). The cost-benefit analysis of emission reduction measures shows that the installation of exhaust gas processing equipment is better than the plan use of LSFO. In other words, the Scrubber is not the most cost-effective option. Yet, from NPV perspective, scrubber is better than Low sulphur bunker.

2. Qualitative research result

"Any act of adding machinery to a ship increases risk," represents the thinking of many shipping companies (Koilo, 2019). In addition, insurance companies are evaluating the higher risks that ships equipped with scrubbers may face. At present, a number of ships have had accidents due to the installation of scrubbers. Some analysts said that the accidents were due to serious corrosion of equipment. It was also suggested that improper installation of the scrubbers or improper operation of the crew could also lead to accidents. Many ships with scrubbers are trying to make their system work properly, and many have to assign more crew for operation. These all are the problems the ships need to face. Even the large shipping companies with professional technical teams, when facing with these problems, are under great pressure, not to mention some small and medium-sized shipping companies in China. As to them, these risks are devastating.
Small and medium-sized shipping enterprises in China are obviously inferior to large ones in utilizing economic resources, obtaining market information and seeking external support. At the same time, the entry barriers of technology, capital and others for small and medium-sized enterprises in the field of production and operation are larger, and the existence of a large number of small and medium-sized shipping enterprises makes them face increasingly fierce competition. Therefore, in a time of severe market turbulence and in a financial crisis, small and medium-sized shipping enterprises are often the hardest-hit ones. The disadvantage of low anti-risk ability makes small and medium-sized enterprises in China, especially small and medium-sized enterprises established in a short time, have higher failure rate. Compared with small-scale enterprises, the economies of scale of large-scale shipping enterprises are favorable for large-scale shipping enterprises to expand market coverage and spread operational risks. Investment in scrubber for large shipping company is also a way to diversify risk (Koilo, 2019).
The decisive factor is the difference between low-sulfur oil and ordinary bunker in China, which is getting smaller and smaller as the number of suppliers increases. The cost advantage of scrubber has gradually been lost. However, during the calculation of IRR and NPV form the cash-flow part, we can find that NPV using scrubber is relatively high. So currently using scrubber is not useless.
Although the current supply of low-sulfur oil has unstable factors, and the quality of low-sulfur oil is also not good, I believe that all of them will be resolved through the technological innovation. With the support of the Chinese government, the continued supply of high-quality low-sulfur oil in the future will solve the supply problem of China's low-sulfur oil market. In addition, emerging technologies, such as the LNG technology, are also an important factor for solving shipping enterprises' control of sulfur emissions.

Conclusion

In the whole paper, I analyzed the research question step by step. Firstly, I got the NPV and IRR for both measures to control SOx emission. And secondly, in the interview I got the information that large scale companies in China still use scrubber, although the IRR is bad, and I got the factors still use scrubber or not. Finally the Regression could prove the results of interview within a small group to a wide shipping industry situation. In all cash flow calculations, the use of Low sulphur bunker is of the worst NPV and good IRR, but the

increase in investment costs caused by it is less, and the reconstruction of ships is not much, so it is also the direct choice for most ship companies. Although the price of Low sulphur bunker has greatly affected the economical efficiency and cost effectiveness of the measure. Especially in this period, due to the increase in the suppliers of Low sulphur bunker, and decrease the price difference between high sulphur bunker and Low sulphur bunker.

Therefore, the use of Low sulphur bunker is the most direct choice to meet the sulphur emission control and also a minimal risk option for shipping companies, which will not put huge pressure on the cash flow of shipping companies in the short term and will not affect the companies by sudden technical accidents. However, the quality of low-sulfur bunker and its impact on the ship's engine also exist. With the more and more strict requirements on bunker sulfur content, the types of bunkers will continue to increase, which is also a challenge for shipping companies.

SEALAND

Customer Advisory 19th February 2020

EFF (Environmental Fuel Fee) for April 2020

Dear Valued Customers,

In line with our previous communication around EFF, we have monitored the low sulphur bunker price for the period associated to April 2020.

Please be informed that the average bunker price applicable for the period associated to April 2020 is as per table below.

Ave. Fuel Price in Time Period	EFF tariff reference	*Type of fuel reference	Average Bunker Price
16th Jan-2020 to 15th Feb-2020	April 2020	0.5% Sulphur Fuel Oil (SYM:MFSP000)	USD572.81/MT

*Source from Bunkerworld, Singapore port (base port for Sealand Asia's bunker reference)

As such, the April EFF tariffs for all origins to all destinations within Sealand Asia scope** **effective 1st April 2020 based on vessel ETD** are as follows:

Scope	20'Dry/DT/FR	40'Dry/40'Hdry/DT/FR	45' Hdry	20'Reef	40'HRef
All countries	USD 42	USD 83	USD 100	USD 63	USD 125

We thank you for your ongoing and valuable support for Sealand – A Maersk Company. Should you have any further queries, please feel free to contact your local Sealand Asia representatives.

Yours sincerely,

Sealand- A Maersk Company Asia

**For details on charges from Russia, please contact your local Sealand Asia representatives.

Interasia 运达航运股份有限公司 INTERASIA LINES SINGAPORE PTE. LTD.

notice for Low Sulphur Regulation

New BAF (NBF) notice for Low Sulphur Regulation

Dear Valued Customers,

To comply with the upcoming Low Sulphur Regulation of International Maritime Organization's (IMO 2020) since January 2020, the cost has increased significantly starting from 2019 Q4. In order to strengthen service and appropriately recover the cost from 1st, Nov. 2019, we will implement the following "New BAF". Thank you for your understanding.

Period: 20200401~20200630

Trade: Intra Asia – India sub-continent
Currency: USD

USD 200/20', USD 400/40' & 40HQ
USD 300/20'Reefer, USD 600/40'Reefer

Trade: India sub-continent – Intra Asia
Currency: USD

USD 100/20', USD 200/40' & 40HQ
USD 150/20'Reefer, USD 300/40'Reefer

WAN HAI LINES LTD.

Notice of Collection of Low Sulphur Surcharge (WBS)

To: Dear Customers/Agents

In accordance with International Maritime Organization (IMO) 2020 sulfide emission regulations, our operating fleets have carried out fuel conversion since October 2019. In order to reflect the cost of fuel, we will charge low sulphur fuel surcharge (WBS) (valid for April 1, 2020-June 30, 2020) from April 1, 2020 according to the rate standards below. The specific rates in East China (Shanghai, Ningbo, Fuzhou, Xiamen, Suzhou and Hangzhou, Yiwu and the ports in the internal branches of the Yangtze River) are as follows:

TRADE(outbound)	20'	40'	40HQ
Southeast Asia (except the Philippines)	USD90(General container)	USD180	USD180(General container)
	USD135(Reefer container)		USD270(Reefer container)
Hong Kong, Philippines	USD48(General container)	USD96	USD96(General container)
	USD72(Reefer container)		USD144(Reefer container)
India/Sri Lanka/Bangladesh/Pakistan	USD195(General container)	USD390	USD390(General container)
	USD293(Reefer container)		USD586(Reefer container)

SITC CONTAINER LINES CO., LTD

Southeast Asia Lines LSS Adjustment Notice

Dear customers,

Costs will rise significantly from the fourth quarter of 2019, in line with the low sulphur regulations of International Maritime Organization (IMO), which will come into effect in January 2020.

In order to stabilize and strengthen the service, and appropriately recover costs from November 2019, we will adjust the low sulphur fuel surcharge "LSS", according to the fuel prices from June to September, start from November 1, 2019 to the end of the year, the collection standards of us are as follows:

Shanghai-Southeast Asia LSS Charging Standard
(Unit: USD/TEU)

Port of destination	Dry container	Reefer container
Hong Kong	45	67.5
Philippines, North	45	67.5
Philippines, South	75	112.5
Vietnam	75	112.5
Kampuchea	75	112.5
Thailand	75	112.5
Singapore	90	135
Malaysia	90	135
Brunei	90	135
Indonesia	90	135

Payment Method: default to freight collect payment (original prepaid LSS is cancelled synchronously)

Starting and Ending Time: November 1, 2019 to December 31, 2019 (ETD at port of departure)

If there is any update to the rate from 2020, we will inform you

Remarks:

The Philippines, North, contains Batangas, Subic, Manila North Port, Manila South Port, Cebu and ports transited through the above ports;

The Philippines, South, includes Cagayan, Davao, General Santos and ports transited through the above ports;

SITC Container Lines Co., Ltd
10/15/2019

	Indo-Pakistani line	Middle East	European line	Southeast Asia	Sino-US line	Australian line	Africa
LSS USD/TUE	印巴航线	中东	欧洲线	东南亚	中美航线	澳洲线	非洲
OOCL	163	132	102	84			
YML	111	134	178	92	156	16	
IAL	200			100			
WHL	195			90	20		
ZIM	20			110			
HMM	101	101	124				
SAF	59						12
EVERGREEN			197				
KMTC		210		90			
APL		75					
CMA			90		5		129
ONE					15		
COSCO			50	80	140		

Influenced lines distribution

The installation of scrubber is of more profitability due to the better NPV than the use of Low sulphur bunker but the IRR is the worst. It is an appropriate choice to install the tail gas treatment equipment in ocean routes. Although the increase in the cost caused by this measure is small, but the up-front investment is a relatively large investment only affordable for state-owned shipping enterprises with the large cash flow.

And for large companies in China, continuing to use desulfurization towers is an important way for companies to share risk. Scrubber is still a good solution when sulfur control policies continue to change. But technical risks and low oil prices still have a huge impact on scrubber. More and more small and medium shipping companies in China are giving up using scrubber. At this moment, scrubber not a good choice.

No matter which way is chosen to control sulphur emissions, the changes in shipping costs construction are inevitable. Through the notices on the increase of low sulphur bunker surcharge from several shipping companies in China, it can be seen that all shipping companies from large shipping companies, such as OOCL, to small and medium-sized shipping companies, such as SITC and WAN HAI, have started to raise freight rates, and specifically marked the increase as the Low sulphur bunker surcharge, including INTERASIA LINES SINGAPORE PTE. LTD. From the table 16 showing that also has started to charge the low sulphur bunker surcharge covering hundreds of lines in most parts of the world from African lines to Australian lines as well as European India–Pakistan line. This fact shows that most companies in China are using low-sulfur bunker.

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