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Proposal on Tightening the Sulphur Content Limits of Marine Light Diesel and Industrial Diesel and Lifting the Restriction on Use of Liquid Fuel and Solid Fuel in Sha Tin Fuel Restriction Area

PURPOSE

This paper seeks Members' views on our proposals to tighten the sulphur content limits of marine light diesel (MLD) and industrial diesel to no more than 0.001% (by weight); and to lift the restriction on use of liquid and solid fuel in Sha Tin fuel restriction area ("STFRA").

BACKGROUND

2. Sulphur dioxide (SO_2) is a major air pollutant, mainly resulting from combustion of fuel containing sulphur. It can cause respiratory illness, reduce lung function, and increase morbidity and mortality at high concentration levels. It also reacts with other chemicals in the atmosphere and transforms into fine sulphate particles that contribute to smog formation and impair visibility.

3. The Government has been imposing control on the sulphur contents of fuels to reduce SO_2 emissions in Hong Kong. Among the various legislations, the Air Pollution Control (Marine Light Diesel) Regulation (Cap. 311Y) ("the MLD Regulation") and the Air Pollution Control (Fuel Restriction) Regulations (Cap. 311I) ("the FR Regulations") limit the sulphur contents of locally supplied diesel fuel for vessels and industrial and commercial uses, respectively, to control SO_2 emissions from these sectors at source.

4. In the 1980s, when Sha Tin District was being developed into a new town, a lot of small and medium scale non-gaseous fuel users co-existed with nearby residents. In addition, since Sha Tin District is situated in valley areas which hinders effective dispersion of air pollutants, the district is susceptible to serious air pollution. To improve the situation, the STFRA (see **Annex 1**) was delineated under the FR Regulations, disallowing any person to use liquid fuel or solid fuel in any relevant plant (including furnace, engine, oven or industrial plant) in the STRFA except at a construction site or during emergency.

(A) TIGHTENING THE SULPHUR CONTENT OF MLD AND INDUSTRIAL DIESEL

Current Sulphur Content Limits of MLD and Industrial Diesel

5. Marine vessels, including ocean-going vessels (OGVs) and local vessels[1], are the major sources of air pollution in Hong Kong. Local vessels contributed to about 20%, 42% and 55% respectively in the total SO_2, respirable suspended particulates (RSP) and nitrogen oxides (NOx) emissions from the marine sector in 2020. Limiting the sulphur content of MLD can effectively reduce the emissions of SO_2 and RSP by local vessels and improve the air quality especially in coastal areas. As such, since April 2014, the MLD Regulation has stipulated that the sulphur content of locally supplied MLD should not exceed 0.05% (by weight).

6. Emissions of SO_2, RSP and NOx from industrial and commercial activities contributed to about 0.7%, 2.2% and 1.5% of the total emissions in Hong Kong respectively in 2020. To reduce emissions from the industrial and commercial sectors, the Government tightened the cap on the sulphur content of industrial diesel stipulated in the FR Regulations to 0.005% (by weight) in 2008.

Current Sulphur Content Limit of Diesel Applied in the Region

7. Since 2019, the State has fully implemented the requirement for supplying diesel meeting China VI standards, with a view to banning the sale of motor diesel below China VI standards. Such measure has brought the sulphur content limit for vehicle diesel, ordinary diesel and oil for some marine vessels[2] to the same level (i.e. not exceeding 0.001%), and achieved the "three-oil integration". As a result, river trade vessels plying between Hong Kong and the Mainland have taken the lead in using light diesel with sulphur content not exceeding 0.001% to meet the requirement for entering the Mainland waters[3].

Sulphur Content of Diesel Currently Supplied in Hong Kong

8. At present, two types of MLD with sulphur content not exceeding 0.05% and 0.001% are available for supply by the local bunkering companies to cater for the respective needs of domestic vessels operating restrictively within Hong Kong waters and the river trade vessels plying between Hong Kong and the Pearl River Delta. Regarding industrial diesel, the locally supplied diesel is the same as Euro V motor diesel currently used by diesel vehicles with maximum sulphur content at 0.001%.

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1 "Local vessels" cover domestic vessels operating restrictively within Hong Kong waters and river trade vessels plying between Hong Kong and the Pearl River Delta.

2 "Some marine vessels" generally refer to non-OGVs including inland vessels and river-sea vessels that navigate in the inland river control area of the Mainland waters.

3 Since 2019, Hong Kong and Guangdong Province have jointly introduced the "Implementation Scheme of the Domestic Emission Control Areas for Atmospheric Pollution from Vessels" within the Pearl River Delta, which includes requiring that fuel oil or diesel up to the national standards for "Marine Fuel Oil for River Trade Vessels" or "Vehicle Diesel Oil" respectively, i.e. having a sulphur content not exceeding 0.001%, shall be used for river trade vessels (except for river-to-sea ones).

Proposed Control on MLD

9. In order to further reduce marine emissions, and at the same time bring the marine fuel standard of Hong Kong on par with other regions within the Pearl River Delta, for our better integration into the Greater Bay Area, we propose to amend the MLD Regulation to tighten the statutory cap on the sulphur content of locally supplied MLD from 0.05% to 0.001%. To cater for OGVs, we also propose to introduce the following provisions in the MLD Regulation to allow MLD importers (oil companies) and suppliers (i.e. oil distributors, oil retailers, oil traders) to continue to supply MLD with sulphur content higher than 0.001% but not exceeding 0.05% ("the restricted MLD") to OGVs:

(i) MLD importers and suppliers who supply the restricted MLD must register with the control authority ("the Authority", i.e. the Director of Environmental Protection) prior to supplying the said MLD;
(ii) MLD importers are permitted to supply the restricted MLD to the registered MLD suppliers only; and
(iii) MLD importers and suppliers who supply the restricted MLD to OGVs are required to submit reports to the Authority regarding information of their supply of the restricted MLD to OGVs regularly.

10. Para. 9(i) and (ii) seeks to ensure that the restricted MLD is only supplied to OGVs whereas para. 9(iii) aims to help make the supply of the restricted MLD traceable which can facilitate enforcement work.

Benefits of the Proposals

11. The benefits of the proposals are summarised as follows:

(i) Emission reduction

The tightened cap would reduce the sulphur content of MLD by 98%. In 2020, about 380 tonnes of SO_2 and 320 tonnes of RSP were emitted by local vessels respectively. It is expected that after the proposed tightening, the annual SO_2 and RSP emissions would be reduced by about 370 tonnes (97%) and 5 tonnes (2%) respectively.

(ii) Smooth transition by the relevant trades

No particular issue is expected in switching to the use of MLD with maximum sulphur content at 0.001%. Upon a comprehensive analysis of relevant data and comments collected from different parties including relevant experts, oil companies, engine manufacturers and marine transport trade, it is concluded that all vessels that could currently use MLD with sulphur content not exceeding 0.05% are suitable for switching to use MLD with sulphur content not exceeding 0.001% without modifying the engine (details at **Annex 2**). Oil companies have also indicated that there would be adequate supply of the latter MLD.

(iii) Safeguarding fuel supply for OGVs

To safeguard the competitiveness of Hong Kong as a major bunkering port in Asia, the MLD Regulation should continue to allow the supply of MLD with sulphur content not exceeding 0.05%, which is still commonly used by and indeed already a "cleaner" fuel in the case of OGVs. The State also allows suppliers at some Mainland ports[4] to continue to supply such MLD despite the implementation of the "three-oil integration".

(iv) Affordable Costs

There have been concerns from local vessel operators that switching to MLD with sulphur content not exceeding 0.001% will lead to an increase in operation costs. Our price review showed that although the price of MLD with the sulphur content not exceeding 0.001% is normally slightly higher than that with the sulphur content not exceeding 0.05%, the import prices of both have been very close to each other since 2014. Even if international oil prices have been very volatile over the past two years, the difference in the average import prices for the two types of light diesel was still less than 5% most of the time. In February to July 2023, the difference was narrowed to less than HK$0.03 per litre (less than 1% of the fuel price). It is expected that the actual cost implications to the vessel owners and operators upon the implementation of the proposal will depend on the differences in import prices and retail prices set by the MLD suppliers. Furthermore, the increase in fuel cost may be offset in long run by savings in operating and maintenance costs from the use of MLD with the sulphur content not exceeding 0.001%, which could for instance reduce wear and tear of engine cylinder liners. Overall the switch is not expected to have significant impact on the operation costs of the trade.

Proposed Control on Industrial Diesel

12. As at present, the locally supplied industrial diesel is the same as Euro V motor diesel, i.e. having a sulphur content not exceeding 0.001%, we propose to amend the FR Regulations by tightening the sulphur content cap of industrial diesel from 0.005% to 0.001%. In fact, the amendment just reflects the actual market situation, and will not have technical and cost implications on the industry.

13. Upon implementation of the proposed control on MLD and industrial diesel, the sulphur content of diesel for motor, industrial and commercial as well as local and inland marine uses in Hong Kong will be 0.001%, and it will bring the numerous benefits on the environmental protection front. Furthermore, this helps Hong Kong to accomplish the "three-oil integration", dovetail with the Mainland's policy and facilitate Hong Kong's further integration into the Guangdong-Hong Kong-Macao Greater Bay Area (GBA).

[4] At present, some Mainland ports such as Zhoushan, Shanghai, Guangzhou, Dalian and Qingdao could supply MLD with sulphur content not exceeding 0.05% to OGVs.

(B) LIFTING THE RESTRICTION ON USE OF LIQUID AND SOLID FUEL IN SHA TIN FUEL RESTRICTION AREA

Proposed Lift of Control

14. We propose to remove the STFRA under the current legislation, and lift the restriction on use of liquid fuel and solid fuel in STFRA.

Justifications

15. At present, Sha Tin has basically been developed into a primarily non-industrial area. Some old industrial areas have been converted to general business uses. There are no substantial number of actively operating factories or major sources of air pollution in the district. Moreover, the planning and development of Sha Tin in the past few decades have been set to use electricity and gaseous fuel in general. Air monitoring data shows that the SO_2 level in Sha Tin has dropped significantly from 14 mg/m3 in 1991 to 5 - 7 mg/m3 in recent years, which is similar to or even lower than the average level in other districts of Hong Kong.

16. We have run computer model to simulate the situation where industries using non-gaseous fuel are established in the district upon lifting the restriction in the STFRA, so as to assess the impact of such lifting on the air quality of the district. The modelling results showed that despite the lifting, the air quality of Sha Tin would remain similar to other districts like Tuen Mun and Tseung Kwan O. It is expected that the lifting will not give rise to additional air pollution problem in the district[5].

17. Based on the above assessment, we consider it is obsolete to retain the STFRA under the current legislation, which causes unnecessary restrictions to some trades and public activities. A salient example is that the public cannot conduct barbeque in Sha Tin, and non-gaseous fuels such as gelled alcohol, Bincho-charcoal and wax candle for cooking or food warming purpose cannot be used in restaurants. Hence, we propose to lift the restriction on use of liquid fuel and solid fuel in STFRA. The Sha Tin District Council Development, Housing, Environment and Health Committee supported the proposal.

TRADE AND PUBLIC CONSULTATIONS

18. We had been engaging various marine trades and stakeholders since 2021 to seek their views during the course of drafting of the above control proposals. In addition, we commenced a two-month public consultation on the control proposals on 10 July 2023 to solicit comments from over 500 stakeholders, including oil importers, suppliers, vessel owners and operators, the industrial and commercial

[5] If large-scale works projects using non-gaseous fuel are operated in the STFRA in the future, they are in any case required to comply with the stringent regulatory requirements under the laws such as the Air Pollution Control Ordinance and the Environmental Impact Assessment Ordinance.

trade, trade associations, green groups, government departments, professional and academic institutions, and other public and advisory bodies. A briefing session on the proposals was held on 26 July 2023 to explain the details of the proposals to the trade and stakeholders. Feedbacks received during the public consultation period were generally supportive, though some vessel operators had expressed concerns about the possible cost implications. Nevertheless, the consulted trades and stakeholders generally agree on the importance of aligning Hong Kong's fuel standards with the Mainland's policy as well as the benefits to Hong Kong's air quality as a result of improving fuel quality.

19. We have reviewed and refined our proposals in the light of the comments received in the consultation.

LEGISLATIVE TIMETABLE

20. We shall report to the Panel on Environmental Affairs of the Legislative Council (LegCo) on the outcome of the public consultation, and accordingly prepare to amend the Air Pollution Control (Marine Light Diesel) Regulation (Cap. 311Y) and the Air Pollution Control (Fuel Restriction) Regulations with a view to introducing the legislative amendments to the LegCo in 2024. Our proposals will start to take effect in January 2025.

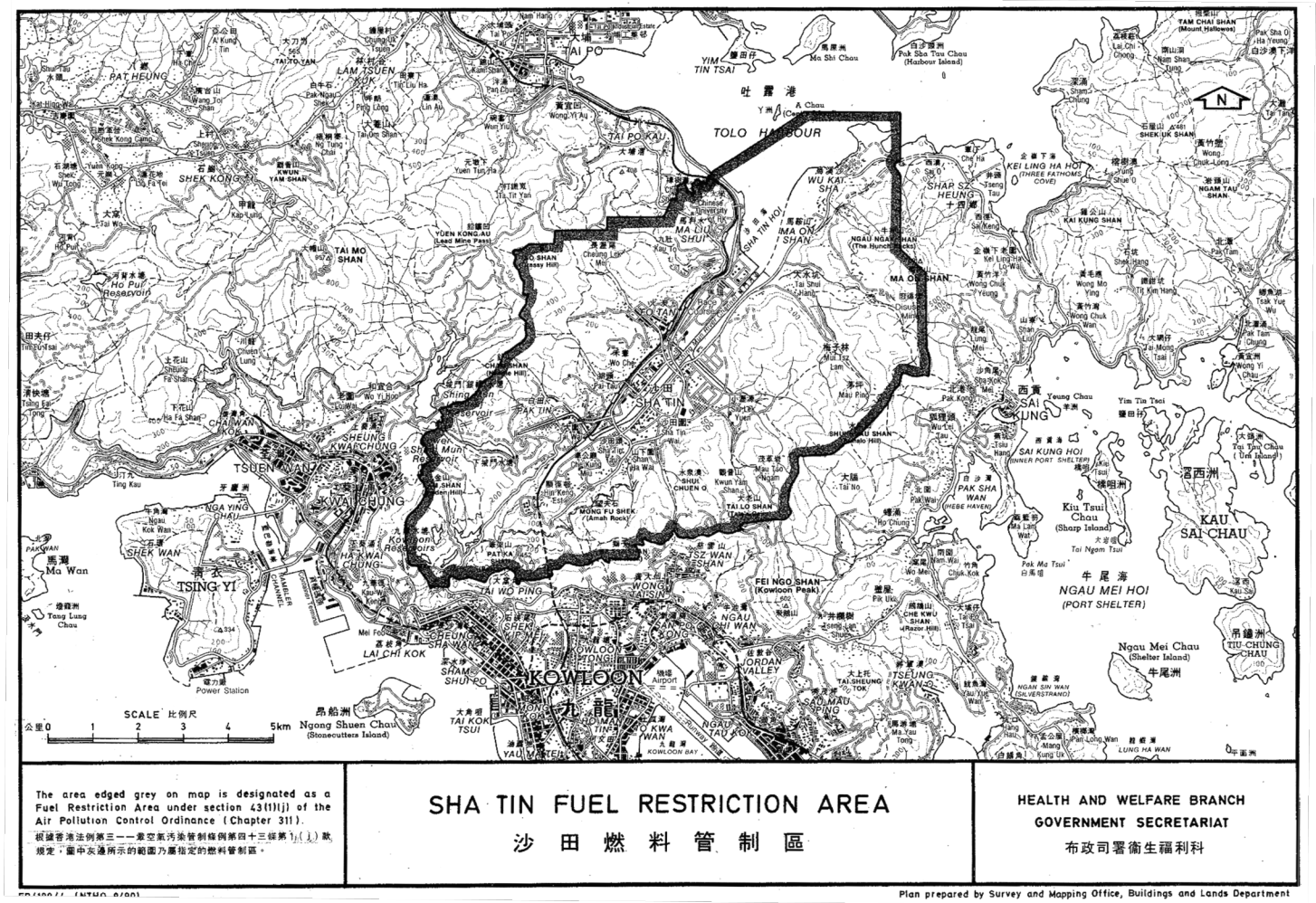
ADVICE SOUGHT

21. Members are invited to comment on our proposals.

Environment and Ecology Bureau
October 2023

Annex 1

Sha Tin Fuel Restricted Area



Annex 2

Technical Feasibility of Marine Engines to Switch to Ultra-Low Sulphur Fuel

At present, diesel vehicles in Hong Kong, land-based machineries for industrial and commercial use (such as non-road mobile machinery), government fleet and river trade vessels plying between Hong Kong and the Mainland have already been using light diesel with a sulphur content not exceeding 0.001%. To assess the feasibility of marine engines to switch to fuel with ultra-low sulphur content, the Government has examined the technical specifications of these two types of locally supplied MLD at present (i.e. MLD with sulphur contents not exceeding 0.05% and 0.001% respectively), and consulted oil companies, marine engine manufacturers and users that have switched to use MLD with sulphur content not exceeding 0.001% for their views.

There are three major factors to be considered for marine engines to use diesel with ultra-low sulphur content, namely lubricity, combustion property and fuel leakage:

(i) Lubricity

Fuel lubricity is related to the wear down of engine parts. Although a reduction in sulphur content will reduce the lubricity of the diesel. However, according to overseas experience in using diesel with ultra-low sulphur content, adding additives to the diesel is sufficient to maintain the same level of lubricity as diesel with higher sulphur content. We have also examined the specifications of locally supplied MLD with sulphur contents not exceeding 0.05% and 0.001%, which show that their lubricity requirements are about the same. Some test results even show that the lubricity of MLD with sulphur content not exceeding 0.001% is better than that with sulphur content not exceeding 0.05%.

(ii) Combustion Property

Cetane index is an indication of combustion property of a diesel fuel. A higher cetane index means that the fuel has better combustion efficiency. In general, a cetane index ranging from 43 to 45 would be sufficient for most boat engines. At present, the cetane index of both types of locally supplied MLD are comparable with their index both above 46. Therefore, engine performance in terms of combustion quality will be similar when the marine engine uses these two types of MLD.

(iii) Fuel Leakage

If the fuel viscosity is too low, it may lead to a fuel leakage in the marine engine. The Government has examined the viscosities of the two types of locally supplied MLD and found that they are comparable. It is therefore expected that the switch of MLD will not result in a leaking problem in the engine.

Besides, marine engine manufacturers have advised that no major upgrade or modification for the engine is required when switching to MLD with sulphur content not exceeding 0.001%. Users that have switched to use MLD with lower sulphur content have also advised that no technical problems in the engine had occurred due to a change of MLD to lower sulphur content. In summary, all vessels that could currently use MLD with sulphur content not exceeding 0.05% are suitable for switching to use MLD with sulphur content not exceeding 0.001%.