

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 consultation paper sets out the following proposals:

- (i) tighten the sulphur content limits of marine light diesel (MLD) and industrial diesel to no more than 0.001% (by weight); and
- (ii) lift the restriction on use of liquid and solid fuel in Sha Tin fuel restriction area.

The above proposals currently fall within the purview of 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”) respectively.

Background

2. Sulphur dioxide (SO₂) is one of the major air pollutants, mainly resulting from combustion of fuel containing sulphur. It can cause respiratory illness, reduce lung function, and even increase morbidity and mortality at high concentration levels. It also reacts with other chemicals in the atmosphere and transforms into fine sulphate particles. Apart from affecting people’s health, these particles also contribute to smog formation and impair visibility. Therefore, the Government has been reducing SO₂ emissions by imposing control on the sulphur contents of fuel with a view to improving air quality in Hong Kong. The purpose of formulating the MLD Regulation and the FR Regulations was to set a limit for the sulphur contents of locally supplied fuel for vessels as well as industrial and commercial uses, so as to control SO₂ emissions from these two sectors at source.

3. 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 were co-existing with nearby residents. In addition, since Sha Tin District is situated in valley areas, which hinder effective dispersion of air pollutants, the district is susceptible to serious air pollution.

To improve the situation, the Sha Tin fuel restriction area¹ (“the STFRA”, see Annex 1) was delineated under the FR Regulations, which stipulated that no person should use liquid fuel or solid fuel in any relevant plant (including furnace, engine, oven or industrial plant) in the STFRA except in construction site or during an emergency.

Sulphur Content of Diesel for Existing Local Vessels and Industrial Use

4. Marine vessels, including ocean-going vessels (OGVs) and local vessels², are the major source of air pollution in Hong Kong. In 2020, SO₂, respirable suspended particulates (RSP) and nitrogen oxides (NO_x) emitted by local vessels contributed to 20%, 42% and 55% of the total emissions respectively from the marine sector. Reducing emissions of local vessels can improve air quality and better protect public health. The improvement will be more prominent in coastal areas. Limiting the sulphur content of MLD is an effective means to reduce the emissions of SO₂ and RSP by local vessels at source. As such, since April 2014, the MLD Regulation stipulated that the sulphur content of locally supplied MLD should not exceed 0.05% by weight.

5. For the industrial and commercial sector, in 2020, emissions of SO₂, RSP and NO_x from industrial and commercial activities contributed to about 0.7%, 2.2% and 1.5% of the total emissions respectively. In 1990, the FR Regulations stipulated that only industrial diesel having a sulphur content not exceeding 0.5% (by weight) could be used in industrial and commercial processes. The Government subsequently amended the FR Regulations in 2008 to further tighten the cap on the sulphur content of industrial diesel to 0.005%.

Proposal to Tighten the Sulphur Content of MLD and Industrial Diesel

MLD

6. Since 2019, the State has fully implemented the requirement for supplying diesel meeting China VI standards (i.e. having a sulphur content not exceeding 0.001%), with

¹ The Sha Tin Fuel Restriction Area covers the areas delineated on a plan numbered FR/50/4, signed by the then Secretary of Health and Welfare on 27 October 1988 and deposited in the Land Office. It includes all areas of the Sha Tin District Council.

² “Local vessels” cover domestic vessels operating restrictively within Hong Kong waters and river trade vessels plying between Hong Kong and the Pearl River Delta.

a view to banning the sale of motor diesel below China VI standards, thus achieving the “three-oil integration” of vehicle diesel, ordinary diesel and oil for some marine vessels³ having the same sulphur content limit. In the meantime, river trade vessels plying between Hong Kong and the Mainland have also taken the lead in using light diesel having a sulphur content not exceeding 0.001%, so as to meet the requirement for entering the Mainland waters⁴.

7. To further reduce emissions from marine vessels, the Government proposes to tighten the cap on the sulphur content of locally supplied MLD from the existing statutory level of 0.05% to 0.001% (the same as the sulphur content limit of Euro V diesel used by existing diesel vehicles), i.e. reducing the sulphur content of fuel by 98%⁵. This will bring the marine fuel standard of Hong Kong on par with other regions within the Pearl River Delta, and facilitate better integration of Hong Kong into the Guangdong-Hong Kong-Macao Greater Bay Area (GBA), so as to complement the development of environmental and ecological protection in the region and the State.

8. At present, two types of MLD with the sulphur contents not exceeding 0.05% and 0.001% are available for supply in Hong Kong to cater the needs of different vessels⁶. To assess the potential impacts of the proposal on relevant stakeholders, we have consulted various marine trades (including oil importers, suppliers, vessel owners and operators) by meetings and conducting surveys from 2021 to June 2023 to collect their views. During the consultation, the trades generally supported the proposal and understood the importance for Hong Kong to be on par with Mainland’s policy as well as the benefits to Hong Kong’s air quality as a result of improving fuel quality.

³ “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.

⁴ 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).

⁵ In 2020, about 380 tonnes of SO₂ and 320 tonnes of RSP were emitted by local vessels respectively. It is expected that after tightening the sulphur content limit of locally supplied MLD, the emission of SO₂ and RSP can be reduced by about 370 tonnes (97%) and about 5 tonnes (2%) annually.

⁶ As some vessels (such as river trade vessels plying between Hong Kong and Mainland waters) are required to use marine fuel with sulphur content not exceeding 0.001% to enter the Mainland waters, local bunkering companies would therefore supply two types of MLD to cater their needs.

Nevertheless, the trade also raised several comments for the Government to take into consideration before putting forward the proposal:

(i) Engine compatibility with MLD having sulphur content not exceeding 0.001%

The local vessel trade indicated that some marine engines were old models manufactured years ago, and was concerned about the use of MLD having a sulphur content not exceeding 0.001% may cause engine compatibility issues, such as increased rate of engine wear or degraded engine performance. In this respect, we have examined the technical specifications of the two types of MLD, and sought advice from relevant technical departments of the Government, oil companies and engine manufacturers. We have also engaged users who have already switched to MLD with sulphur content not exceeding 0.001% for their experiences. Upon a comprehensive analysis of relevant data and comments from different parties, 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 modification for the engine. Thus, there will be no compatibility issue arising from the switch to MLD with sulphur content not exceeding 0.001% (detailed assessment is shown in Annex 2).

(ii) Maintaining the supply of MLD with sulphur content not exceeding 0.05% to OGVs

Oil importers, suppliers and the OGVs trade have raised that Hong Kong is one of the major bunkering ports in the world and Asia. When OGVs visit Hong Kong, apart from bunkering marine fuel oil (sulphur content not exceeding 0.5%⁷), some of them also bunker MLD (sulphur content not exceeding 0.05%) for meeting their operational needs or to fulfill fuel requirements for visiting other ports. To maintain the business and the competitiveness of Hong Kong as a major bunkering port in Asia, they have suggested that the MLD Regulation shall continue to allow the supply of MLD with sulphur content not exceeding 0.05% to OGVs. Nevertheless, some oil suppliers also supported to standardise the supply of MLD with sulphur content not exceeding 0.001% to local vessels in Hong Kong as soon as possible, so as to reduce their operating costs such as procurement, transportation, storage and treatment, etc.

⁷ Since 1 January 2019, the Air Pollution Control (Fuel for Vessels) Regulation (Cap.311AB) requires all vessels to use compliant fuel (i.e. low sulphur fuel with sulphur content not exceeding 0.5% or liquefied natural gas), irrespective of whether they are sailing or berthing in Hong Kong.

Having reviewed the situation of the local bunkering market, and considered that the State allows oil suppliers at some ports in Mainland⁸ to continue to supply MLD with sulphur content not exceeding 0.05% to OGVs despite the implementation of the “three-oil integration”, we will consider to exempt the supply of MLD with sulphur content not exceeding 0.05% to OGVs under enhanced requirements of monitoring and reporting by adding provisions in the amended MLD Regulation.

(iii) Supply of MLD with sulphur content not exceeding 0.001%

Some oil suppliers and local vessel trade have indicated that at present, the major type of locally supplied MLD is with sulphur content not exceeding 0.05%. They were concerned that there would not be sufficient supply of compliant MLD upon implementation of the proposal. In this regard, we have consulted the oil importers, who have confirmed that they will be able to supply sufficient MLD with sulphur content not exceeding 0.001%. They have also indicated that it would take about six months to complete the related works on fuel switching. Therefore, we do not expect a supply issue upon the implementation of the proposal.

(iv) Cost increase

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. The trades have also indicated that some of increased cost may have to be transferred to the users of maritime services, such as consumers and some logistics trade. 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 prices for the two types of light diesel was still less than 5% most of the time. In February to April 2023, the difference was even less than HKD 0.1 per litre (i.e. less than 2%). 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. Nevertheless, since the proposal would establish that MLD with sulphur content not exceeding 0.001% will be the only compliant fuel to be supplied to local vessels, it will help stabilise the demand of the fuel and hence its retail price in the local market. Furthermore, the increase in

⁸ 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.

fuel cost could 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 slow down the deterioration of engine oil and reduce wear and tear of engine cylinder liners.

Industrial Diesel

9. At present, locally supplied industrial diesel is the same as Euro V motor diesel, i.e. having a sulphur content not exceeding 0.001%. Hence, we propose to amend the FR Regulations by tightening the sulphur content limit of industrial diesel from the current statutory level of 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. We have conducted a survey regarding the proposal in April this year to consult the trade, who have indicated no objection to the proposal.

10. Upon implementation of the proposal, 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%, accomplishing the “three-oil integration”. The proposal will dovetail with the Mainland’s policy of having diesel fuel with sulphur content not exceeding 0.001% for vehicle diesel, ordinary diesel and oil for some marine vessels, and facilitate Hong Kong’s further integration into the GBA, thereby benefitting the future development of environmental and ecological protection in the region.

Proposal to Lift the Restriction on Use of Liquid and Solid Fuel in Sha Tin Fuel Restriction Area

11. At present, Sha Tin has basically been developed into a residential area. Some of the old industrial areas have been converted to general business uses. There are no substantial number of 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 SO₂ 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.

12. In addition, 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 relaxation on the air quality of the district. The modelling results showed that upon the lifting the restriction on STFRA, the air quality of Sha Tin is similar to that of other districts in Hong Kong having similar topographical features, such as Tuen Mun and Tseung Kwan O. Therefore, it is expected that lifting the restriction will not give rise to additional air pollution problem in the district.

13. However, if large-scale works projects using non-gaseous fuel are operated in the STFRA in the future, they are required to comply with the stringent regulatory requirements under the current environmental legislation, such as the Air Pollution Control Ordinance and the Environmental Impact Assessment Ordinance, so as to ensure their operation will not give rise to air pollution.

14. 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. For instance, 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.

Proposal

15. We propose to amend the MLD Regulation and FR Regulations with the aim to implement the new sulphur content limit of MLD and industrial diesel, as well as lift the restriction on use of liquid and solid fuel in STFRA in the third quarter of 2024.

Way Forward

16. Upon completion of the consultation, we will finalise the proposal and consult the Advisory Council on the Environment and the Panel on Environmental Affairs of the Legislative Council.

Views Sought

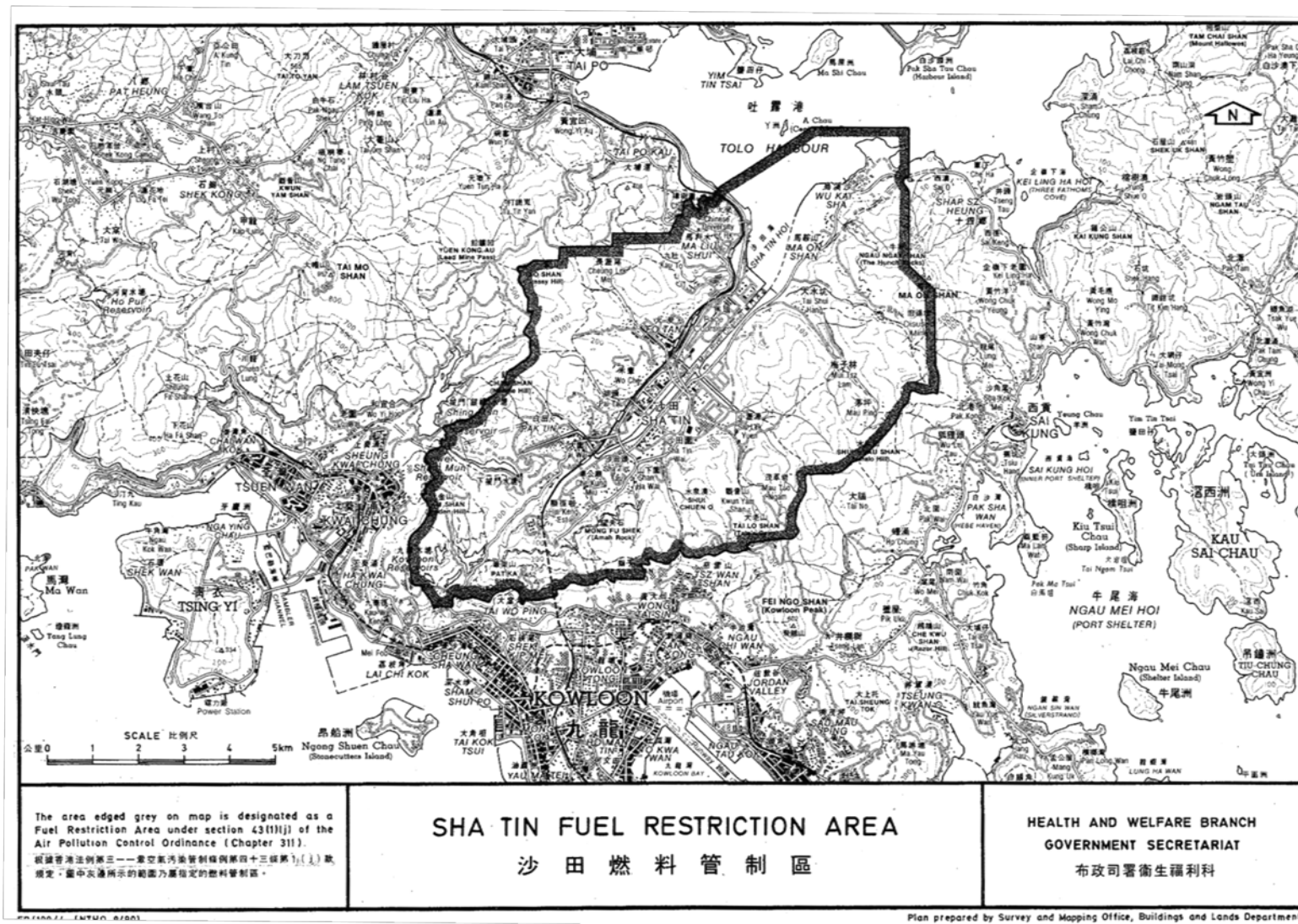
17. Please send your views on the proposal to the Environment and Ecology Bureau on or before 9 September 2023 by mail/email/facsimile:

Environment and Ecology Bureau
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18. Please note that the Government may, either in discussion with others or in any subsequent report, whether privately or publicly, refer to and attribute views submitted in response to this consultation document. Any request to treat all or part of a response in confidence will be respected, but if no such request is made, it will be assumed that the response is not intended to be confidential.

Environment and Ecology Bureau
July 2023

Sha Tin Fuel Restricted Area



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%.