

# Challenges for shipowners using low sulphur fuels

船东使用低硫燃料的挑战

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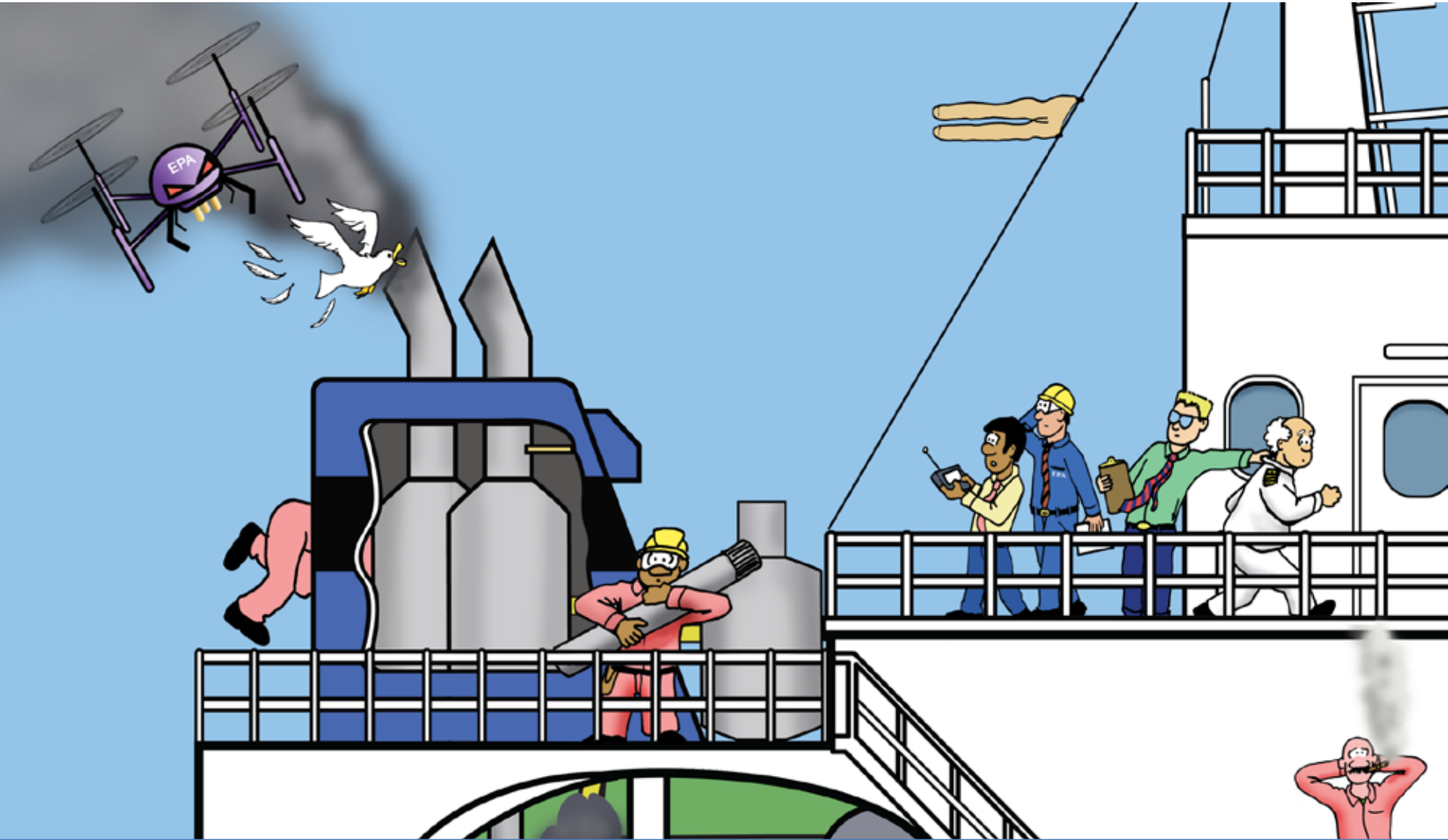
# Low sulphur fuels: A summary

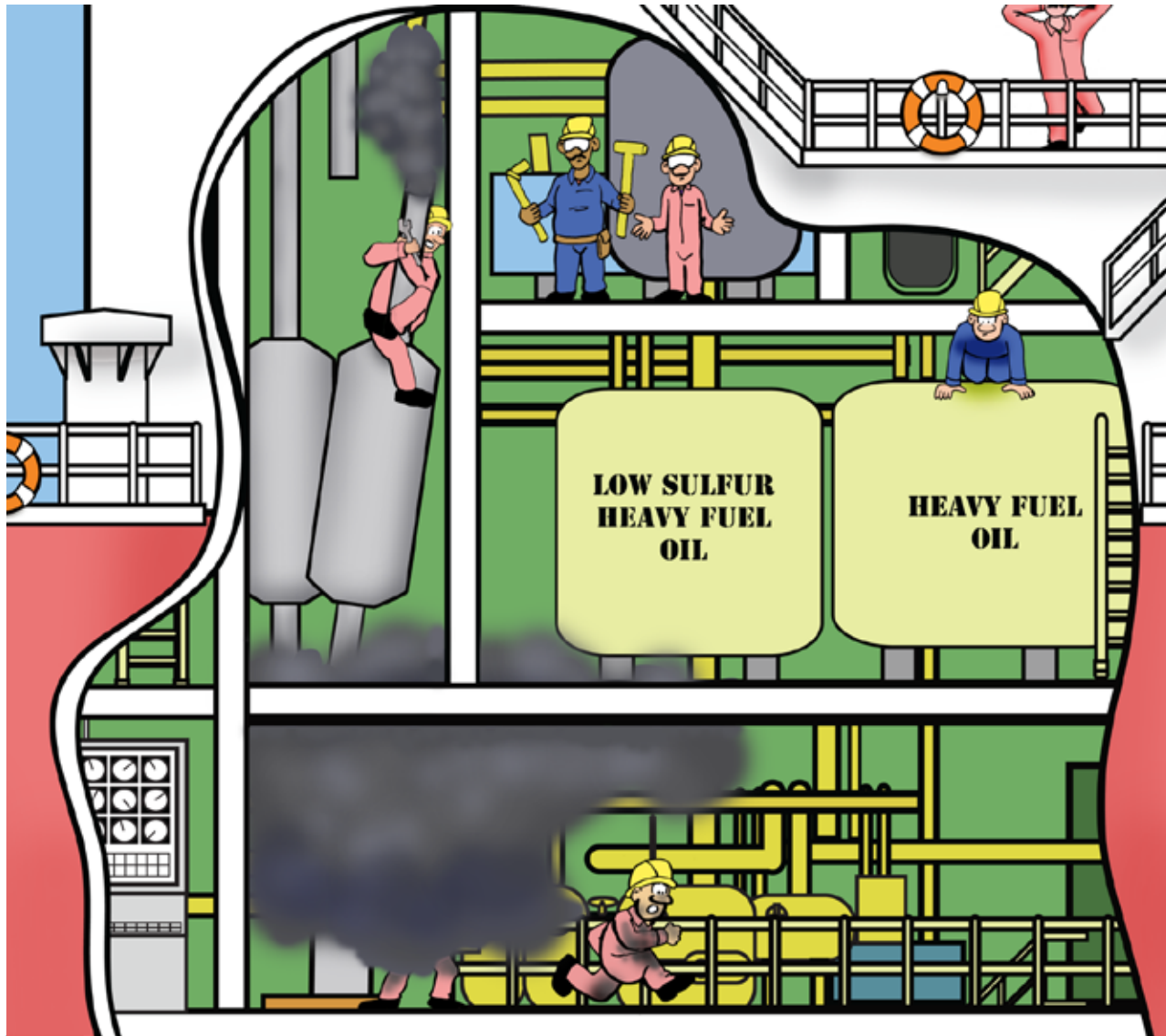
## 低硫燃料：综述

- International regulations  
国际法规
- Facts regarding USA/EU regulations  
美国和欧盟法规现况
- Facts regarding PRC and Hong Kong regulations  
中国和香港法规现况
- Technical concerns  
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- Prices & availability  
价格 & 可用性
- Loss prevention measures  
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# Challenges of emission requirements 排放要求的挑战



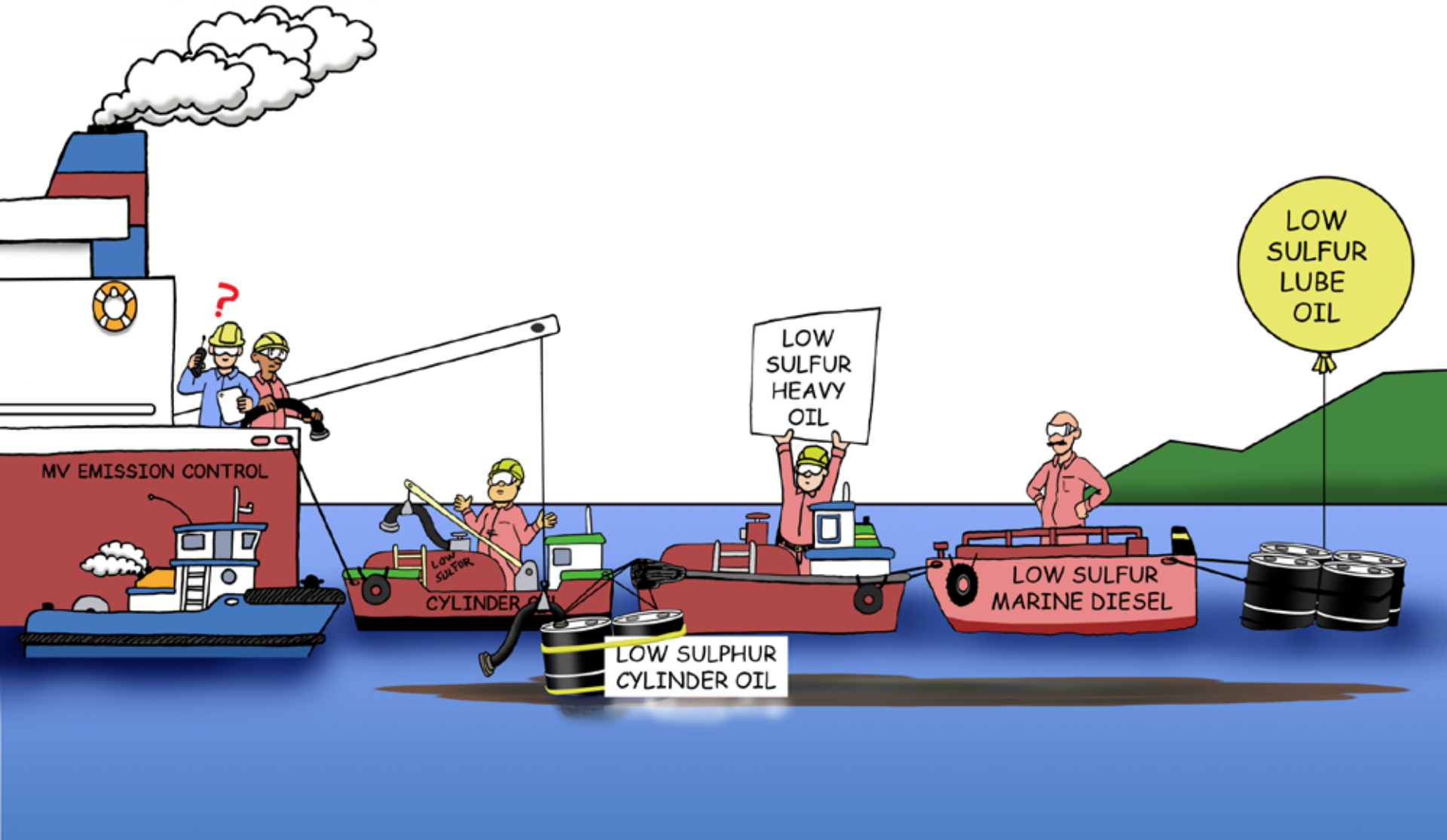


# Challenges of emission requirements (cont.) 排放要求的挑战 (续)





# Challenges of emission requirements (cont.) 排放要求的挑战 (续)



# Low sulphur fuels: International regulations

## 低硫燃料：国际法规

- MARPOL 73/78 Convention, Annex VI (Air pollution)

国际防止船舶造成污染公约，附则六（大气污染）

ü Limits pollutants from ship exhaust gas

限制船舶尾气中的污染物

ü SO<sub>x</sub>, NO<sub>x</sub> and Ozone Depleting Substances (ODS)

硫氧化物，氮氧化物和消耗臭氧层物质

ü Designated Emission Control Areas (ECAs)

指定排放控制区

# Low sulphur fuels: International regulations (cont.)

## 低硫燃料：国际法规（续）

- MARPOL 73/78 Convention, global sulphur caps

国际防止船舶造成污染公约，全球硫帽

ü Reduced from current <3.5% to <0.5% on 1 January 2020  
subject to feasibility review—authority to delay implementation

根据可行性审查-授权延迟执行，自2020年1月1日开始，  
从目前的 3.5%以下减少至0.5%以下

ü Limits on SO<sub>x</sub> and particulate matter in ECAs reduced to 0.1%  
from 1 January 2015

自2015年1月开始，排放控制区对  
硫氧化物和颗粒物的限制减少至0.1%



# Low sulphur fuels: International regulations (cont.)

## 低硫燃料：国际法规（续）

- 2010 – Emission Control Area ( ECA ) limit reduced to <1% (from <1.5%)

2010-排放控制区的限制减少至1%以下（从1.5%以下）

2012 – Global limit reduced to <3.5% (from <4.5%)

2012-全球限制减少至3.5%以下（从4.5%以下）

- 2015 – ECA limit reduced to <0.1%

2015-排放控制区的限制减少至0.1%以下

## Low sulphur fuels: International regulations (cont.) 低硫燃料：国际法规（续）

- 2020 – Global limit to  $<0.5\%$  but a review in 2018, with authority to delay implementation, will determine whether this is achievable

2020-全球限制减少至0.5%以下，但会基于对2018年的展望，加之延迟执行的授权，将决定这是否可以实现

- 2025 – Global limit to  $<0.5\%$  notwithstanding the result of the 2018 review

2025-无论2018年的审查结果如何，  
全球限制减少至0.5%以下

# Low sulphur fuels: US regulations 低硫燃料：美国法规

North American ECAs

北美排放控制区

US, Canada, Gulf of Mexico, Hawaii and US  
Caribbean

美国，加拿大，墨西哥湾，  
夏威夷和美国加勒比地区



# Low sulphur fuels: EU regulations 低硫燃料：欧盟法规

ECAs in Baltic Sea and North Sea

波罗的海和北海排放控制区

Passenger ships operating on regular services to and from any EU ports required to use marine fuels of <1.5% in sea areas outside of ECAs

定期往返欧盟各港口的客运船舶被要求在排放控制区以外的海域使用少于1.5%的船用燃料



# Low sulphur fuels: Chinese regulations 低硫燃料：中国法规

- PRC Ministry of Transport's *Ship & Port Pollution Prevention Special Action Plan: 2015-2020*

中华人民共和国交通部船舶港口污染防治专项行动计划

ü 5 year program to reduce SO<sub>x</sub> and NO<sub>x</sub> emissions in Chinese ports

在中国港口降低硫氧化物和氮氧化物的五年计划

ü No direct link between Chinese and MARPOL 73/78 requirements

中国和国际防止船舶造成污染公约的要求之间没有直接关联



# Low sulphur fuels: Chinese regulations (cont.)

## 低硫燃料：中国法规（续）

All ships navigating, anchored and operating within ECAs excluding military, fishing boats and recreational vessels

所有在排放控制区内航行、锚泊和作业的船舶，

包括军用、渔业和娱乐性船舶



# Low sulphur fuels: Chinese regulations (cont.)

## 低硫燃料：中国法规（续）

- ECA regions and designated ports

### 排放控制区域和指定港口

- ü Pearl River Delta—Shenzhen, Guangzhou and Zhuhai

- ü 珠三角-深圳，广州和珠海

- ü Yangtze River Delta—Shanghai, Ningbo-Zhoushan and Nantong

- ü 长三角：上海，宁波舟山和南通

- ü Bohai Rim—Tianjin, Qinhuangdao, Tangshan and Huanghua

- ü 渤海湾：天津，秦皇岛，唐山和黄骅

- ü Switch to compliant fuel must be within one (1) hour of arriving at the berth and at least one (1) hour after departing berth

- 靠泊之前1小时内以及离泊后至少1小时内调整使用合规燃料

# Low sulphur fuels: Chinese regulations (cont.)

## 低硫燃料：中国法规（续）

**1 January 2017**– ships calling ECA ports must use fuel <0.5% sulphur content while berthed

2017年1月1日- 在排放控制区靠泊时船舶必须使用硫含量低于0.5%的燃油

**1 April 2016**– ships calling ECA ports in Yangtze River Delta must use fuel <0.5% sulphur content while berthed (ahead of 1 January 2017 schedule)

2016年4月1日-在长三角靠泊时船舶必须使用硫含量低于0.5%的燃油（在2017年1月1日的计画之前）

# Low sulphur fuels: Chinese regulations (cont.)

## 低硫燃料：中国法规（续）

- **1 October 2016**– ships calling at ECA designated port of Shenzhen must use fuel <0.5% sulphur content while berthed (ahead of 1 January 2017 schedule)
- 2016年10月1日-在排放控制区指定的深圳港靠泊时船舶必须使用硫含量低于0.5%的燃油（在2017年1月1日的计划之前）
- **1 January 2019**– ships operating within ECA regions must use fuel <0.5% sulphur content prior to and exit ECA
- 2019年1月1日-在排放控制区内作业的船舶在抵达和离开排放控制区时必须使用硫含量低于0.5%的燃油

# Low sulphur fuels: Chinese regulations (cont.)

## 低硫燃料：中国法规（续）

Authorities will accept alternative compliance methods of emissions reduction (e.g. use of shore power, scrubbers for exhaust gas cleaning and clean fuels such as LNG)

政府将接受替代性的减排措施（比如，使用岸电，废气净化洗涤器和液化天然气等清洁燃料）

Regulations apply to  $SO_x$  and not  $NO_x$  at this time  
法规适用于硫氧化物，此次不适用于氮氧化物

Chinese government will review requirements in 2019 to determine if stricter requirements are necessary

中国政府将审查2019年的要求以决定是否有必要使用更严格的要求



# Low sulphur fuels: Hong Kong regulations

## 低硫燃料：香港法规

Ocean going vessels >500 GT 大于500净吨的远洋船舶  
Must burn fuel with <0.5% sulphur content while berthed  
in HK territorial waters 在香港水域靠泊时必须使用硫含量  
低于0.5%的燃油

Change overs between fuels  
must be within one (1) hour  
of berthing and no more  
than one (1) hour before  
departure

靠泊1小时内以及离泊前1小时内  
调整使用合规燃料

Exemptions as similar to  
PRC requirements  
和中国规定有类似的豁免



# Low sulphur fuels: Technical concerns 低硫燃料：技术问题

- Modern ship machinery not designed for LSFOs  
现代机械船舶并非专为低硫油设计
- Poor lubrication lead to potential damages to fuel injection equipment, seizing of fuel pump plungers, injection needles, etc. 润滑不良导致对燃油喷射系统，燃油泵以及注射针等造成潜在的破坏
- HFO combustion is relatively more acidic than that of LSFOs 燃烧高硫油的含酸量比低硫油更大
- Requires use of lube oils to have a total base number (TBN) to maintain neutral combustion during operation  
润滑油的使用要求有一个总体基数（TBN）以保证运作中的定性燃烧
- Rates of supply of cylinder oils to engine may need adjustment 汽缸油的供应量可能需要调整



## Low sulphur fuels: Technical concerns (cont.) 低硫燃料：技术问题

- Continuous operation with normal rates and high TBN cylinder oil can lead to ash build up on pistons causing scuffing of cylinder liners 保持正常率和高基数气缸油连续操作会导致活塞堆灰进而划伤缸套
- Thermal shock– during switchover of fuels, temperature differences between fuels can lead to thermal shock and differential expansion of machinery components 热冲击-在切换使用燃料时，不同燃油的温度不同会导致热冲击和机械零件不均匀局部膨胀
- Filter clogging can occur when distillate fuel and HFO are incompatible

当馏分燃料和高硫油不相容时会导致筛检程式堵塞

Loss of propulsion 失去动力



# Low sulphur fuels: Loss prevention measures

低硫燃料：防损措施

- PRC MSA has issued guidelines on implementation and supervision of ECAs: *Notice of the MSA of the PRC on Strengthening the Supervision and Administration of ECAs for Vessels (HCJ [2016] No. 48)*
- 中华人民共和国海事局对排放控制区域的施行和监管颁布指导意见：中华人民共和国海事局关于加强排放控制区船舶的监督和管理的通知(HCJ [2016] No. 48)

# Low sulphur fuels: Loss prevention measures 低硫燃料：防损措施

- Methods of verification of compliance 达标性验证方法
  - ü Ships using low sulphur fuels: checking of bunker delivery notes, fuel change over procedures, engine room log book records and fuel oil samples
    - ü 船舶使用低硫油：检查燃料输送记录，燃料更换程式，机舱日志记录和燃料油样品
  - ü Ships using alternative compliance: checking of International Air Pollution Prevention (IAPP) certificates and records and engine room log books
    - ü 船舶使用替代合规燃料：检查国际空气污染防治证书和记录和机舱日志

## Low sulphur fuels: Loss prevention measures (cont.) 低硫燃料：防损措施

- Ensure bunkering strategies and fuel change over procedures meet ECA compliance requirements including: 确保燃油储存策略和燃油更改程式符合排放控制区标准的要求
  - ü Instructions on temperature management, fuel flow, etc. 温度管理和燃油流量等指南
  - ü Fuel analysis to determine if fuel additives are needed to address compatibility concerns 燃料分析以确定是否需要燃料添加剂来解决相容性问题
  - ü Check with engine builders 和发动机制造商检查确认
  - ü Cylinder oil TBN must be considered, particularly if operating for prolonged periods in ECA 汽缸油总基数必须纳入考量，特别是在排放控制区内作业时间较久的时候
  - ü Vessels need separate tank capacity for low LSFO and alternate cylinder oil 船舶需要为低硫油和备用汽缸油准备单独储油箱

# Low sulphur fuels: Loss prevention measures (cont.)

## 低硫燃料：防损措施

- Take and maintain detailed records of dates and times of the ship's arrival, departure, fuel change over operations and ensure available for inspection  
对船舶抵达，开航，燃料更换的日期和时间的详细记录并保存，且确保可用于检查
- Obtain and maintain onboard the bunker delivery notes  
取得并保存加油单
- Take and maintain representative samples of low sulphur fuel oil delivered  
提取并保存低硫油样品
- Recommended guidance material– *ABS Fuel Switching Advisory Notice*
- 推荐指导素材，ABS燃料转换咨询公告

# Low sulphur fuels: Prices & availability

## 低硫燃料：价格 & 可用性



BW380 index



BW0.1%S index

Source: Bunkerworld





## Low sulphur fuels: Prices & availability (cont.)

### 低硫燃料：价格&可用性（续）

- Low sulphur fuel oil (LSFO) is in relatively low supply  
低硫燃油的供应相对较少
- Low sulphur distillates are widely available, but costly  
低硫馏分油应用广泛但是耗费较大
- Oil majors expressing concerns in meeting global demand as compliance dates are reached, particularly the 2020 deadline for <math><0.5\%</math> sulphur content as per MARPOL 73/78 石油业对达到即将生效的全球标准高度重视，特别是根据MARPOL 73/78规定的截止日期为2020年的少于0.5%的硫含量的要求



# Loss prevention is core to American Club's Mission

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<http://american-club.com/page/loss-prevention>

- Best practices & guidance
- 最好的实践和指导
- Education & training tools
- 培训方法
- Safety comics & posters
- 安全性相关漫画和海报

**Questions? Contact us!**

**有问题请联系我们**

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Thank you for the attention  
谢谢！

