STATUS OF THE NORTH AMERICAN EMISSIONS CONTROL AREA
北美排放控制区发展现状

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NRDC
THE EARTH'S BEST DEFENSE

STEPS TO CREATING AN ECA
如何建立排放控制区

- Annex VI of the International Maritime Organization (IMO) International Convention for the Prevention of Pollution from Ships (MARPOL) governs air pollution from ships
- 船舶污染是由国际海事组织 (IMO)防止船舶污染的国际公约 (MARPOL) 的附件六 (Annex VI) 管辖的。

- Annex VI was adopted in 1997 and went into effect in 2005
- 附件六 (Annex VI) 是在1997年制订，并在2005年生效。

- In 2008, IMO amended Annex VI to enable Parties to adopt Emission Control Areas (ECAs) to reduce SOx and/or NOx from ships operating in the ECAs
- 在2008年, IMO为了使各方采取排放控制区 (ECAs) 减少船舶在ECAs 排放的 SOx 和/或 NOx 而修改了附件六。

STEPS TO CREATING AN ECA
如何建立排放控制区

- Because the control strategies that reduce SOx and NOx also reduce PM, PM reductions will also result from the implementation of any ECA
- 由于控制SOx和NOx的策略同时减少颗粒物（PM），实施ECA也会降低颗粒物的排放。

- Only countries that have ratified MARPOL Annex VI can submit an ECA application to the IMO
- 只有已批准MARPOL公约附件六的国家才可对IMO申请ECA。

HOW THE ECA WORKS
ECA 的细节

- Fuel control 燃油控制
  - SOx in marine fuel is controlled to limit emissions of particulate matter (PM).
  - 控制船用燃料里的SOx来限制PM。

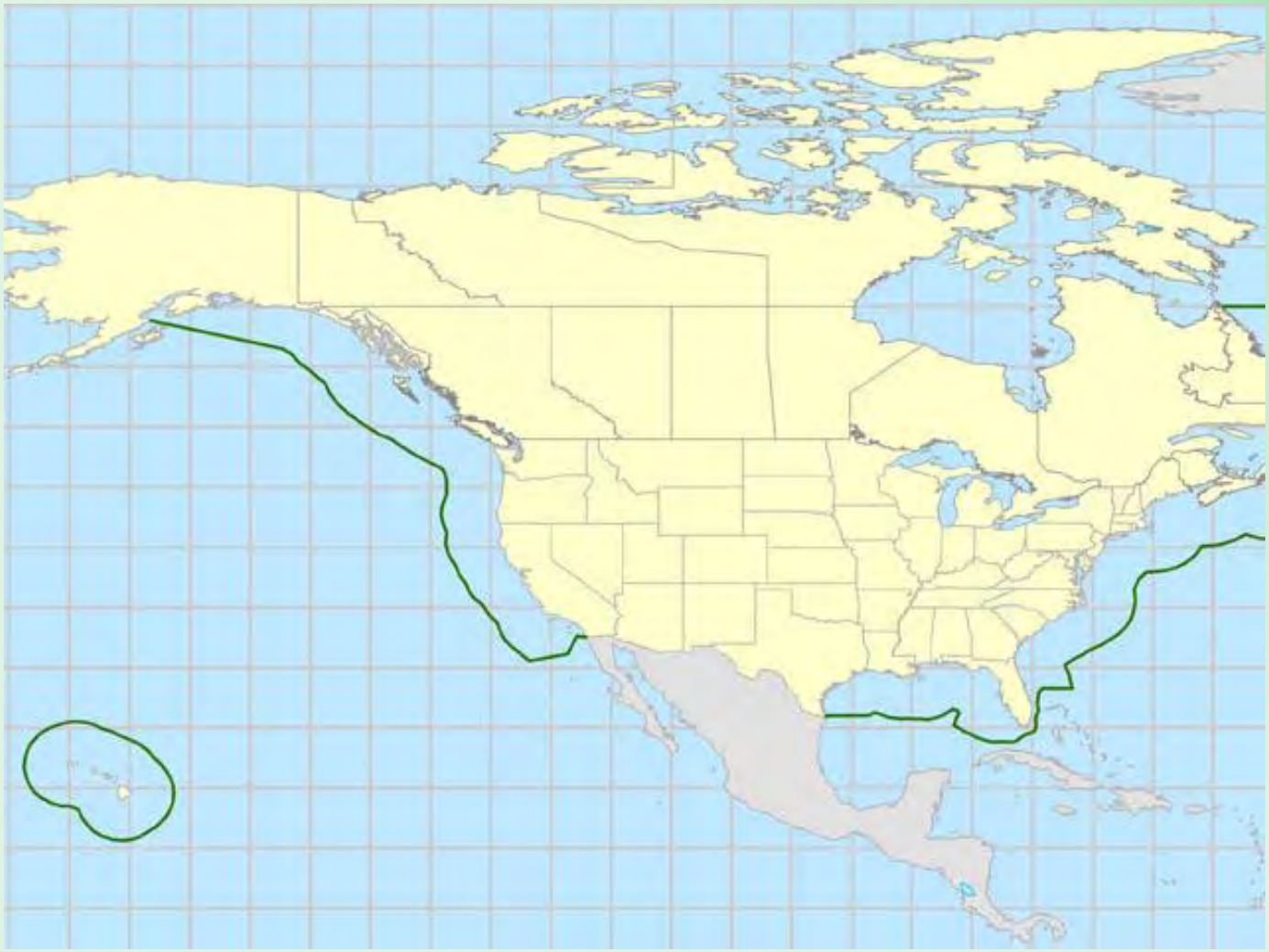
- Engine control 发动机控制
  - NOx emissions are controlled to limit the formation of ozone, for example through selective catalytic reduction (SCR).
  - 控制NOx的排放量同时限制臭氧的形成，例如通过选择性催化还原法(SCR)。

HOW THE ECA WORKS
ECA 的细节

- U.S. Coast Guard & EPA enforcement
  - Penalties for violation: up to $25,000 per day; more if false documents are submitted

- 美国海岸警卫队和美国环保局执法
  -- 违章处罚：每天罚 25,000美元之下 (如提交虚假文件，罚款会更高）。

The North American ECA
北美排放控制区



KEY FEATURES OF US ECA
北美排放控制区的关键特点

- First-ever ECA to include Tier III NOx limits
- 第一个包括根据公约附件4中第三级的氮氧化物限制的ECA。
- Covers all ships within 200 nm from most of the US and Canadian coasts
- 包括所有离美国和加拿大海岸200海里的船舶。

KEY FEATURES OF US ECA
北美排放控制区的关键特点

- Sulfur cap (0.1%) will reduce SOx and PM by more than 85%
- 含硫量的限制 (0.1%) 将减少超过85%的SOx和PM。

- Tier III NOx limit will reduce NOx by 80% in 2016
- 对第三级的氮氧化物限制将在2016年减少80%的Nox。

WHY WE CARE ABOUT SOx AND Nox
为何在乎SOx 和 NOx

SOx and PM (硫氧化物和颗粒物)

- SO_2 is transformed into particulate sulfate in the atmosphere.
- SO_2会转化作大气中的硫酸盐颗粒。

- SO_2 can be directly emitted from a ship as particulate matter.
- SO_2可直接从船排放为颗粒物。

WHY WE CARE ABOUT SOx AND Nox
为何在乎SOx 和 NOx

- NOx and Ozone 氮氧化物和臭氧

  - NOx and volatile organic compounds (VOCs) can combine, in the presence of sunlight, to produce smog.
  - 氮氧化物和挥发性有机化合物（VOCs）可以在阳光照射下结合而产生雾霾。

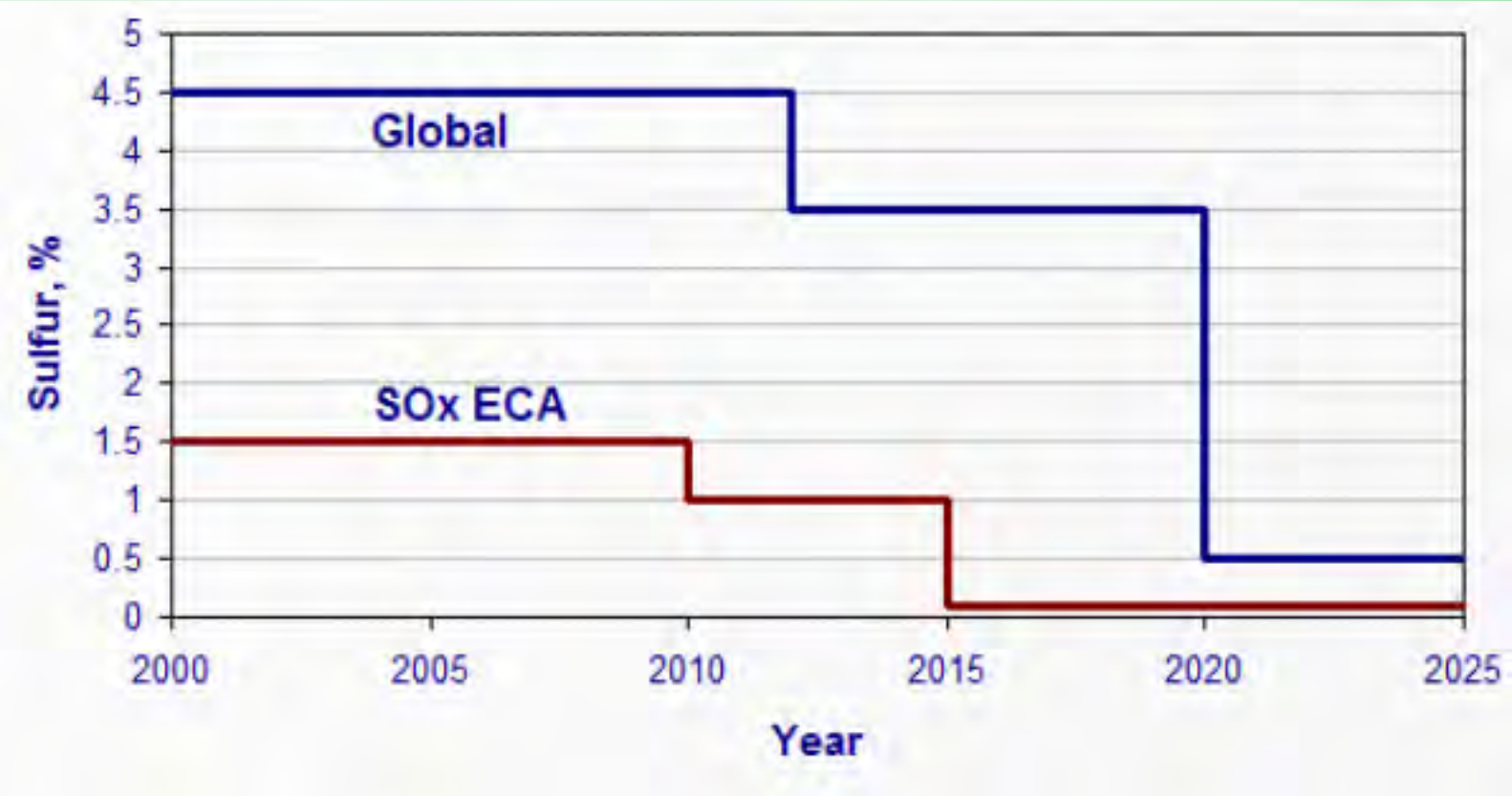
COST ISSUES
成本问题

- Residual fuel is cheaper than distillate.
- 剩余燃油比馏分油便宜。

- Rough estimate: $15,000 more per day to use 0.10% sulfur fuel.
- 粗略估计: 使用 0.10% 硫燃料大概每天增加15,000美元的成本 。

- LNG can be a cheaper alternative fuel.
- 液化天然气 (LNG) 是一种廉价的替代燃料。

Sulfur limits in marine fuel are declining worldwide
船用燃料中的硫含量限制在全世界下降



BENEFITS OF THE NORTH AMERICAN ECA
北美ECA的好处

North American ECA will:
北美ECA会：

- Reduce fleetwide ship emissions across a range of pollutants:
- 减少船舶排放中一大方面的污染物:
  - NOx: 23%
  - PM2.5: 74%
  - SOx: 86%

- Eliminate up to 14,000 premature deaths/year by 2020 and 31,000 premature deaths/year by 2030
- 到2020年，每年避免14,000的过早死亡；到2030年，可每年避免31,000的过早死亡。

- Provide huge monetized value of health and other social benefits:Up to US$110B/year by 2020
  提供巨大健康及其他社会福利的货币化价值: 到2020年高达每年一千一百亿美金。

BENEFITS OF THE NORTH AMERICAN ECA
北美ECA的好处

- In contrast, implementing current and proposed regulatory programs to reduce emissions from the entire US automobile fleet will create benefits of up to US $48B benefits by 2030
- 相比之下，实施现有和拟议的监管方案去减少整个美国汽车车队的排放量将在2030年创造高达四百八十亿美金的货币化价值。

- Benefits far outweigh the costs by a factor of 14:1 to 34: 1
- 估计好处远远超过成本的比率从 14:1 到 34:1

- Would increase cost of new vessel by 0.5-2%
- 将对新的船舶增加 0.5-2% 成本。

- Would increase cost per container by US $18
- 将对每个集装箱的成本增加18美元。

CREATING AN ECA: INFORMATION NEEDED BY THE IMO
建立ECA: IMO所需要的信息

- A clear delineation of the proposed ECA
- 提出一个明确的ECA领域

- The emission(s) that is or are being proposed for control (i.e., NOx, SOx, and/or particulate matter)
- 提出 ECA 所要控制的排放物体（NOx，SOx，和/或颗粒物）

- A description of the population and environmental areas at risk
- 描述在 ECA 内目前受害风险的人口和环境领域

- An assessment of ship contributions to ambient concentrations of air pollution or to adverse environmental impacts in the proposed ECA
- 评估船舶在 ECA 内对环境空气污染浓度或对环境的不利影响

CREATING AN ECA: INFORMATION NEEDED BY THE IMO
建立ECA: IMO所需要的信息

- Meteorological conditions in the proposed ECA
- 在 ECA 内的气象条件

- Patterns, density, and nature of the ship traffic in the proposed ECA
- 在所提出的ECA内的船舶交通形态，密度，和性质

- A description of the control measures taken to address land-based sources of NOx, SOx, and/or particulate matter emissions that are in place and operating concurrent with any ECA measures to be adopted
- 描述目前采取的陆地措施控制NOx，SOx，和/或颗粒物排放，和任何将会被采取的 ECA 措施

- Analysis of the relative costs of reducing ship emissions compared with land-based controls and the economic impacts on shipping engaged in international trade
- 分析及比较减少船舶排放的相对成本和陆地控制措施，和对从事国际贸易的船舶的经济影响

TIMELINE FOR NORTH AMERICAN ECA
北美ECA时间表

- There is no set schedule or timetable for the process of having an ECA adopted by the IMO
- ECA被IMO批准的过程没有设定时间或时间表

- The timetable of events that led to the IMO adoption of the North American ECA was as follows: 北美ECA过程的时间表是：

  - October 2008: Instrument of Ratification deposited with IMO
  - 十月2008： 递交IMO批准书
  - January 2009: Annex VI entered into force for US
  - 一月2009： 附件六对美国生效
  - March 2009: US and Canada submitted ECA proposal to IMO
  - 三月2009： 美国和加拿大对IMO申请ECA
  - July 2009: IMO members considered ECA proposal at MEPC 59
  - 七月2009： IMO成员在MEPC 59讨论ECA
  - March 2010: IMO adopted ECA Proposal at MEPC 60
  - 三月2010: IMO在MEPC 60制定ECA
  - August 2012: ECA entered into force
  - 八月2012: ECA生效

Three strategies are emerging to meet ECA requirements
三个新兴策略去达到ECA的要求

Low sulfur fuel oil (MDO / MGO)

ISSUES TO RESOLVE:
Fuel availability and price

PRO: No extra infrastructure needed

CONS: Higher fuel costs; scrubbers still needed for Tier III NOx control

Existing high sulfur fuel and install advanced emissions control technology

ISSUES TO RESOLVE:
Equipment costs, waste disposal, fuel costs

PROS: Scrubber technology is mature; fuel and bunkering is available; fuel costs less than low-sulfur fuel

CONS: Capital cost and lost time during retrofit; Technologies may be expensive; availability and cost of waste disposal infrastructure

Liquefied Natural Gas (LNG)

ISSUES TO RESOLVE:
Conversion costs, fuel bunkering, fuel availability and cost

PROS: Meets SO, PM, and NOx Tier III requirements without added emission controls; Potentially lowest overall cost due to lowest-cost fuel

CONS: High upfront capital costs; onboard fuel storage and bunkering issues

CURRENT ISSUES 现况

- Fuel availability; California experience has been positive.
- 燃料的可用性； 加州有积极的经验

- Technical issues, viscosity and flash point; no serious issues reported in California.
- 技术问题，粘度和闪点；在加州没有严重问题的报告。

- Russian proposal to delay the NOx rule.
- 俄罗斯提议推迟NOx的制度。
  - Likely to be resolved this Spring. 多数会在这个春天解决。

- Timing of the sulfur fuel study.
- 硫燃料的研究时间。
  - Now scheduled for 2018. 现在定于2018。

CRUISE SHIP ISSUES
船舶的问题

- Issue: North American cruise ships tend to stay within the ECA area.
  - 北美的游轮往往停留在ECA内的地区。

- US EPA agreement with Carnival:
- 美国EPA与嘉年华邮轮公司的协议：
  - NOx scrubbers
  - 氮氧化物洗涤器
  - Diesel particulate filters (DPF)
  - 柴油颗粒过滤器

CALIFORNIA'S MARINE FUEL RULE
加州的船用燃料规则

- In effect since 2009.
  在2009年生效
- Extends 24 nm off the Coast.
  延伸海岸出24 海里
- Gradual reductions in fuel sulfur.
  逐渐减少燃料中的硫
- Designed to reach the same limits as the ECA.
  限制度相当ECA
- Needed to reduce PM and ozone, especially in Southern California.
  需要降低PM和臭氧，尤其是在南加州
- No serious technical or fuel availability issues.
  没有严重的技术或燃料供应问题

U.S. AND CALIFORNIA EXPERIENCE
美国和加州的经验

- U.S. at 1% sulfur since 2012.
  在2012年起，美国用 1% 硫。

- California at 0.1% sulfur since January 1, 2014.
  在2014年1月1日起，加州用 0.1% 硫。

- No serious operational problems
  没有严重的操作问题

- No serious problems with fuel availability
  燃料的可用性没有严重的问题

- Maersk experience has been positive
  马士基公司的经验是积极的

CONCLUSIONS
总结

- Fuel is available
  不缺燃料
- No tech problems
  没有技术问题
- Big health and air quality benefits
  极大健康和空气质量的效益
- It’s a success so far.
  目前很成功

THANK YOU! 谢谢!

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