

# Reducing Vessel Emissions in Hong Kong & Pearl River Delta region:

Stakeholder  
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# Civic Exchange

- Hong Kong-based independent, public policy think tank
- Convenes air quality scientists, public health professionals, government officials and other experts together with relevant stakeholders to tackle air pollution
- Longstanding focus on marine & port emission reductions, including 2008 Green Harbours work

# Sustainability Challenge: Expanding Ports

(TEU throughput in thousands)

Rank	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
1	Hong Kong 16211	Hong Kong 18098	Hong Kong 17826	Hong Kong 19144	Hong Kong 20449	Hong Kong 21984	Singapore 23192	Singapore 24792	Singapore 27936	Singapore 29918	Singapore 25867	Shanghai 29069
2	Singapore 15945	Singapore 17087	Singapore 15571	Singapore 16941	Singapore 18411	Singapore 21329	Hong Kong 22602	Hong Kong 23539	Shanghai 26150	Shanghai 28006	Shanghai 25002	Singapore 28431
3	Kaohsiung 6985	Kaohsiung 7426	Busan 8073	Busan 9453	Shanghai 11282	Shanghai 14554	Shanghai 18080	Shanghai 21720	Hong Kong 23998	Hong Kong 24494	Hong Kong 21040	Hong Kong 23699
4	Busan 6440	Busan 6383	Kaohsiung 7541	Shanghai 8610	Shenzhen 10650	Shenzhen 13660	Shenzhen 16200	Shenzhen 18470	Shenzhen 21100	Shenzhen 21416	Shenzhen 18250	Shenzhen 22510
5	Rotterdam 6400	Rotterdam 6290	Shanghai 6340	Kaohsiung 8493	Busan 10408	Busan 11492	Busan 11843	Busan 12039	Busan 13261	Busan 13453	Busan 11980	Busan 14194
6	Long Beach 4408	Shanghai 5612	Rotterdam 6120	Shenzhen 7620	Kaohsiung 8843	Kaohsiung 9714	Kaohsiung 9471	Kaohsiung 9775	Rotterdam 10791	Dubai 11827	Guangzhou 11200	Ningbo-Zhoushan 13144
7	Shanghai 4210	Los Angeles 4879	Los Angeles 5184	Rotterdam 6534	Los Angeles 7179	Rotterdam 8292	Rotterdam 9288	Rotterdam 9653	Dubai 10653	Guangzhou 11001	Dubai 11124	Guangzhou 12550
8	Los Angeles 3829	Long Beach 4601	Shenzhen 5080	Los Angeles 6106	Rotterdam 7144	Los Angeles 7321	Hamburg 8088	Dubai 8923	Kaohsiung 10257	Ningbo-Zhoushan 10934	Ningbo-Zhoushan 10503	Qingdao 12012
9	Hamburg 3750	Hamburg 4248	Hamburg 4689	Hamburg 5364	Hamburg 6138	Hamburg 7003	Dubai 7619	Hamburg 8862	Hamburg 9890	Rotterdam 10784	Qingdao 10262	Dubai 11600
10	Antwerp 3614	Antwerp 4082	Long Beach 4463	Antwerp 4777	Antwerp 5445	Dubai 6429	Los Angeles 7485	Los Angeles 8470	Qingdao 9460	Qingdao 10024	Rotterdam 9743	Rotterdam 11100

- GUANGZHOU**  
12,550m TEU
- SHENZHEN**  
22,510m TEU
- ZHONGSHAN** 1,08m TEU
- HONG KONG**  
23,699m TEU
- MACAU** 0,09m TEU
- + ZHUHAI** 0,70m TEU



**10.5% GLOBAL TEU**

**PRD MAJOR CONTAINER PORT THROUGHPUT 2010**

# Pearl River Delta Region = San Francisco Bay Area



San Francisco



Hong Kong

# Emission trends by source

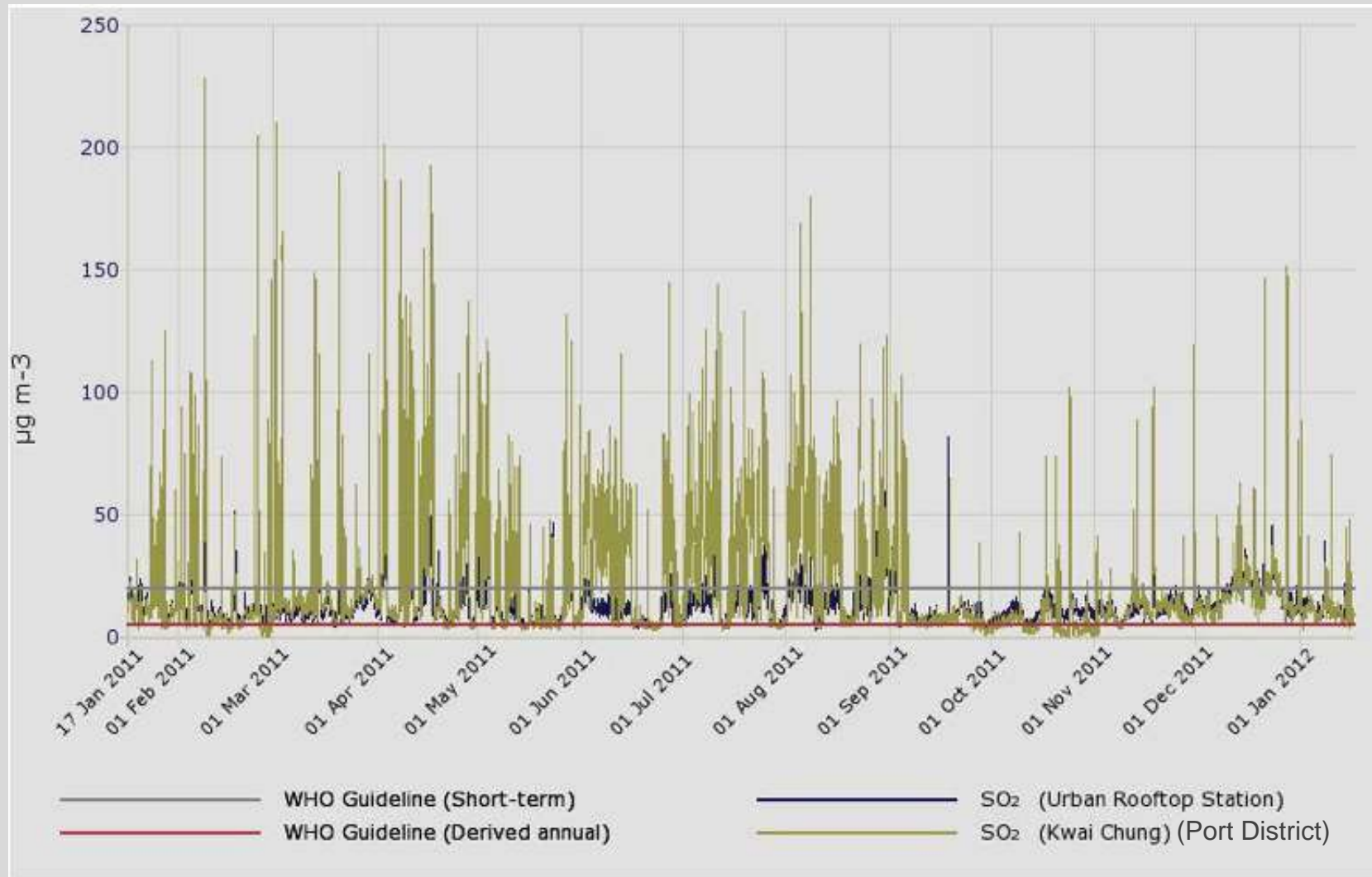
- Since 1990, most sectors have reduced their air emissions in Hong Kong.

Source	Sulphur Dioxide	Nitrogen Oxides	Particulate Matters
Power Generation	↓49%	↓67%	↓69%
Road Transport	↓95%	↓22%	↓64%
Marine	↑93%	↑84%	↑61%
Civil Aviation	↑155%	↑156%	no change
Other Fuel Combustion	↓65%	↓27%	↓35%
Non-combustion	N/A	N/A	↑19%
<b>Total</b>	<b>↓51%</b>	<b>↓48%</b>	<b>↓55%</b>

# Proximity to ports poses a serious public health risk



# Ship emissions affect urban air quality: SO<sub>2</sub>

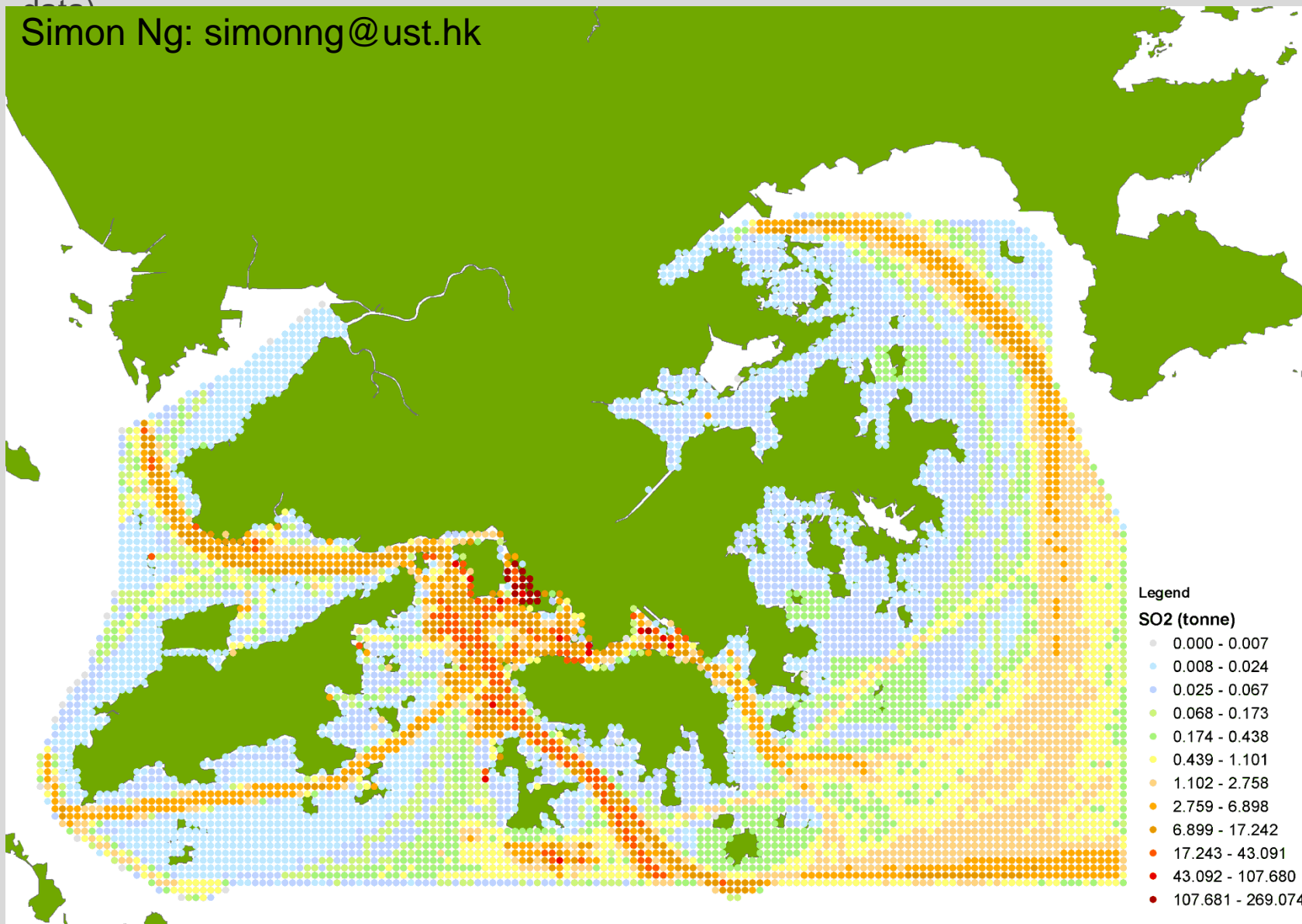




# Hong Kong Marine Emission Inventory

Spatial Distribution of SO<sub>2</sub> Emission from Marine Source by 500 x 500m Grid (2007 data)

Simon Ng: [simonng@ust.hk](mailto:simonng@ust.hk)

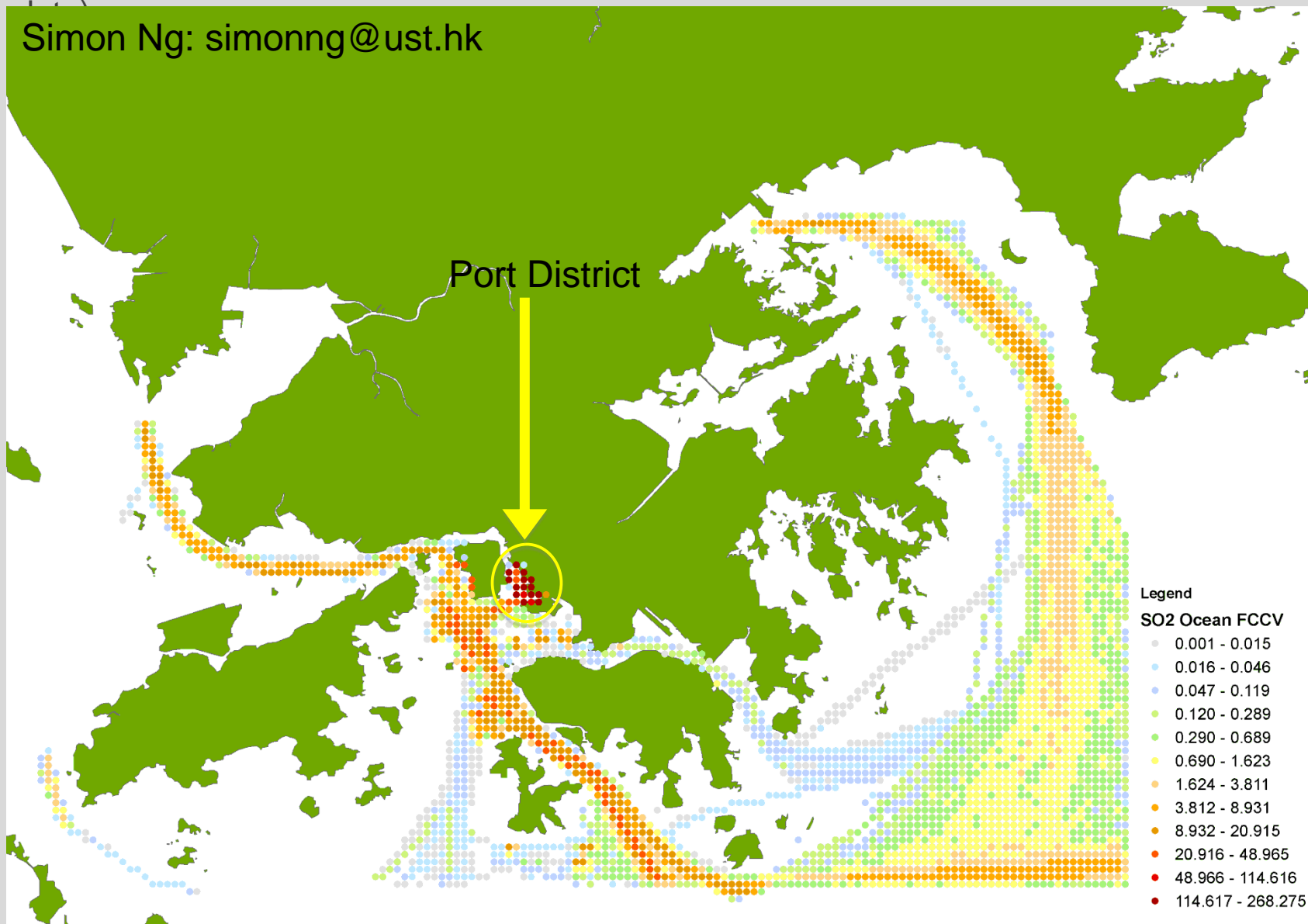


“Findings quoted in this presentation may not be final & are subject to revision, until the Final Report of the Study is finalized & published.”

# Hong Kong Marine Emission Inventory

Spatial Distribution of SO<sub>2</sub> Emission by Container Vessel (2007)

Simon Ng: simonng@ust.hk



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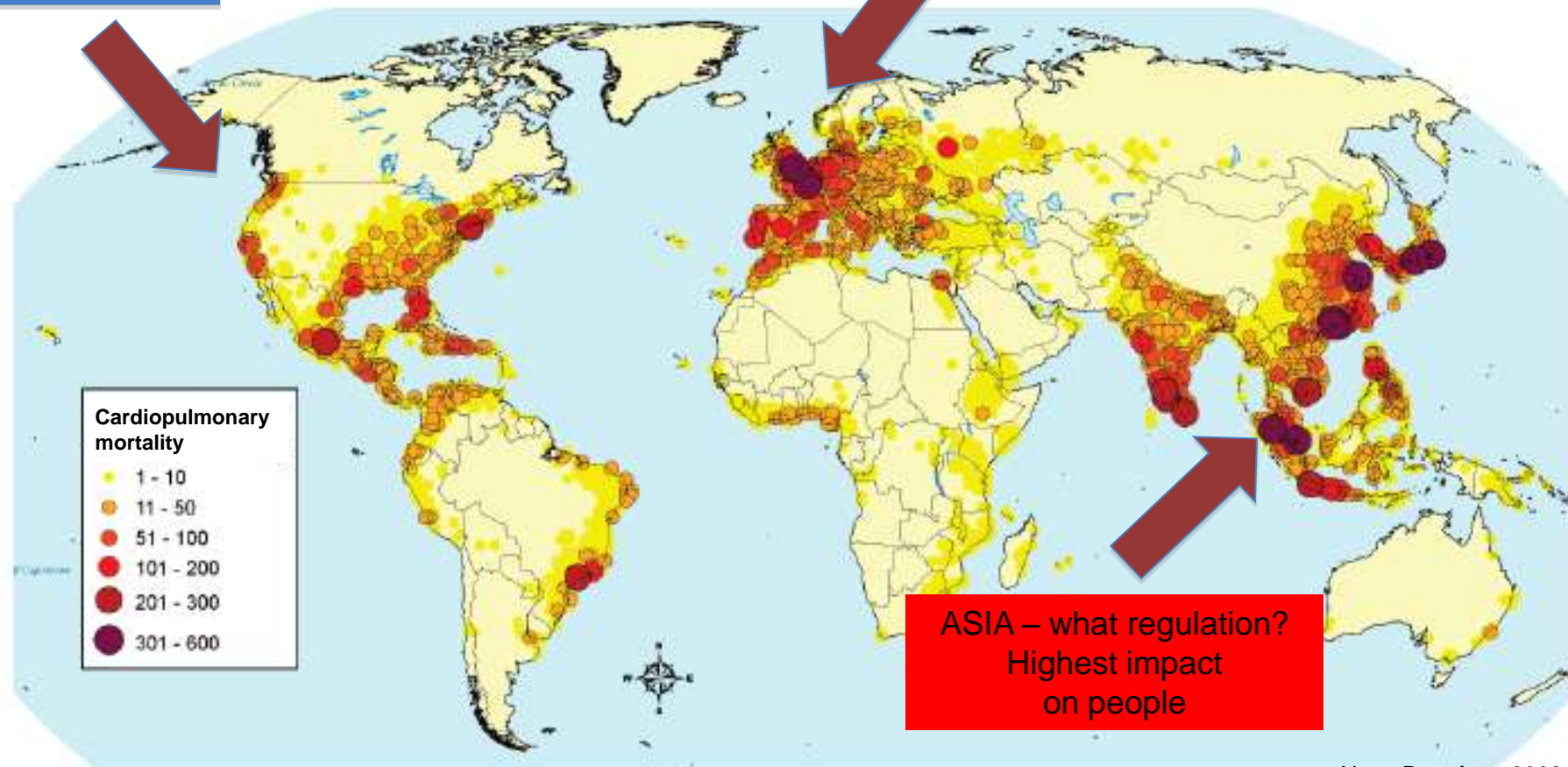
# International Regulation

- International Maritime Organization (IMO)
  - International Convention for the Prevention of Pollution from Ships (MARPOL)
  - Annex VI: Air Emissions – 3.5% Jan 2012, getting tighter
    - Emission Control Areas – 1% now, 0.1% in 2015
- Regional regulation
  - EU Ports
  - California
- Ships that call at these ports have cleaner fuel on board when in HK-PRD

# Regulation and mortality from ship emissions

North America  
ECA approved  
(2012)

North Sea, Baltic Sea,  
English Channel ECA now  
in effect

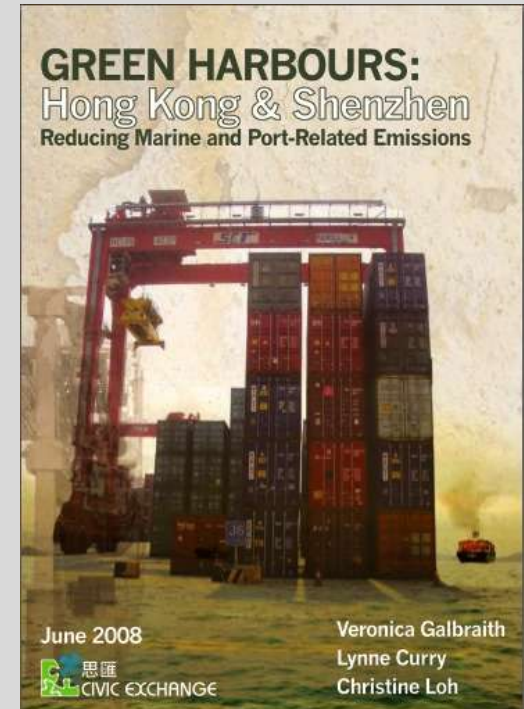


Note: Data from 2002

# Port Activity: Green Harbours

- Cross-sector project:

- Container terminal operators
- Shipping lines
- Local craft (barges & tugs)
- Trucks
- Shippers (cargo producers)
- Fuel providers
- Government & Academia



- Major finding: shipping industry wants regulation consistent with MARPOL Annex VI & ECAs in HKPRD

# 2010: World's first shipping industry-led, voluntary, unsubsidized, at-berth fuel switch

## The Fair Winds Charter 2011 - 2012

As international carriers, we recognize the emissions from our ships affect air quality in Hong Kong and the Pearl River Delta region. As responsible businesses, WE VOLUNTARILY COMMIT TO :

- Switching to a fuel containing 0.50% sulphur content or less ("low sulphur fuel") while at berth (at the terminal or at anchorage) in Hong Kong, to the maximum extent possible;
- Undertaking this voluntary initiative between 1 January 2011 and 31 December 2012;
- Collaborating within our sector and with the Hong Kong SAR and Guangdong Governments to introduce regulation on ship emissions, consistent with international standards.

### In support of the HKLSA FAIR WINDS CHARTER, WE :

- Urge the Hong Kong SAR Government to take a lead and work with the Guangdong Government to regulate the use of low sulphur fuel in the Pearl River Delta region by 31 December 2012. Urge the Hong Kong SAR Government to encourage broader industry participation by providing incentives, as it has done with other transport modes.
- Encourage the container terminals to support this initiative by offering advantages to participating ships, as well as by addressing emissions from cargo handling equipment, and the trucks and local craft that service the terminals.
- Encourage ocean-going passenger liners and other maritime users of the Port of Hong Kong to use low sulphur fuel while at berth in Hong Kong.
- Encourage cargo producers and buyers to favour participating shipping lines as a way of meeting their sustainable supply chain commitments.
- Welcome the support of end consumers who purchase the goods that the shipping industry carries.



Crystal Cruises



EVERGREEN LINE

HAMBURG SÜD



CHINA NAVIGATION



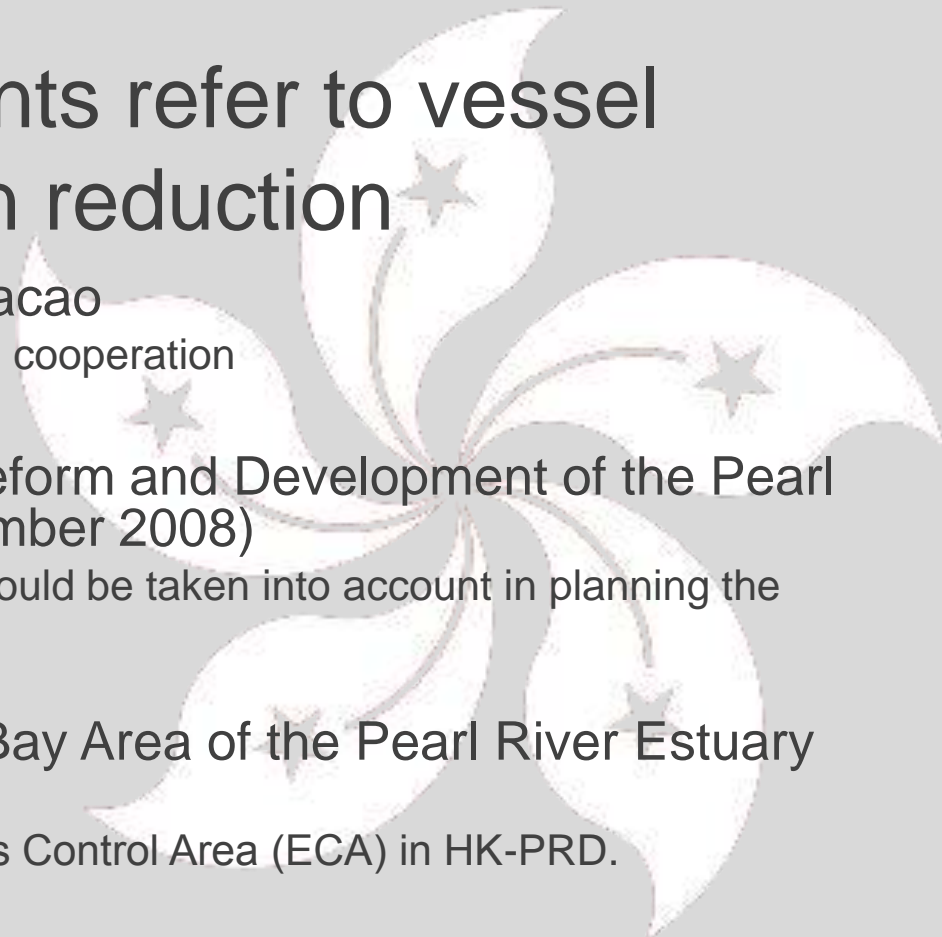
Hapag-Lloyd



Prestige Cruise Holdings



# Policy Documents refer to vessel emission reduction



- China's 12<sup>th</sup> 5-Year Plan: HK & Macao
  - Deepening HK-PRD-Guangdong cooperation
- The Outline of the Plan for the Reform and Development of the Pearl River Delta (2008 – 2020) (December 2008)
  - environmental considerations should be taken into account in planning the Pearl River Delta region.
- Study on the Action Plan for the Bay Area of the Pearl River Estuary (2009-11)
  - proposes China's first Emissions Control Area (ECA) in HK-PRD.
- Framework Agreement on Hong Kong/Guangdong Cooperation (2010)
  - "Guangdong and Hong Kong will progressively adopt air quality objectives and fuel and emission standards for...vessels which are more advanced than other places in the Mainland."
- Regional Cooperation Plan on Building a Quality Living Area - Guangdong, Macau & Hong Kong authorities (September 2011)

# Clear policy intent: reduce vessel emissions



## (d) Exploring opportunities in controlling air pollutant emissions from vessels in the Greater PRD waters

- (i) conducting a joint basic study on controlling air pollution from vessels in the Greater PRD waters by the three sides, including compilation of an emissions inventory on vessels in the Greater PRD waters; and
- (ii) formulating cooperation plans on controlling air pollutant emissions from vessels. Initial cooperation proposals include:

- ▶ jointly formulating emissions reduction targets for vessels and their fuel standards with a view to further strengthening control of vessel emissions;
- ▶ restricting emissions from vessels, including NO<sub>x</sub> emissions from new vessels which should be in line with the latest development of the engine manufacturing and ship building industries as well as the shipping sector;
- ▶ examining measures to encourage vehicles entering the port areas to use cleaner fuels with a view to reducing air pollutant emissions in their vicinity;
- ▶ exploring the possibility of using cleaner energy by providing onshore power supply to cruise vessels and ocean-going vessels berthing at the Greater PRD ports;
- ▶ considering requiring ocean-going vessels at berth and at anchorage at the Greater PRD ports to use low sulphur fuel or onshore power; and
- ▶ studying and exploring the establishment of an "Emission Control Area" in Greater PRD waters.



# HKEPD proposals to Legislative Council

CB(1) 625/11-12(03)

For discussion on  
21 December 2011

## LEGISLATIVE COUNCIL PANEL ON ENVIRONMENTAL AFFAIRS

### Controlling Emissions from Vessels

#### PURPOSE

This paper seeks Members' views on a proposal to control emissions from vessels for further improvement to air quality.

#### BACKGROUND

2. Since 1990, we have taken proactive actions to reduce land-based emissions, which have a more direct impact on the general public. As a result of these efforts, the land-based emissions of sulphur dioxide (SO<sub>2</sub>), respirable suspended particulates (RSP) and nitrogen oxides (NO<sub>x</sub>) were reduced by about 61%, 64% and 52% respectively during 1990 to 2008. In the same period, these emissions from vessels increased by 54%, 41% and 4% respectively, with the maritime activities as reflected by vessel arrival numbers increased by 57% to 76%, depending on specific marine trades<sup>1</sup>. Vessels have become one of the major local air pollution sources, being the largest source of RSP, and the second largest SO<sub>2</sub> and NO<sub>x</sub> emitter after power plants.

3. These pollutants could cause a variety of health impacts, including damage to respiratory and lung functions, aggravation of existing respiratory and heart diseases and increased risk of developing chronic respiratory diseases. The emissions also contribute to visibility impairment, which is a major environmental problem overcasting Hong Kong and the Pearl River Delta (PRD) region. Moreover, the impacts of their emissions are particularly discernible at locations near the Kwai Chung container terminals where ocean going vessels (OGVs) berth and in places close to their routes. To further improve air

<sup>1</sup> Marine trades comprise international trading and businesses involving ocean-going vessels such as fully cellular container vessels, cruises/ferries, oil tankers, cargo vessels, bulk carriers; river trading and businesses with neighbouring regions such as Hong Kong-Macao Ferries, Hong Kong-Pearl River Delta Ferries, cargo vessels, lighters, barges and cargo junks; and local marine businesses such as ferry operation, harbour craft operation, fishing and yachting.

CB(1) 625/11-12(03)

二零一一年十二月二十一日  
討論文件

## 立法會環境事務委員會 管制船舶排放廢氣

#### 目的

本文件就管制船舶排放廢氣以進一步改善空氣質素的建議，徵詢委員意見。

#### 背景

2. 自一九九零年開始，我們一直採取積極措施減少對市民大眾有較大直接影響的陸上污染源排放。有關的努力已見成效，在一九九零年至二零零八年間，陸上排放的二氧化硫、可吸入懸浮粒子和氮氧化物的排放分別減少 61%、64% 和 52%。期間，源自船舶的這三類污染物的排放量分別增加 54%、41% 和 4%；而反映海上活動的船舶抵港數目則上升 57% 至 76% 不等，視海上貿易<sup>1</sup>類型而定。船舶排放已成為本港空氣污染的主要源頭之一，是可吸入懸浮粒子的最大排放源，亦是繼發電廠後的二氧化硫和氮氧化物第二大排放源。

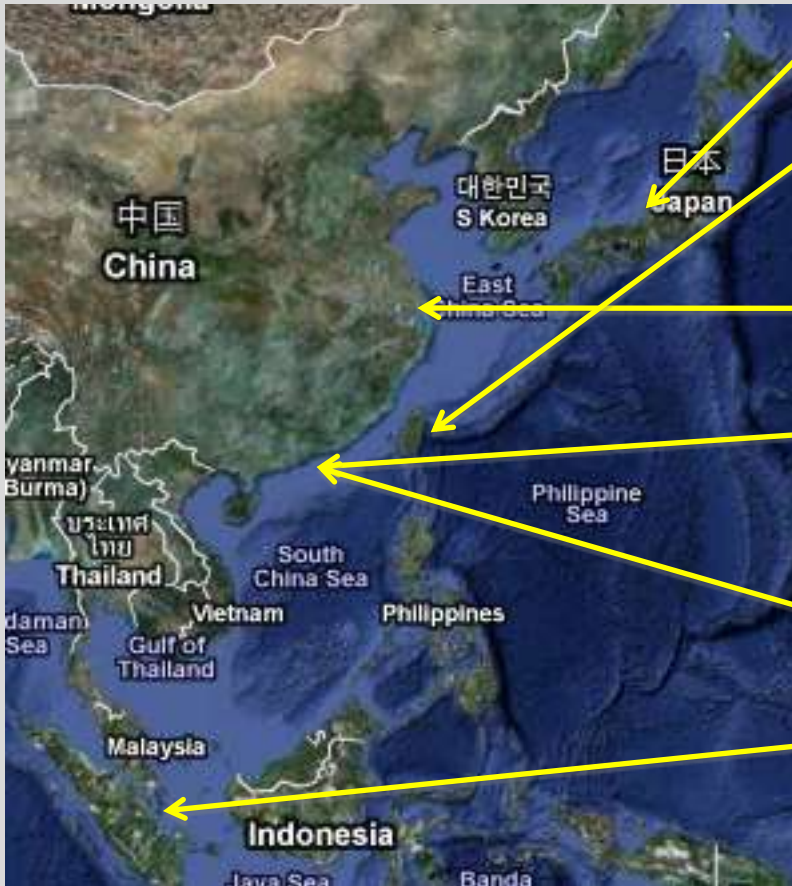
3. 這些污染物對健康可產生多種影響，包括損害呼吸系統及肺功能、使現有呼吸系統疾病及心臟病惡化，以及增加患上慢性呼吸系統疾病的機會。排放亦令能见度下降，造成嚴重環境問題，影響香港及珠三角地區。此外，在遠洋輪船停泊的葵涌貨櫃碼頭附近及靠近遠洋船舶航線的地方，船舶排放廢氣的影響尤其顯著。為進一步改善空氣質素及保障市

<sup>1</sup> 海上貿易包括：涉及遠洋輪(例如貨櫃輪、郵輪、運油船、貨輪、散裝貨輪)的國際貿易及商業活動；涉及內河船舶(例如港澳輪渡、行走香港和珠三角地區的輪渡、貨輪、駁船、躉船、貨艇)的內河貿易和與鄰近地區的商業活動；及涉及本地的海上商業活動例如輪渡、港內船舶、渡輪和遊艇運作。

# HK-PRD: Looking ahead

- 4 joint policy documents in last 3 years
- Policy address on 12 October reinforced this:
  - “explore with the governments of Guangdong, Shenzhen and Macao proposals for requiring ocean-going vessels to switch to low-sulphur diesel while berthing in PRD waters”
  - “setting up an Emission Control Area in PRD waters”
  - “study...ways to improve the quality of vessel fuels sold locally to reduce vessel emissions.”
- LegCo paper: legislation in 2012?

# Regional Initiatives



## Japan

- MILT reviewing possible ECA

## Taiwan

- Fuel switch & slow steam
- Inventory

## Shanghai

- Inventory

## Hong Kong

- Fair Winds Charter
- EPD Inventory

## Shenzhen & Guangzhou

- Green Ports activities

## Singapore

- Green Port Programme

# Thank you



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