CONTENTS

• MAIN PROFILE OF SHANGHAI PORT
• GREEN PORT CONSTRUCTION
• VESSEL POLLUTION REDUCTION PLAN
• PORT AREA GOVERNANCE
• VESSELS GOVERNANCE
• MANAGEMENT AND CAPACITY BUILDING
• SAFEGUARDING MEASURES
• NEXT STEPS
PROFILE

• Cargo throughput capacity in 2017: 710 million tons

• Container throughput: 40.30 million TEUs
Air Quality in 2016 (µg/m³)

- SO2
- PM10
- PM2.5
- NO2

2016年上海空气质量（微克/立方米）
# Main Air Pollutants Contribution Rate from Different Type of Vessels

<table>
<thead>
<tr>
<th>VESSEL TYPE</th>
<th>PM$_{2.5}$</th>
<th>NO$_x$</th>
<th>SO$_x$</th>
<th>N$_2$O</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ocean going vessels</td>
<td>66.6%</td>
<td>45.6%</td>
<td>74.4%</td>
<td>45.5%</td>
</tr>
<tr>
<td>Domestic vessels</td>
<td>23.8%</td>
<td>25.8%</td>
<td>23.1%</td>
<td>28.7%</td>
</tr>
<tr>
<td>Inland river vessels</td>
<td>9.6%</td>
<td>28.6%</td>
<td>2.6%</td>
<td>25.8%</td>
</tr>
</tbody>
</table>
# Air Pollutant Emissions Characteristics from Main Vessel Types (not including inland river vessels)

<table>
<thead>
<tr>
<th>Type of vessels</th>
<th>Pollution contribution (percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Container ship</td>
<td>54%~60%</td>
</tr>
<tr>
<td>Bulk carrier</td>
<td>11%~12%</td>
</tr>
<tr>
<td>Oil tanker</td>
<td>4%~6%</td>
</tr>
<tr>
<td>Ro-ro ship</td>
<td>3%</td>
</tr>
<tr>
<td>Bulk chemical carrier</td>
<td>2%~3%</td>
</tr>
<tr>
<td>Tugboat and barge</td>
<td>1%~2%</td>
</tr>
<tr>
<td>Pusher tugs and liquefied natural gas carrier</td>
<td>1%</td>
</tr>
<tr>
<td>General cargo, dry cargo, and multi-purpose carrier</td>
<td>16%~18%</td>
</tr>
</tbody>
</table>
GREENPORT MAIN CONTENTS

• Overall goals (2015-2017)
  ➢ Comprehensive energy consumption per unit of throughput of port operation will fall by 7% as compared to 2010 level
  ➢ Carbon emissions will fall by 9% as compared to 2010 level
  ➢ PM$_{2.5}$ average concentration will fall by 20% as compared to 2013 level

• How to make it happen
  ➢ Air pollution treatment
  ➢ Port area governance
  ➢ Vessels management
  ➢ Capacity building

• Safeguarding measures
Vessel Pollution Reduction Plan


- Air Pollution Prevention Law became effective on January 1st, 2016, Article 64 has stipulated that Transport Department of the State Council can designate ship pollution Emission Control Areas (ECA) off the coast, all the ships should conform to the relevant emission requirements when entering the area.

- On December 2nd, 2015, MOT published 《Ship Emission Control Area Implementation Program》 at the Pearl River Delta, the Yangtze River Delta, and the Bohai Rim.

- On February 27th, 2016, in order to improve the air quality and advance green development of the Shanghai International Shipping Center, Shanghai municipal government published 《Shanghai Port Ship Emission Control Area Project》, including inland rivers areas. The City took the lead in carrying out the project, which was higher than the current emission control requirements.
Ship Emission Control

Ship emission control area at the Yangtze River Delta

- Coastal area

- Inland river: Nanjing, Zhenjiang, Yangzhou, Taizhou, Nantong, Changzhou, Wuxi, Suzhou, Shanghai, Jiaxing, Huzhou, Hangzhou, Shaoxing, Ningbo, Zhoushan, and Taizhou, 16 municipal administrative areas

- Core port areas: Shanghai, Ningbo-Zhoushan, Suzhou, Nantong.
From January 1st, 2016: All the ships should comply with the requirement of international conventions and national laws regarding sulfur oxide, and nitrogen oxide emission standards, some qualified ports within the ECA may require the ships at-berth to use fuel with a maximum of 0.5% (m/m) sulphur content

From January 1st, 2017: Ships at-berth at the ECA core port areas (with the exception of one hour after at-berth and before departing), should use fuel with a maximum of 0.5% (m/m) sulphur content

From January 1st, 2018: All ships should use fuel with a maximum of 0.5% (m/m) sulphur content when calling at all ports within the ECA
From Jan 1st, 2019: Vessels should use fuel with a maximum of 0.5% (m/m) sulphur content when entering into the ECA

Before December 31st, 2019: The government will evaluate the results, make sure whether to carry out the following measures: (1) use fuel with a maximum of 0.1% sulphur content when sail into the ECA; (2) scale up the ECA boundaries; and, (3) other measures

Ships can use other alternative measures such as shore power, clean energy, exhaust gas treatment, etc.
Comparison of SO$_2$ concentrations in the Port region and the Shanghai City before and after the implementation of fuel switching by vessels at-berth

**Port: 14% reduction from 2015 level**

**City: 12.2% reduction from 2015 level**
Ship Emission Control (cont.)

Pollutant Concentrations after the Implementation of ECA (in ug/m³)

- SO2
- NO2
- NO
- PM2.5
- PM10

2014 2015 2016.4-2017.3
### Ship Emission Control (cont.)

#### Pollutant Emissions Reduction by Control Measures

<table>
<thead>
<tr>
<th>Control Measures</th>
<th>PM$_{2.5}$</th>
<th>SO$_x$</th>
<th>NO$_x$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vessels at-berth use fuel with a maximum of 0.5% sulphur content</td>
<td>7.4%</td>
<td>11.8%</td>
<td>1.2%</td>
</tr>
<tr>
<td>Vessels at-berth use fuel with a maximum of 0.1% sulphur content</td>
<td>11.7%</td>
<td>26.4%</td>
<td>1.2%</td>
</tr>
<tr>
<td>Vessels entering into ECA use fuel with a maximum of 0.5% sulphur content</td>
<td>45.6%</td>
<td>44%</td>
<td>3.2%</td>
</tr>
<tr>
<td>Vessels entering into ECA shall use fuel with a maximum of 0.5% sulphur content, and, vessels at-berth shall use 0.1% sulfur content fuel when calling</td>
<td>48.7</td>
<td>56.7%</td>
<td>3.2%</td>
</tr>
<tr>
<td>Vessels entering into ECA use fuel with a maximum of 0.1% sulphur content</td>
<td>65.7</td>
<td>93%</td>
<td>3.2%</td>
</tr>
</tbody>
</table>
Shore (Port)-Based Power Project

• By the end of 2017, Shanghai has installed 9 sets of shore power equipment, 2 at Guandong Terminal, 3 at Yangshan Phase IV, 2 at International Cruise Terminal, and, 2 at Wusongkou Cruise Terminal.
Port Area Governance

- Energy Conservation and Emission Reduction Technology Renovation at Terminals
  - By the end of 2017, SIPG has owned 1,253 yard tractors, 896 of which have been powered by LNG.
Fuel Oil Quality Control for Inland River Vessels

- Inland river vessels and ocean-river vessels should use GB 252 standard diesel oil. Residual oil will be prohibited.

- From January 1\textsuperscript{st}, 2017, public service vessels, excursion boats, ferries, harbor craft, sanitation vessels, and vessels sailing, calling, and operating at Huangpu River core areas shall use fuel oil with a sulphur content less than the category IV diesel oil.
Vessels Governance

• Inland River LNG Application

  By the end of 2017, 91 LNG-powered vessels operating at inland rivers. Their main business types include: transport of coal, pulp, steel coil, mineral, municipal solid wastes, waste dirt, and, construction and demolition debris.
Management and Capacity Building

- Vessel Pollution Prevention

  - 30 agencies are responsible for outer port clean-up work

  - Oil spilling emergency equipment depot at the Yangtze River Estuary can defend 1,000 tons of oil spills
Management and Capacity Building

Inland River Vessels Pollutants Recovery

- Number of vessel waste received
- Received Amount (tons)

- 2015
- 2016
- 2017
Safeguarding Measures

• Strengthen Organizational leadership and coordination

• Increase Policy Support and Financial Investment

• Expand International and Regional Cooperation

• Focus on Talent Training and Public Engagement
Next Steps

According to the Comments on fully advancing green transport development by the MOT, by 2020:

• Inland river vessels standardization proportion: 70%
• The proportion of LNG inland river vessels: up by 200% from 2015
• Energy consumption of vessels turnover volume reduction: down 6% from 2015
• $\text{SO}_x$, $\text{NO}_x$, and PM emissions at Bohai Rim, Yangtze River, Pearl River: down 65%, 20%, 30% from 2015, respectively
• $\text{CO}_2$ emission intensity: down 7% from 2015
Thank You!