Air Pollution Control Status and Future Strategies for Major Ports in Taiwan

Department of Air Quality Protection and Noise Control, EPAT

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To fulfill the commitments of Taiwan-US cooperation, the Taiwan EPA conducted a series of actions to improve the air quality of port areas, and cooperated with partners to achieve the sustainable development of ports in Taiwan.

**Target:** Green Port

- Port Evaluation
  - Ports Emissions Inventory
  - Clean Air Action Plan

**Responding to the concerns from public and specialists**

**Assessing the priority of control strategies according to the emission inventory**

**Scheduling the implement plans of control strategies under the overall evaluation**

**Partners**
- EPA
- EPB
- MPB
- TIPC

**Public Operators**
Port Emissions Inventory

- **Baseline:** 2015
- **Ports:** Keelung, Taipei, Taichung, Kaohsiung, Hualien, Suao, Anping and Budai 8 commercial ports. Mailiao and Hoping 2 industrial harbors. The other 4 special terminals.

- **Pollutants:**
  - NO$_X$
  - VOCs, CO, SO$_2$
  - PM$_{10}$, PM$_{2.5}$
  - DPM and GHG.

- **Sources:**
  - Ocean-Going Vessels (OGV)
  - Harbor Craft (HC)
  - Rail Locomotives (RL)
  - Cargo Handling Equipment (CHE)
  - Heavy-Duty Vehicles (HDV)
Port Emissions Inventory

- Emission estimates results in the 7 commercial ports of Taiwan for the year from 2009-2015 (including within 20 nm area)
Clean Air Action Plan

Clean Air Action Plan - Structure

Ocean-Going Vessels

1. Speed Reduction (Incentives Mechanism)
2. Low Sulfur Fuel (MARPOL)
3. Shore Power (commitment of EIA)

Harbor Craft

1. Low Sulfur Fuel (Lease Negotiation)
2. Shore Power (Administrative requirements)

Cargo Handling Equipment

1. Low Sulfur Fuel (Regulation)
2. Electric Engine/Clean Engine (Lease Negotiation)

Heavy-Duty Vehicles

1. Promotion of Anti-idling (Regulations)
2. Automatic Recognition for Regulations Exhaust Gas Control and Regulations (Administrative requirements)
3. Self-Management (Incentives Mechanism)

Fugitive Sources

1. Dust Proof Net for Vehicles (Regulations)
2. System for Material Loading and Unloading (Regulations)
3. Audit for Material Loading Unloading Area Encourage Closed Type Loading, Unloading and Warehousing System (Lease Negotiation)
Ministry of Transportation and Communications (ROC) 2013/7/29 issued an announcement about that the vessels cruising between any commercial ports should perform the MARPOL 73/78 Annex VI to have the IAPP certificate.
## Performance

### Ocean-Going Vessels - Speed Reduction Program (2016, Jan-Aug)

<table>
<thead>
<tr>
<th>Port</th>
<th>Main type of fast Ship</th>
<th>Target of calls</th>
<th>Under 12 knots calls</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Port of Taipei</td>
<td>Container Ships</td>
<td>2776</td>
<td>845</td>
<td>30.44%</td>
</tr>
<tr>
<td></td>
<td>Car container ships</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Port of Hualien</td>
<td>Bulk Carriers</td>
<td>984</td>
<td>516</td>
<td>52.44%</td>
</tr>
<tr>
<td></td>
<td>Cement Carriers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chip Carriers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Port of Taichung</td>
<td>Container Ships</td>
<td>16710</td>
<td>5428</td>
<td>32.48%</td>
</tr>
<tr>
<td></td>
<td>Ro-Ro Ships</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Port of Keelung</td>
<td>Refrigerator Ships</td>
<td>7278</td>
<td>1223</td>
<td>16.80%</td>
</tr>
<tr>
<td></td>
<td>Passenger Ships</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Container Ships</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Port of Suao</td>
<td>Bulk Carriers</td>
<td>546</td>
<td>166</td>
<td>30.40%</td>
</tr>
<tr>
<td></td>
<td>Cement Carriers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Port of Kaohsiung</td>
<td>Passenger Cargo Ships</td>
<td>30866</td>
<td>6063</td>
<td>19.64%</td>
</tr>
<tr>
<td></td>
<td>Container Ships</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Port of Anping</td>
<td>Bulk Carriers</td>
<td>666</td>
<td>359</td>
<td>53.90%</td>
</tr>
<tr>
<td></td>
<td>Cement Carriers</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Clean Air Action Plan

### Performance

**Ocean-Going Vessels - Shore Power Implementation Status (2016)**

<table>
<thead>
<tr>
<th>Port</th>
<th>Number of Shore Power equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>110V-440V</td>
</tr>
<tr>
<td>Port of Taipei</td>
<td>6</td>
</tr>
<tr>
<td>Port of Hualien</td>
<td>3</td>
</tr>
<tr>
<td>Port of Taichung</td>
<td>2</td>
</tr>
<tr>
<td>Port of Keelung</td>
<td>11</td>
</tr>
<tr>
<td>Port of Suao</td>
<td>2</td>
</tr>
<tr>
<td>Port of Kaohsiung</td>
<td>15</td>
</tr>
<tr>
<td>Port of Anping</td>
<td>6</td>
</tr>
</tbody>
</table>

*Kao Ming & Evergreen Container Terminal, Shore Power Clean Air Action Plan*
The Taiwan EPA re-executed the “Port Air Pollution Evaluation Program” in 2013 to evaluate the improvement of pollution from stationary sources and mobile sources. Focus as follows:

- **Stationary sources:**
  - Compliance of PM regulations of port areas.

- **Mobile sources:**
  - Promote the use of Ultra Low Sulfur Diesel on harbor craft.
  - Promoting Ocean-Going Vessels emission reduction.

- **Others:**
  - Shore power.
  - Cargo handling equipment electrification.
  - Green port.
Future Control Strategies

- **Stationary sources of Pollution:**
  - Implement the “Stationary fugitive particle pollution prevention facilities management regulation.”
  - Execute auditing and reporting, random inspections of fuel quality, provide guidelines and promotion videos for public reference.
  - Cooperate with EPBs, and enhance auditing and monitoring of air quality at ports.
  - Business operators should conduct investigations to locate their pollution sources and provide budgets for improvements.
Future Control Strategies

- **Mobile sources:**
  - **Emission Control Areas** designation of main contaminated region.
  - Continuously requiring ocean-going vessels to *reduce speed to under 12 knots when within 20 nm.*
  - Continuously requiring berthed vessels to utilize a certain ratio of *shore power.*
  - Continuously requiring diesel generators and diesel loading machinery for anchored vessels, to utilize a certain ratio of *Ultra Low Sulfur Diesel.*
  - Continuously perform *random* fuel quality and exhaust emission inspections.
Conclusions

- The Taiwan EPA will continuously collaborate with the USEPA, other Asian authorities, local harbor authorities and EPBs to implement relevant control measures.

- Besides the regulatory control measures, the Taiwan EPA also encourages operators to voluntarily develop action plans to maintain port air quality.

- It is important to maintain a good communication channel with the public, helping them cooperate with ports to improve their environmental quality.
Thank You