电动、氢燃料电池船舶在中国的应用与发展
Electric and H2 fuel cell ships in China

凌贵阳
Guiyang Ling
In 1997, the State Council made a major strategic decision to build Shanghai as the main body and Jiangsu and Zhejiang as the two wings of the Shanghai International Shipping Center. It was decided that the Ministry of Communications, Shanghai, Zhejiang and Jiangsu should jointly establish the Shanghai Port Management Committee.
环渤海 Bohai Rim

长三角 Yangtze River Delta

珠三角 Pearl River Delta

核心港口 core ports

天津港、秦皇岛港、唐山港、黄骅港
Tianjin Port  Qinhuangdao Port  Tangshan Port  Huanghua Port

上海港、宁波-舟山港、南通港、苏州港
Shanghai Port  Ningbo Zhoushan Port  Nantong Port  Suzhou Port

深圳港、广州港、珠海港
Shenzhen Port  Guangzhou Port  Zhuhai Port
交通运输部文件

交通运输部关于印发船舶大气污染物排放控制区实施方案的通知

为深入贯彻落实《中华人民共和国大气污染防治法》和《中华人民共和国船舶及其有关作业活动排放控制区实施方案》精神，促进船舶大气污染物排放控制区实施方案的实施，交通运输部决定印发《交通运输部关于印发船舶大气污染物排放控制区实施方案的通知》。该通知自2018年1月1日起施行。

一、工作目标

通过实施船舶大气污染物排放控制区（以下简称排放控制区），降低船舶氮氧化物、颗粒物、挥发性有机物等大气污染物的排放，改善大气环境和内河水域水体空气质量。

二、防控措施

（一）促进环境监测设备和数据交换协同发展。

（二）强化船舶大气污染物排放控制。

（三）遵守国际公约和国内法律法规要求。

（四）保障实施效果和实施效果满意度。

三、适用对象

本方案适用于在排放控制区内航行、停泊、作业的船舶，以及在排放控制区内从事与船舶作业相关的辅助服务活动的单位和个人。
新版船舶排放控制区政策对船舶排放控制提出了更深更广的要求

The latest ship emission control zone policy puts forward deeper and broader requirements for ship emission control

对船舶靠港使用岸电也提出了更明确的要求

More explicit requirements have also been put forward for the use of shore power by ships in port

鼓励船舶使用清洁能源、新能源、船载蓄电装置满足船舶排放控制要求

Encouraging ships to use clean energy, new energy and on-board storage devices to meet ship emission control requirements
深化政府部门之间、政府和企业之间的合作
Deepening cooperation between government departments and government-to-enterprises
Encouraging major ports of Yangtze River Delta to be pioneers and make more detailed plans

- Strengthen the application of shore power
- Promoting the enhancement of emission monitoring and law enforcement capabilities of maritime departments
- Unmanned aerial vehicle
- Fast Sulfur Analyzer
加快推广LNG、电动等新能源船舶应用

Speed up the Promotion of New Energy Ship Applications such as LNG and Electricity

LNG filling station

LNG vessel

Launching of electric freighter
海事执法情况

二氧化硫含量下降明显

<table>
<thead>
<tr>
<th>地区</th>
<th>2017年二氧化硫浓度（微克/立方米）</th>
<th>同比下降年-on-year fall</th>
<th>2018年二氧化硫浓度（微克/立方米）</th>
<th>同比下降年-on-year fall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shanghai</td>
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<td>20%</td>
<td>14</td>
<td>3.3%</td>
</tr>
<tr>
<td>Jiangsu</td>
<td>16</td>
<td>54.3%</td>
<td>12.5</td>
<td>21.9%</td>
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<tr>
<td>Zhejiang</td>
<td>11</td>
<td>15.4%</td>
<td>9.8</td>
<td>10.9%</td>
</tr>
</tbody>
</table>
Lithium iron phosphate and lithium ternary, who is more suitable for ships

Lithium iron phosphate battery

Ternary lithium battery
• By the end of 2017, the MOT will launch pilot application of pure electric ships in inland passenger ships and official boats.

• The MOT has proposed to promote the popularization and application of electric ships and to carry out research on relevant technologies and standards.

• MOT has proposed to speed up the research of pure electric freighters and realize the berthing and charging of electric freighters.

• By the end of 2017, the MOT will launch pilot application of pure electric ships in inland passenger ships and official boats.
Supportive policies (Norms and standards)

- Guidelines for Examination and Inspection of Inland River Dual Electricity (Lithium Iron Phosphate Battery, Super Capacitor) Pure Electric Propulsion Tourist Ship
- guidelines for the inspection of hybrid electric ships
In principle, electric or LNG power is preferred for new official ships and support system ships.

By 2020, about five pure electric or hybrid passenger ships will be put into operation.

Ordering at least one electric law enforcement vessel by the end of 2018.

Yangtze River Delta

Guangzhou

Shenzhen
500-ton pure electric freighter

Phosphoric acid battery

Super capacitor
Hybrid oil and electricity

When escorting and cruise, pure electric mode is adopted, when berthing and unberthing, hybrid propulsion mode.
Pure electric bulk carrier

LOA: 70.5m
Deadweight: 2000 tons
MAX speed: 15 km/h
Range of voyage: 100 km
Battery capacity: 2400 kwh
electric propulsion ferry steamer
典型案例
typical cases

MSA boat
典型案例
typical cases

1300 passenger Yangtze River cruise ship
The 64TEU battery power system container ship project
The ideal is fullness, the reality is very skinny.
政策支持（规范标准）
Supportive policies （Norms and standards）

2015年7月中国船级社发布了《燃料电池系统应用指南》对氢燃料电池动力船舶的布局，燃料系统消防、防爆等所涉及的安全系统作了相应的要求和规定，同时也对氢燃料船舶入级检验予以明确。
Yacht powered by hydrogen fuel cell
支持性工业
Hydrogen fuel cell industry supports
图2：沿海氢能源走廊

来源：卓创资讯，光大证券研究所整理
在未来，我们更需要电动船、氢能源这样的零排放。但是相比较而言，大型船舶、远洋船舶氢燃料电池更适合

In the future, we need more zero emissions such as electric ships and hydrogen energy. But in comparison, hydrogen fuel cells are more suitable for large ships and ocean-going ships.
THANKS
谢谢聆听