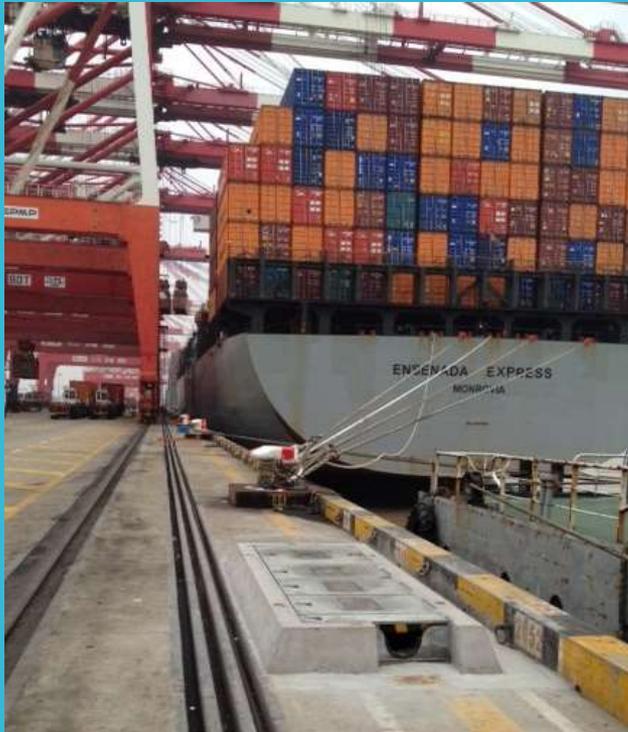




# The role of government in onshore power supply

By Ye Xing



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# Development of shore power supply

Shanghai Environment Protection Bureau issued the analysis of PM2.5 in 2012–2013, showing that local emission contributes to 64%–84%, 74% on average of the total pollution emission with an influence factor at 16%–36%. In the source of emission, motors, ships, airplanes and non-road mobile machinery account for 29.2%.

# Share of main pollutants of different ships in Port of Shanghai

ship type	PM <sub>2.5</sub>	NO <sub>x</sub>	SO <sub>x</sub>	N <sub>2</sub> O
International	66.6%	45.6%	74.4%	45.5%
domestic	23.8%	25.8%	23.1%	28.7%
In-land river	9.6%	28.6%	2.6%	25.8%

# Share of main pollutants of different ships in Port of Shanghai

## Sharing rate

International ships are gigantic, whose tonnage is dozens or hundreds times of inland river ship.

## Sharing rate

Main engine, auxiliary engine and boiler have a capacity that are several times or hundreds of times bigger than the inland land ships.

## Sharing rate

while international ship is at port, it usually uses heavy oil which contains higher pollutants oil including sulfide.

# Main emission features of different ship types in Shanghai Port

Ship type	Pollutant share
Container	54%~60%
Break-bulk	11%~12%
tanker	4%~6%
RoRo	3%
Chemical bulk	2%~3%
no transport(tug boat and barge)	1%~2%
LNG and tug boat	1%
others (dry, bulk and multi-purpose)	16%~18%

# Air features of ships in Shanghai Port

The biggest share comes from international ships, especially the sulfide. Other emission comes from coastal and inland river ships with an equal NO<sub>x</sub> emission with the international ships.

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In terms of space, higher emission area are Yangshan, Waigaoqiao, Wusong which accounts for more than 60%.



# Air features of ships in Shanghai Port

Containers take the bigger share

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In the air emissions from ships, sulfide has the largest influence



**So it is significant to promote the use of onshore power supply and improve the port area air quality by reducing the ship emission.**

# The pilot development of onshore power supply



Promoting the application of onshore power supply to international ships is significant. Pilot development has been conducted in Yangshan and Wusong Cruise Port.

Experiences can be learned from the model of pilot project, which can help with the supporting policy, and a mode that can be accepted by power company, energy service enterprise, terminals and ship owners.

# The Guangdong onshore power pilot project of Yangshan Port

## Guandong Terminal

**In this project a new power conversion station will be built for the onshore power supply. The conversion device will convert the source power into the needed mode and send to high voltage reception box via HV cable which provides electricity to ships via international standard HV connector.**

# The Guangdong onshore power pilot project of Yangshan Port

## Guandong Terminal

The project has completed the power conversion station and terminal connecting box and source power installation and cable layout. It is estimated to complete the ship test and other tests by November 2015.

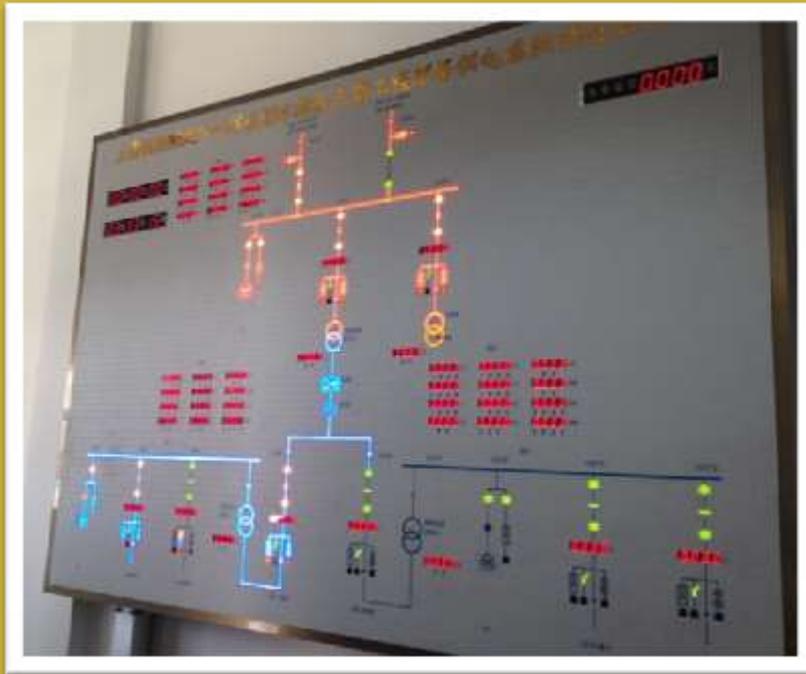
## Guandong Terminal

The project with a total investment of 118.93 million RMB can provide 2.05 million KWH for ship use and reduce fuel consumption 1158.3 tons per year.

# The Wusong Cruise Wharf onshore power pilot project

- Wusong International Cruise Wharf has two large cruise berths, 774 m long and 34 m wide, with one berth for 100,000 tons and one berth for 200,000 tons. Among the two berths, one is designed with a capacity for 220,000 tons, which can accommodate the largest cruise ship in the world.
- The Wusong Cruise Wharf onshore power pilot project will provide power to ships by renovating one berth and installing the converter. As the power supply demand from the cruise is huge, the onshore power supply capacity is 16MW with a total investment at 50 million RMB. The installation of devices is to be completed at the end of 2015 and ship test will be run in the 1st half of 2016.
- It is estimated to provide 16.575 million KWH, reducing energy consumption of 3315 tons.

# The role of government



- identify the objective
- Formulate the policy
- Establish the supporting policies

# identify the objective

The Ship and Port Pollution Prevention Initiative (2015–2020) issued by the Ministry of Transport proposes that 90% of the port handling ships, governmental ships use onshore power supply, and 50% containers, passenger and RoRo and cruise terminals be available for onshore power supply.

# Identify the objective

Three year Green Shanghai Port Initiative (2015–2017)		
2015	Yangshan Port (1 <sup>st</sup> phase)	Wusong Cruise Wharf (1 <sup>st</sup> phase)
2016	Wanggaoqiao Port	Yangshan Port (2 <sup>nd</sup> phase)
2017	North Bund Cruise Terminal	Wusong Cruise Wharf (2 <sup>nd</sup> phase)

build electricity capacity, conduit ready for onshore power supply in proportion to the container terminal and cruise terminal

# Formulate supporting policy

- There are a number of problems like onshore power supply, huge pre-investment, high renovation cost of ship technology and electricity supply. To alleviate the severity of these problems and increase the construction and the active use of onshore power supply, Shanghai Transport Commission, together with Shanghai Reform and Development commission, Shanghai Financial Bureau formulated the supporting policy of onshore power supply for international ships at port.
- The subsidies cover construction of onshore power supply facilities of pilot terminals, the expansion of capacity, electricity difference in the operation and maintenance cost.

# Construction of onshore power supply facilities and maintenance

- *construction cost includes onshore power supply construction cost and the related expansion project cost. The expansion project cost will be charged half according to the current standards.*
- *Onshore power supply projects that meet the completion test and the current usage rate requirement will be given a subsidy that covers 60% of the construction cost and 10% subsidy for the expansion project.*
- *Based on the consumption of onshore power supply, the 0.07 RMB/KW subsidy for maintenance operation will be given to pilot terminal.*

## **service charge for onshore power supply**

- **to be priced by tagging to the oil price**
- **to promote the ship companies to use the onshore power supply, service charge will be slightly lower than the cost of electricity produced by auxiliary engine.**
- **The differences between the service charges paid by the ships to terminal operators and the cost of electricity paid by terminal operators will be subsidized by the government fund.**

## onshore power supply service charge

<b>P=the closing price of 380-cst in the Singapore Public Market (unit: dollar)</b>	<b>onshore service charge (unit: RMB/KWh)</b>
$P \geq 420$	0.7
$420 > P \geq 360$	0.6
$360 > P \geq 300$	0.5
$P < 300$	0.45

# Establish security measures

## One : system security

1. Shanghai has issued the relevant regulations regarding onshore power supply such as Measures on Ship Pollution at Shanghai Port, which proposes that ships that are docked at qualified terminals for onshore power supply requirement shall turn off the fuel power generator and use onshore power supply. Therefore the government should strengthen the implementation to ensure the current regulations compliance.
2. to accelerate the research on ship emission standards and increase the pollution cost of ship's using auxiliary engine to generate power; to jointly use the approach of lead and enforcement to promote the activeness of ship at port in using onshore power supply.

# establish security measures

Two:

1. The onshore power supply is developing at present. The government should vigorously encourage device manufacturers to work harder at technology R&D and device cost to make the onshore power supply more competitive.
2. As onshore power supply can not live without the improvement of various types of standards, government should guide research institute and guilds to fully consider the compatibility between ship and onshore power devices in the process of standard formulation to ensure the usage ratio.



**Thank you!**