Port of Kaohsiung

Environmental Report

高雄港環境報告書

2012 ▸ 2013

Port of Kaohsiung

Taiwan International Ports Corporation, Ltd.

Environmental Repoert Workteam

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Port of Kaohsiung
Taiwan International Ports Corporation, Ltd.

This environmental report presents Kaohsiung Port's achievements in environmental protection from 2012 to 2013 as well as the environmental policy, commitments and action plans of the Kaohsiung Branch, Taiwan International Ports Corporation, Ltd.

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Port of Kaohsiung
Taiwan International Ports Corporation, Ltd.

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Taiwan International Ports Corporation Environmental Policy

"Leverage innovation effectively to connect and communicate with global trade flows. Mature into a world-class port management group" is the vision of Taiwan International Ports Corporation (TIPC). TIPC manages and operates commercial ports in Taiwan and is engaged in maritime transport related services, free trade zones, and the development of relevant tourism and recreational projects.

While TIPC pursues business growth, we are well-aware of the importance of our social responsibility, which is to ensure both environmental and economic sustainability. With the goal to establish green and sustainable ports, we will proactively identify environmental risks that may be associated with our activities and manage the risks accordingly to minimize the environmental impacts.

We commit to:

1. Implement and follow through with the Green Port Programme to establish extraordinary world-class ports;
2. Comply with applicable environmental regulations to fulfill corporate environmental responsibility;
3. Execute pollution prevention, monitoring, and control mechanism to enhance environmental quality in and around port areas;
4. Reinforce environmental education to cultivate environmental awareness among employees; and
5. Strengthen the communication with local communities, and pursue sustainable development for both the ports and the cities where we are operating.

Hsiao, Ding-Hsun

Hsiao, Ding-Hsun
Chairman of TIPC
Date: 5 / 5 / 2014

Lee, Tai-Hsin

Lee, Tai-Hsin
President of TIPC
Date: 5 / 5 / 2014

Environmental Policy of Port of Kaohsiung

Kaohsiung Branch of TIPC understands our role as a port management entity that is responsible for maintaining and improving the environment of the port. Also, we ought to consider environmental protection as part of the sustainable management. Therefore, we are committed to reducing the environmental impact resulting from port operations, as well as to providing an environmentally friendly, sustainable progressing port of high quality. In order to keep the port environmental performances consistent with the policy, the following principles will be put into practice:

Fully apply the environmental management system; promote sustainable development of the Green Port

Follow environmental laws and regulations; endeavor to fulfill corporate social responsibility

Provide appropriate environmental education and training; enhance environmental awareness and skills of our employees

Continue environmental monitoring and pollution control; reduce energy consumption, carbon emissions and environmental load

Disclose environmental information regularly; establish a bridge of communication between the inner and outer port

Encourage the adjacent communities to participate in creating a friendly environment of the port city

To achieve our promises in the environmental policy statement, the following environmental objectives are set based on the ten major environmental impacts from the port:

Reduction of ship emissions:
The emissions can be reduced by promoting shore power systems, speed reduction and replacement of fuel.

Improvement of air quality in the port:
To reduce air pollution caused by the emissions and dusts from transportation vehicles and by building construction within the port area

Reduction of noise within the port area:
To reduce evening and nighttime traffic noise by building an access transportation system

Improvement of water quality in the port:
To build a sewage treatment system and a long-term water quality monitoring program within the port area

Marine sediment pollution monitoring:
To carry out waterway dredging regularly, reduce marine sediment pollution and monitor the dredged mud disposal site

Strengthening relationships with local communities:
To implement information disclosure, encourage public participation and increase opportunities to interact with local communities

Close attention on port development:
To follow the development procedure of mitigation measures and to implement continuous environmental monitoring of marine development

Reduction of land contamination within the port area:
To continuously monitor and improve the contaminated sites within the port area and reuse them through brown field revitalization

Control of port resource consumption:
To keep track of the consumption of water, electricity, fuel and paper at the offices within the port area and to promote the Port resources reduction and control plan

Implementation of habitat restoration:
To build a port ecological monitoring database, and conserve and restore the existing ecological habitats in the port

The President, Kaohsiung Branch of TIPC is responsible for the implementing, upholding and communicating of the environmental policy, and also for reviewing the environmental policy annually in order to meet the commitment, make continuous improvement and achieve the environmental objectives. The environmental policy will be effectively conveyed to employees, shipping companies, lessees (or contractors) and residents of the adjacent communities, and has been available on the official website of Kaohsiung Branch of TIPC.

TIPC
臺灣港務股份有限公司
TAIWAN INTERNATIONAL PORTS CORP., LTD
高雄分公司 PORT OF KAOHSIUNG

President Huang, Kuo-Ying
Kaohsiung Branch of TIPC
Date: 5/29/2014

01/

Letter from the President

In recent years, ports around the world have started to work toward the goal of sustainable development. Countries in Europe, North America as well as Japan and Australia have taken the lead in promoting the principles of "Eco- Port" and "Green Port. The principles emphasize that in addition to economic profit, port development should also pay attention to low pollution, promotion of biodiversity, environment restoration and community development.

In response to the global trends, domestic policies in Taiwan have also evolved. Based on Project No. 2 of the 2008 i-Taiwan 12 Projects (the Twelve Major Taiwan Construction Projects), "Turning Kaohsiung Port into a free port and an eco port", the Ministry of Transportation and Communications (MOTC) formulated two major policies: "A gateway to the world for better competiveness" and "Promotion of sustainable green transportation to reduce energy consumption and carbon emissions". In 2013, the proposal of Taiwan International Ports Corporation, Ltd. (TIPC) to promote green ports in Taiwan was approved. In the proposal, short-term, mid-term and long-term policies and action plans for the development of green ports have been discussed, focusing on four aspects: "travel", "shipment", "port environment" and "city/community development".

As the largest international commercial port in Taiwan, the Port of Kaohsiung is also an important hub in the Asia Pacific region; it helps to promote international trade and maritime industry. The Kaohsiung Branch of TIPC was transformed into a public entity in 2012. In addition to continuous efforts to promote Kaohsiung Port's position as a main trade and forwarding center in the Asia Pacific region and pursue economic profit for the port, Kaohsiung Port understands that as a port management entity, it has the responsibility to maintain and improve the environment of the port. Hence, the Port of Kaohsiung is committed to incorporate environmental protection as an important part of the sustainable management of the port. We will continue to reduce the impact of the port operation on the environment and continue to make the port a green port and the first eco port in Asia to be accredited by the European Union.

President, Huang, Kuo-Ying
Kaohsiung Branch of TIPC
Date: 05/29/2014

02/ Description of the Port

02/ Description of the Port

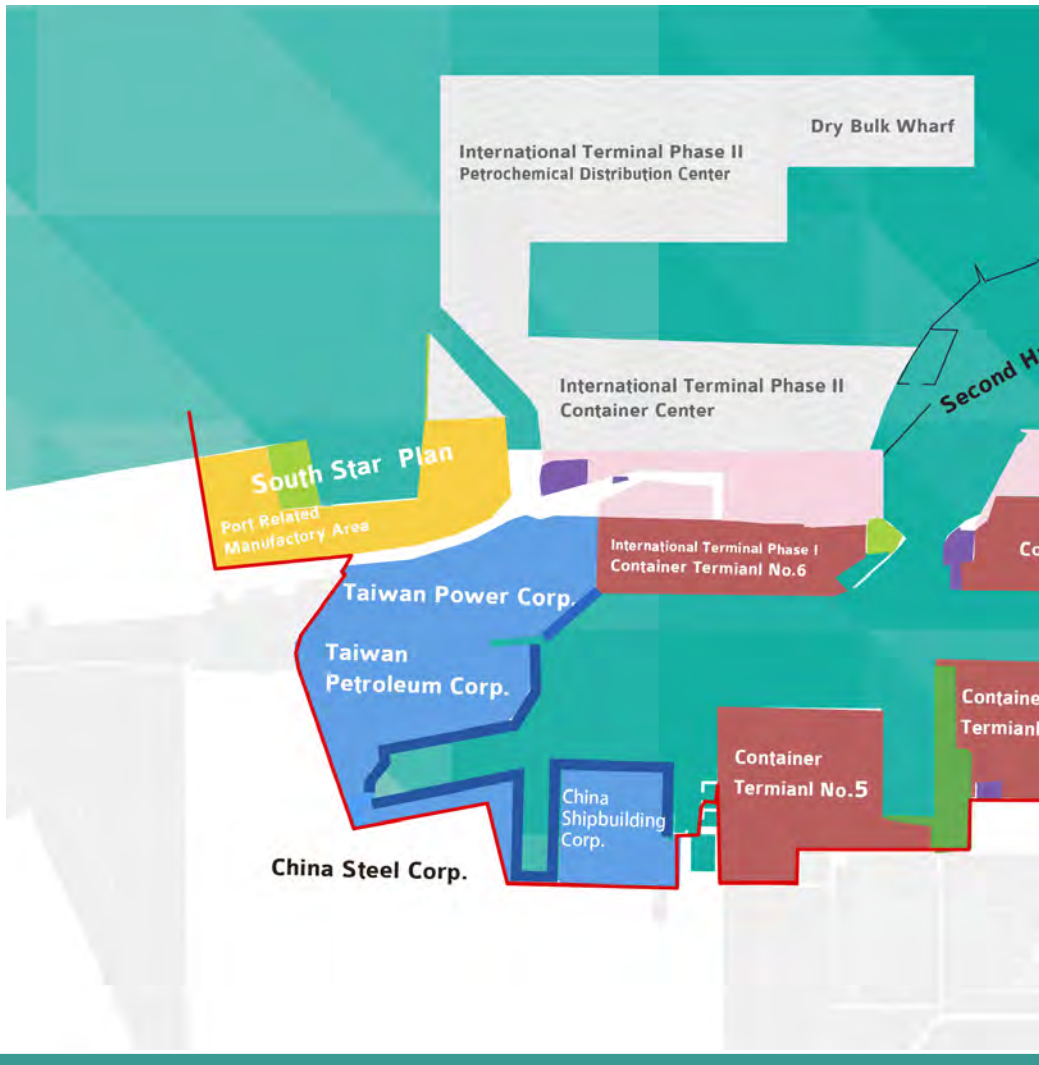
2. Description of the Port

2.1 Port Location and Port Area

The Port of Kaohsiung is located on the southwest coast of Taiwan (120°10′ and 22°27 north latitude) at the intersection of Taiwan Strait and Bashi Channel. The Port enjoys a geographic position at the hub of shipping routes, and serves as an essential point for American, European, Australian and Asian shipping routes. With a vast hinterland, the port occupies 18.71 km^2 of land, and the water area of the Port reaches 158.65km^2. The maximum draft of its inner port is 17.6 meters. Mean tide is 0.74 meters. The Port has two entrances: No. 1 and No.2.

Geographically speaking, the Port was a natural lagoon before it became a port (Takao Bay). The Port is situated on a plain area, and the coastal area of the Port includes: rocky foreshore, tidal flats, sea walls, offshore island (Chichin Peninsula), offshore banks and sandy beach. The Port neighbors the downtown area of Kaohsiung City, industrial parks (Linhai Industrial Park, Export Processing Zone) and waterfront recreational area (Chichin Seashore). In addition, the Love River, Qianzhen River, Canal No. 5 and Yanshui Stream all flow into the ocean through the Port.

Master Plan of Port of Kaohsiung



2.2 Legal Status and Port Operators

To modernize the management of commercial ports in Taiwan, the country passed the amendment of Commercial Port Law on December 28, 2011. It was then decided in March 2012 that the government should be separated from the enterprise for management of the ports. Public entities that used to manage the ports, including: Kaohsiung Harbor Bureau, Taichung Harbor Bureau, Keelung Harbor Bureau and Hualien Harbor Bureau, are integrated into a corporation (Taiwan International Ports Corporation, TIPC) to increase the flexibility of the ports and allow them to adapt quickly to market change. In the past, due to the constraints of the laws and the organization of the ports, such flexibility used to be limited. The competitiveness of the ports can also be enhanced. After the transformation, management of the Port of Kaohsiung is now the responsibility of the Kaohsiung Branch of TIPC. The Southern Taiwan Service Center of Maritime and Port Bureau (MPB), Ministry of Transportation and Communications (MOTC) will be in charge of navigation and management of issues related to public authority.

At present, the commercial section of the port include 121 operating docks, including: bulk and sundry goods dock, container dock and industrial dock. Commercial activities within the port include: ship building and repair, petroleum product processing, marinas / leisure, chemical industry, general manufacturing, storage and packaging and refrigerated cargo.

02/ Description of the Port

2.3 Main Cargo

In 2013, commodities exported through Port of Kaohsiung included: mining products (50.28%), base metal and metal products (20.07%) .

Main Cagoes in Port of Kaohsiung

Petroleum	Pyrites minerals
Crude oil Refined products LNG	Aluminum Cement Phosphates Sulphur
Dry bulk	**Liquid bulk**
Animal feed Chemicals Grains Iron Steel Scrap Timber Wood products	Liquid chemicals Liquefied gases Perishable liquids
Ores	**Other**
Coal Iron ore	Vehicles Fish Fruit

Table of Main Cagoes in Port of Kaohsiung.

2.4 Main Commercial Activities and Cargo Handling

Business of Port of Kaohsiung

		2012	2013	Difference	%
Volume of Imports & Exports	M.T.	120,756,000	115,034,300	-5,721,700	-4.74
Total Volume of Cargo Handled	Revenue Ton	440,301,297	441,452,925	1,151,628	0.26
Number of Cargo Handle	TEU	978,122,100	993,771,900	15,649,800	1.60
Dry bulk	M.T.	40,413,029	40,414,389	1,360	-6.61
Liquid bulk	M.T.	27,934,415	23,250,352	-4,684,063	-16.77
Groceries	M.T.	15,151,090	14,701,469	-449,621	-5.50
Passenger Ship (incoming)	V.	144	60	-84	-58.33
	G.T.	897,371	1,201,421	304,050	33.89
Passenger and Cargo Ship (incoming)	V.	255	252	-3	-1.18
	G.T.	1,703,674	1,955,723	252,049	14.79
	Cargo	5,826	7,934	2,108	36.18
Container Ship (incoming)	V.	8,228	8,516	288	3.50
	G.T.	252,142,617	256,830,462	4,687,845	1.86
	Cargo	18,630,333	18,013,084	-617,249	-3.31
Cargo Ship (incoming)	V.	16,581	17,334	753	4.54
	G.T.	378,601,663	381,755,916	3,154,253	0.83
	Cargo	84,386,455	79,651,051	-4,735,404	-5.62
Total (incoming)	V.	17,250	17,646	396	2.30
	G.T.	381,202,708	384,913,060	3,710,352	0.97
	Cargo	84,392,281	79,659,474	-4,732,807	-5.61
Incoming and Outgoing Passenger	Number	119,374	141,119	21,745	18.22

Table of Business of Port of Kaohsiung.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03/ Description of the Environmental Management System

03/

Description of the Environmental Management System

3.1 Organizational Structure

In addition to Kaohsiung Branch of TIPC, the organizations involved in the environmental issues include: South Maritime Affairs Center of Maritime and Port Bureau of MOTC, Kaohsiung City Marine Bureau, Environmental Protection Bureau of Kaohsiung City Government, Environmental Protection Administration of Executive Yuan, Southern Coastal Patrol Office of the Coast Guard Administration of the Executive Yuan, Kaohsiung Harbor Police Department of National Police Agency of Ministry of the Interior, and Naval Fleet Command.

Among them, the organizations involved in managing the environment of the commercial harbor districts of Kaohsiung Port, according to Commercial Port Law and Marine Pollution Control Act, include: the Kaohsiung Branch of TIPC, South Maritime Affairs Center of Maritime and Port Bureau of MOTC and Kaohsiung City Marine Bureau. The Kaohsiung Branch of TIPC is responsible for environmental issues related to the operation and management of the port; Southern Taiwan Service Center of Maritime and Port Bureau is in charge of environmental issues related to public authority; Kaohsiung City Marine Bureau is responsible for environmental issues regulated by the Marine Pollution Control Act.

The supervision organizations involved

Figure of Organization involved in environmental issues of Port of Kaohsiung (commercial Harbor)

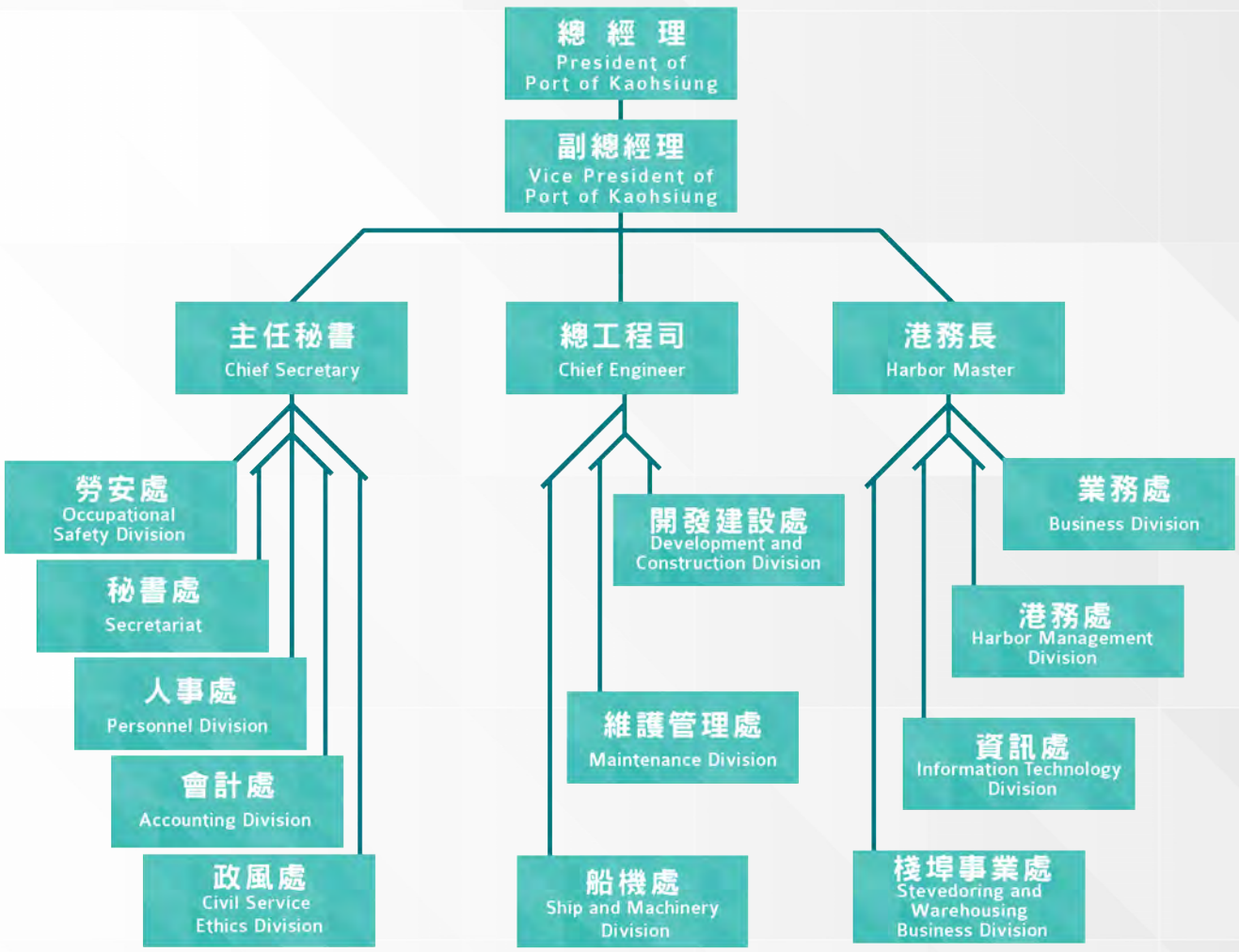
in managing and monitoring the environment of the port and the adjacent urban areas are: the Environmental Protection Administration of Executive Yuan and Environmental Protection Bureau of the Kaohsiung City Government, supported by Coast Patrol Corps 5 of the Southern Coastal Patrol Office of the Coast Guard Administration of Executive Yuan, Kaohsiung Harbor Police Department of the National Police Agency of Ministry of the Interior, carrying out seizure, evidence collection, transfer and other duties.

In the Kaohsiung Branch of TIPC, the department responsible for the operation and management of the environment is the Occupational Safety Division that consists of the Safety and hygiene Division, Pollution Control Division and Environmental Management Division. The Safety and Hygiene Division is in charge of management of occupational safety and hygiene; the Pollution Control Division deals with pollution control, environmental laws, environmental impact assessment, environmental monitoring, emergency management and environmental education in the port; the Environmental Management Division manages conservation, plant conservation, waste treatment and recycling. Among the staff members, 49 are involved in environmental protection issues.

Figure of Logo of Kaohsiung Branch of TIPC

TIPC
台灣港務股份有限公司 高雄分公司
PORT OF KAOHSIUNG TAIWAN INTERNATIONAL PORTS CORP.,LTD

Figure of Organization chart of Kaohsiung Branch of TIPC



03/

Description of the Environmental Management System

3.2.1 International shipping regulations

The Kaohsiung Branch of TIPC follows relevant international specifications, such as International Convention for the Prevention of Pollution From Ships (MARPOL73/78), London Dumping Convention, The Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, International Convention for the Control and Management of Ships' Ballast Water and Sediments, International Convention on the Control of Harmful Anti-fouling Systems on Ships etc.

	Relevant Environmental Laws
Transportation Relevant	The Commercial Port Law
	The Law Of Ships
Agriculture Relevant	Wildlife Conservation Act
Interior Relevant	Fire Services Act
Economic Relevant	Petroleum Administration Act
Environmental Protection Relevant	Marine Pollution Control Act
	Air Pollution Control Act
	Basic Environment Act
	Toxic Chemical Substances Control Act
	Indoor Air Quality Act
	Water Pollution Control Act
	Waste Disposal Act
	Resource Recycling Act
	Soil and Groundwater Pollution Remediation Act
	Noise Control Act
	Environmental Impact Assessment Act
	Public Nuisance Dispute Mediation Act
	Environmental Education Act
Cross Section Relevant	Disaster Prevention and Protection Act

3.2.2 Domestic environmental laws and regulations

The Kaohsiung Branch of TIPC collaborates with local authorities to manage the environment in the Port in compliance with relevant environmental laws and regulations in Taiwan. The table below lists relevant environmental laws and regulations related to ports in Taiwan.

	Central Governing Authority	Enforcement Agencies
2011/12/28	Ministry of Transportation and communications R.O.C	Southern Taiwan Service Center of Maritime and Port Bureau, MOTC
2010/12/08		
2013/01/23	Council of Agriculture, Executive Yuan	Kaohsiung City Marine Bureau/ Agriculture Bureau
2011/12/21	Ministry of the Interior R.O.C	Fire Bureau, Kaohsiung City Government
2014/06/04	Ministry of Economic Affairs R.O.C	Economic Development Bureau, Kaohsiung City Government
2000/11/01	Environmental Protection Administration, Executive Yuan	Kaohsiung City Marine Bureau
2012/12/19		Kaohsiung City Environmental Protection Bureau
2002/12/11		
2007/01/03		
2012/04/02		
2007/12/12		
2013/05/29		
2009/01/21		
2010/02/03		
2008/12/03		
2003/01/28		
2009/06/17		
2010/06/05		
2012/11/28	According to different kinds of disaster, the regulating authorities are different	

Table of Relevant Environmental Laws and Regulations Related Port in Taiwan.


KMCT
SWL 40LT
B1-1
KAO MING

04/ State of the Environment

04/

State of the Environment

4. State of the Environment

To save energy and reduce carbon emissions, the Kaohsiung Branch of TIPC has promoted the 4S project to monitor the consumption of water, electricity, fuel and paper in office area and operation area so that we can have a clear figure of energy consumption within the Port and formulate plans for better efficiency.

4.1 Resources Consumption

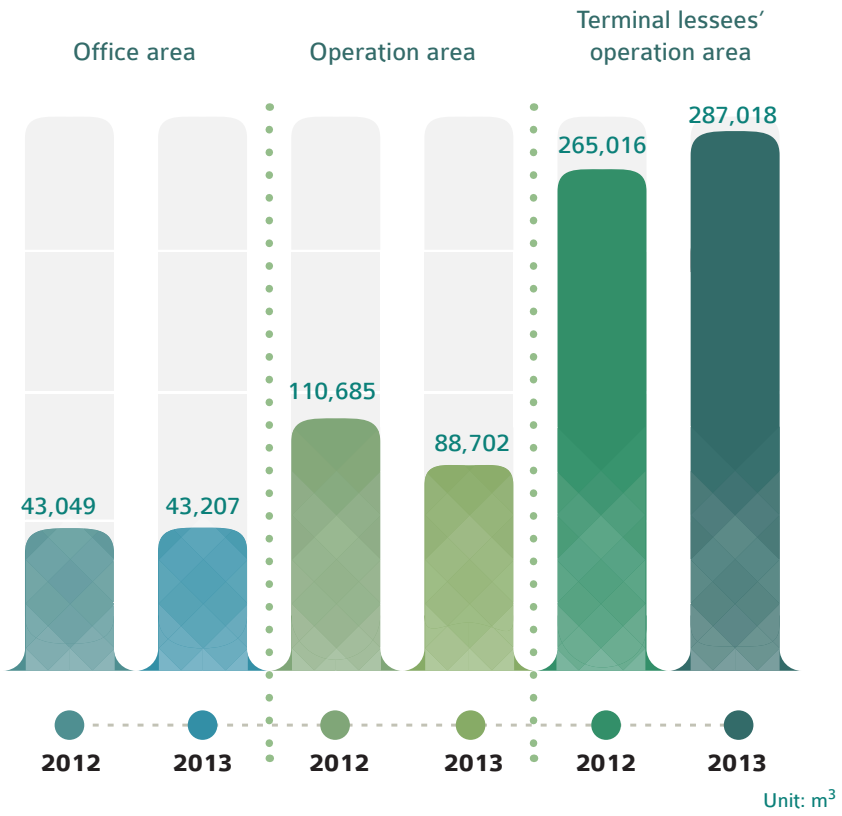
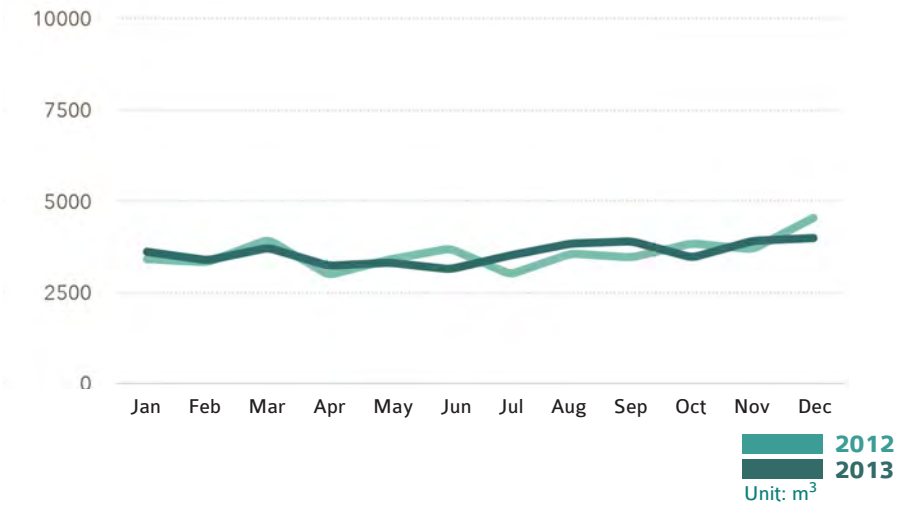


Figure of Water consumption in the Kaohsiung Branch of TIPC in 2012-2013.

4.1.1 Water consumption

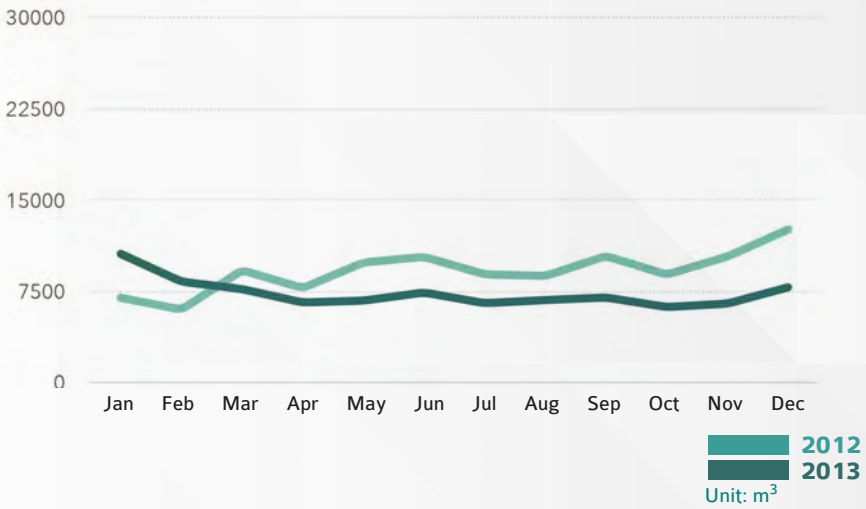
Office area

The office area in the Kaohsiung Branch of TIPC consumed 43,049 cubic meters of water in 2012 and 43,207 cubic meters in 2013.



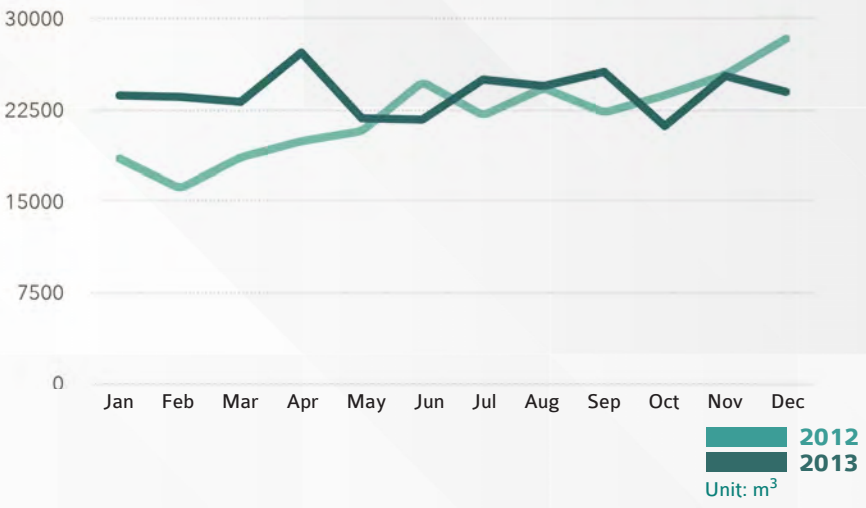
Operation area

The operation area of the Kaohsiung Branch of TIPC consumed 110,685 cubic meters of water in 2012 and 88,702 cubic meters in 2013.



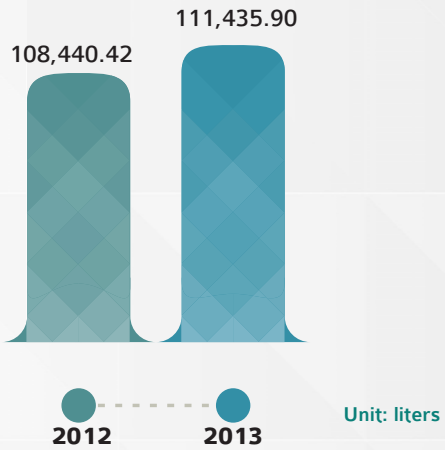
Terminal lessees' operation area

The terminal lessees' operation area consumed 265,016 cubic meters of water in 2012 and 287,018 cubic meters in 2013.



4.1.2 Fuel Consumption

The office area of the Kaohsiung Branch of TIPC used 108,440.42 liters of fuel in 2012 and 111,435.90 liters of fuel in 2013.



4.1.3 Electricity consumption

In addition, the operation area of the Kaohsiung Branch of TIPC used 580,288 kilowatt-hours of general electricity in 2012 and 591,775 kilowatt-hours in 2013. The terminal lessees' operation area used 934,458 kilowatt-hours of general electricity in 2012 and 743,706 kilowatt-hours in 2013.

The volume of shipments in the Port of Kaohsiung varies since February and March are the off season (winter) and August and September are the high season (summer); the amount of electricity consumption in both office and operation area also changes accordingly.

Electricity Consumption in 2012-2013.

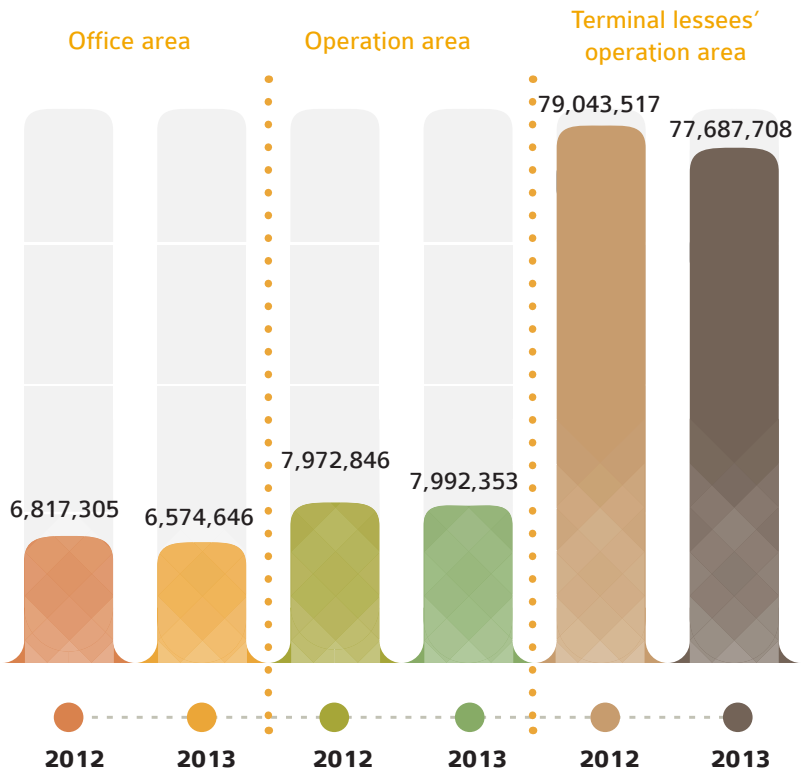


Figure of electricity consumption in 2012-2013.
Unit: kilowatt-hour

Office area

The office area of the Kaohsiung Branch of TIPC consumed 6,817,305 kilowatt-hours of electricity in 2012 and 6,574,646 kilowatt-hours in 2013.

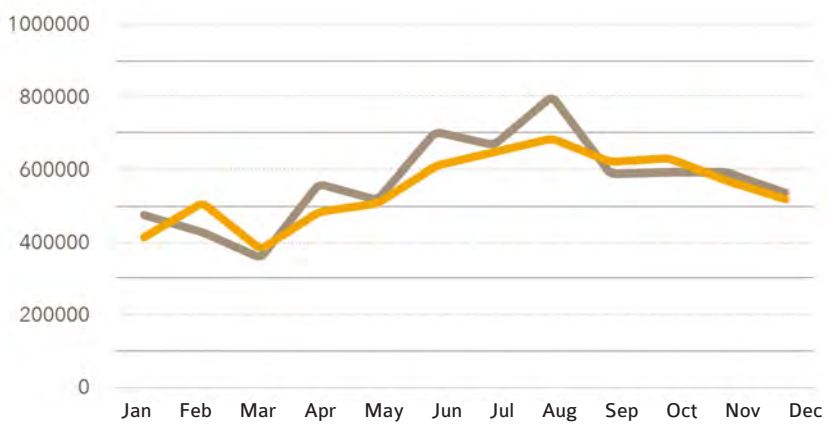


Figure of electricity consumption of office area in 2012-2013.

2012
2013
Unit: kilowatt-hour

Operation area

The operation area of the Kaohsiung Branch of TIPC used 7,972,846 kilowatt-hours of (high volt) electricity in 2012 and 7,992,353 kilowatt-hours in 2013.

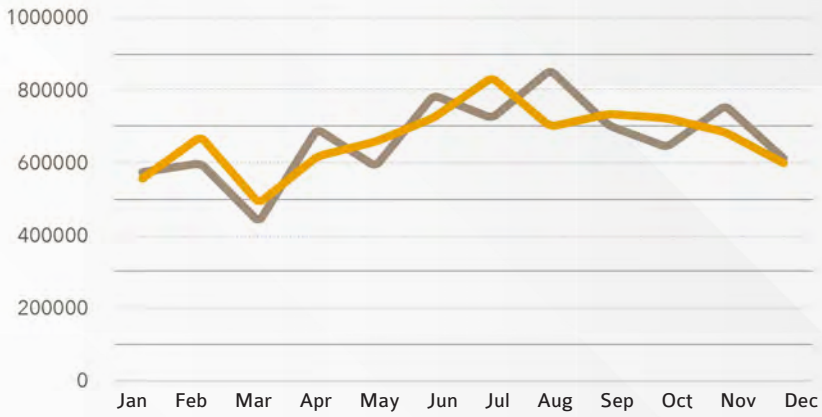


Figure of electricity consumption of office area in 2012-2013.

Unit: kilowatt-hour

Terminal lessees' operation area

The terminal lessees' operation area consumed 79,043,517 kilowatt-hours of (high volt) electricity in 2012 and 77,687,708 kilowatt-hours in 2013.

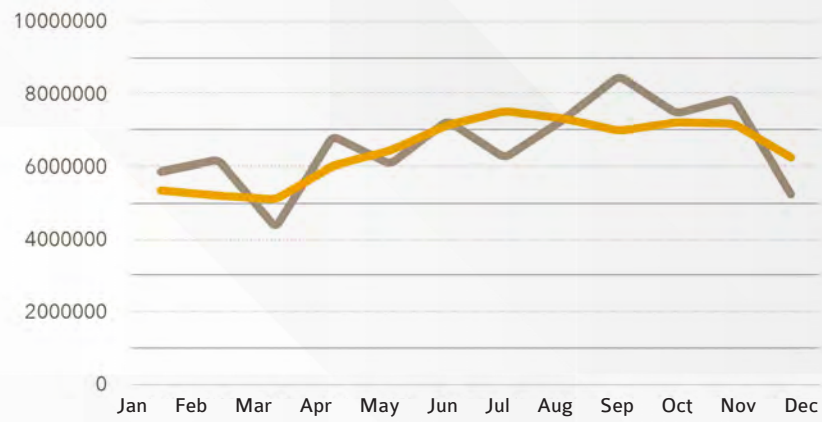


Figure of electricity consumption in terminal lessees' operation area in 2012-2013.

Unit: kilowatt-hour

4.1.4 Paper Consumption

The office area of the Kaohsiung Branch of TIPC used 2,610,000 sheets of paper (approximately 13.05 tons) in 2012 and 2,902,500 sheets of paper (approximately 14.51 tons) in 2013.

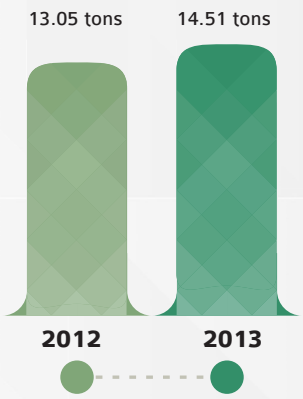


Figure of paper consumption of office area in the Kaohsiung Branch of TIPC in 2012-2013.

4.1.5 Summary of indicators

Generally speaking, total consumption of resources in the operation area of the Port of Kaohsiung is proportional to the freight traffic volume, and it is difficult to reduce consumption. In comparison, resources consumption in the office area has increased along with the increasing volume of shipment and major projects. Overconsumption of resources might have been a result of administrative demand. Energy saving and resources saving will need to be promoted by all divisions.

Office area

Year	Electricity Consumption (kilowatt-hours)	Water Consumption (cubic meters)	Paper Consumption (sheets)	Fuel Consumption (liters)
2012	6,817,305	43,049	2,610,000	108,440.4
2013	6,574,646	43,207	2,800,000	111,435.9
conservation rate	3.56%	-0.37%	-7.28%	-2.76%

Table of Resource Conservation Rate in Office Area in 2012-2013.

Operation area

Year	Electricity Consumption (kilowatt-hours)	Water Consumption (cubic meters)	Paper Consumption (sheets)
2012	7,972,846	580,288	110,685
2013	7,992,353	591,775	88,702
conservation rate	-0.24%	-1.98%	19.86%

Table of Resource Conservation Rate in the Operation Area in 2012-2013.

Terminal lessees' operation area

Year	Electricity Consumption (kilowatt-hours)	Water Consumption (cubic meters)	Paper Consumption (sheets)
2012	79,043,517	934,458	265,016
2013	77,687,708	743,706	287,018
conservation rate	1.72%	20.41%	-8.30%

Table of Resource Conservation Rate in terminal lessees' operation area in 2012-2013.

4.1.6 CO_2 Emissions

According to the carbon emission index stipulated by Taiwan Water Corporation, Environmental Protection Administration of the Executive Yuan and Chung Hwa Pulp Corporation, carbon emission of Port of Kaohsiung was approximately 51,055,729.16 kg in 2012 and 50,128,346.63 kg in 2013. Total reduction of carbon emission was 1.82%.

Unit: Kg

	2012	2013
Water Consumption	68,675.00	68,704.03
Electricity Consumption	50,725,356.25	49,789,980.02
Fuel Consumption	245,411.51	252,190.59
Paper Consumption	16,286.40	17,472.00
Total	51,055,729.16	50,128,346.63

* CO_2 coefficient - Water: 0.164 kg / kWh (2012); electricity: 0.532 kg / kWh (2012 default coefficient); Oil: 2.2631 kg / liter; Paper: 3.12 kg / 500 sheets

Table of Carbon Emission of Port of Kaohsiung in 2012-2013.

Action plans of Resource Reduction

Key points		Plans	To be Implemented by
Speed up customs clearance of passengers		A comprehensive and convenient customs clearance area should be designed. The Port of Kaohsiung should assist CIQS to simplify its customs clearance procedures, allowing the speedy clearance of passengers and reducing the time needed for them to stay in the building for customs clearance.	Harbor Management Division
project	Saving fuel	Promote carpool and buses and encourage staff members to take public transportation. Limit vehicle idle time to less than 3 minutes. Monitor fuel consumption of official vehicles regularly (with fuel consumption record).	Secretariat
	Saving water	New building projects, expansion projects and innovation projects should all use products with water-saving labels and install a rainwater recollection system, so water consumption can be reduced and buildings can have duel water supply systems (separate pipes for tap water and miscellaneous drainage).	
	Saving electricity	Air conditioning machines are to be examined and assessed by professional technicians or contractors. Air conditioning machines exceeding effective service life with low energy efficiency should be replaced with a central conditioner with VFD drive. An energy management and monitoring system should be installed. Use high-efficient illumination and electrical ballast with energy label.	
	Saving paper	Use double-sided printing for official documents and recycle paper; encourage on-line reviewing and on-line signature for official documents and reduce printing of official documents.	

Table of Action plans of Resource Reduction.

4.2 Waste

General waste produced in the water and land areas of the Port of Kaohsiung are collected and disposed by subcontractors of the Kaohsiung Branch of TIPC by dock sections and according to operation properties. Terminal operators, terminal lessees and contractors are responsible for contacting qualified companies to collect industrial waste (including waste fuel and waste water).

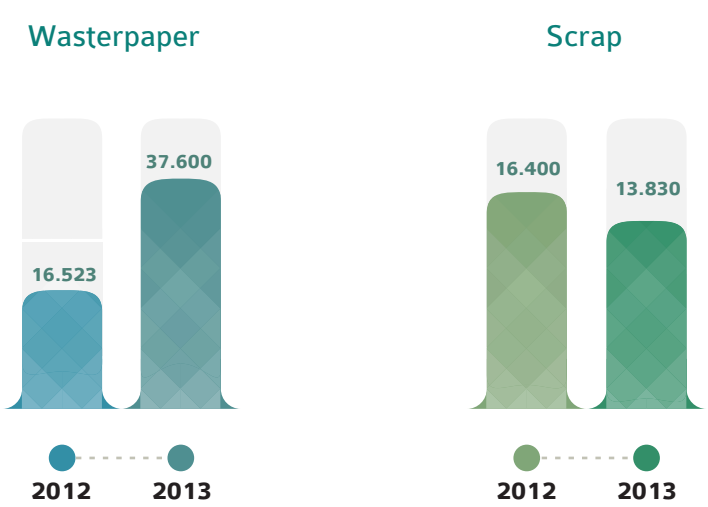
The Port of Kaohsiung conducts spot checks at least once or twice a week to ensure that the waste is disposed of properly.

In addition to waste, the Port of Kaohsiung also carries out slurry removal and sanitation operation twice a year to ensure the quality of the environment and health of the personnel.

Unit: tones

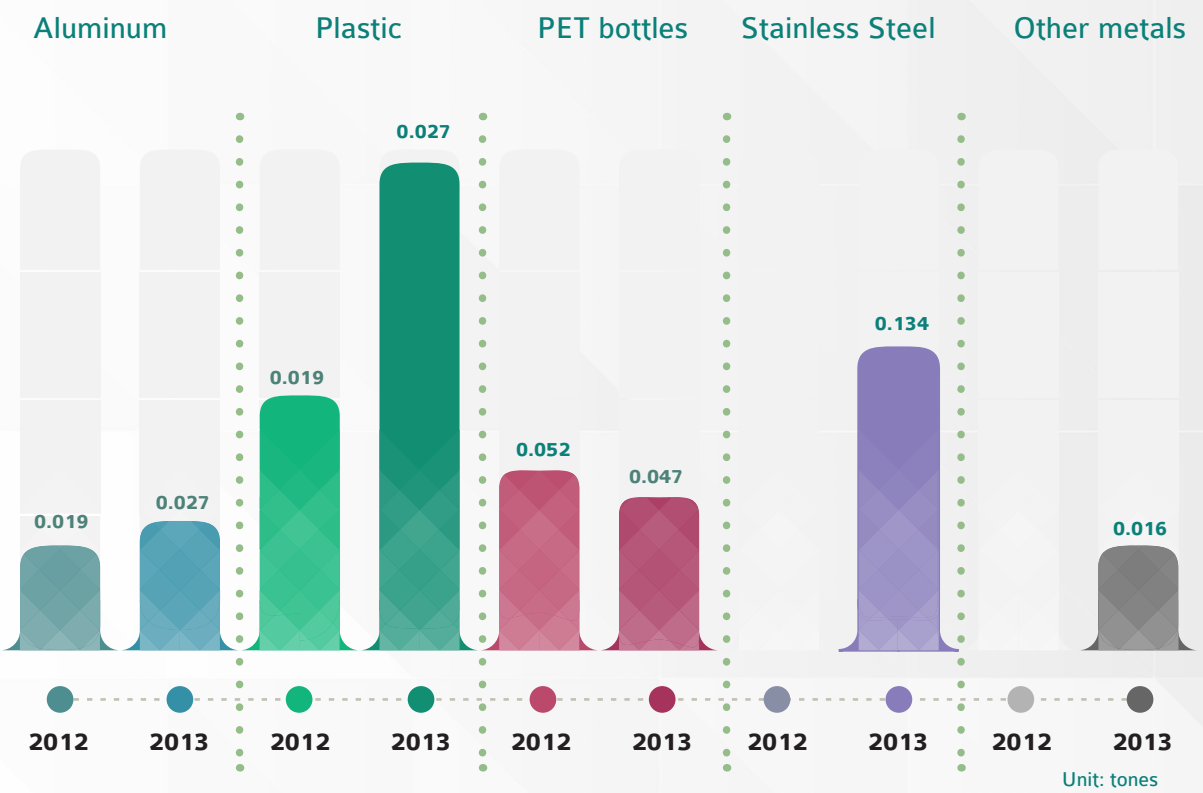
Region	2012	2013
Water Area	637.84	883.65
Zhong-Dao Land Area (中島陸域)	321.10	317.84
Peng-Lai Land Area (蓬萊陸域)	228.71	235.63
No. 2,3,4,5 Container Terminals, Built factory, Harbor Craft Base	221.16	194.03
Jurisdiction Area of Kaohsiung Branch of TIPC and the beach of No. 1 and No.2 entrances	127.40	186.78
Total	1536.21	1817.93

Table of General Waste Removals of Kaohsiung Branch of TIPC in 2012-2013



Unit: tones

Figure of Waste Recycle Statistics of the Kaohsiung Branch of TIPC in 2012-2013.



Unit: tones

Figure of Waste Recycle Statistics of the Kaohsiung Branch of TIPC in 2012-2013.

Action Plans of Waste Reduction

Key points	Plans	To be implemented by
Collection of ship-generated waste	Collected 24 hours a day, all year round.	Occupational Safety Division
Cleaning of public area	Public areas are cleaned daily	
Waste reduction and recycle	Arrange for trucks to collect recyclable wastes from various collection points on Monday	

Table of Action plans of Waste Reduction.

04/

State of the Environment

4.3 Air Quality

The Port of Kaohsiung is located in an area surrounded by heavy industry, neighboring steel making companies like China Steel Corporation, petrochemical companies, including China Petroleum Corporation as well as ship-making companies like Taiwan Steelmaking Company. The Port is also very close to Linhai Industrial Park, Kaohsiung Processing and Exporting Zone and Linyuan Industrial Park. Productive activities in these industrial parks make the Port of Kaohsiung an area with severe air pollution. Moreover, vehicle exhaust emission in the Port is another source of air pollution.

At present, the Kaohsiung Branch of TIPC does not have its own air quality monitoring mechanism for the port area; hence, we rely on data provided by the Environmental Protection Administration (EPA), Executive Yuan and Environmental Protection Bureau (EPB), Kaohsiung City Government, as well as environmental assessment and monitoring data of the past two years. Monitoring of air quality in the Port of Kaohsiung is carried out all year round. The EPA of Executive Yuan and EPB of the Kaohsiung City Government monitor the air quality 24 hours a day. According to the data and "air quality standards" stipulated in item 3, Article 5 of the Air Pollution Control Act, in areas surrounding Port of Kaohsiung, the annual average value of fine particles less than 10μm in diameter (PM10) usually exceeds the stipulated air quality standards. The concentrations of sulfur dioxide (SO_2), nitrogen dioxide (NO_2) and carbon monoxide (CO) all meet the air quality standards. In addition, the concentrations of various air pollutants have been decreasing annually.

The results show that suspended fine particles mainly come from road dust, vehicle exhaust emission and construction projects. In the future, the Kaohsiung Branch of TIPC will improve its management, and educate the neighboring area on how to reduce air pollution. For example, wheel-washes can help to reduce road dust, ethanol-gasoline can help to reduce exhaust emission, and dust screeners can manage dust generated from construction sites. With these efforts, we can help to reduce air pollution in the Port of Kaohsiung.

- Marine Bureau of Kaohsiung City Government
- Kaohsiung Branch of TIPC
- Environmental Protection Bureau, Kaohsiung City Government
- Environmental Protection Administration, Executive Yuan

Dust Protection Wall

Action Plans of Air Quality

Key points	Plans	To be implemented by
To reduce road dust from freight transportation and set up a vehicle license plate recognition system in collaboration with EPB of Kaohsiung City Government at Checkpoint No. 55	Set up vehicle license plate recognition system at Checkpoint No. 55	Occupational Safety Division
Encourage diesel vehicles to join the autonomous management project	Diesel vehicles that frequently enter the port area are encouraged to join the autonomous management project of Kaohsiung City	
Conduct inspections in collaboration with relevant authorities	Work with the EPB of Kaohsiung City Government, Export Processing Zone Administration and Southern Taiwan Service Center of MPB, MOTC to carry out joint inspections	
Cargo handling equipment and vehicles in the Port should use qualified fuel	Cargo handling equipment and vehicles in the Port should use qualified fuel.	Stevedoring and Warehousing Business Division
Promote forecasting system for trucks entering container terminals	Coordinate with container shipping carriers and container trucking carriers to set up a container truck forecasting system	Information Technology Division, Harbor Management Division
Promote items that require collaboration from terminal operators	When we visit the terminal operators annually, we will promote the necessity to upgrade equipment, increase automation and use hybrid electric cargo handling equipment.	Business Division
Encourage use of closed warehousing to reduce dust	Encourage terminal operators or carriers to use closed warehousing	
Dust suppression at construction sites in the port	Cover storage mound to suppress dust and air pollution. Spread water when necessary to manage the site.	Maintenance Division, Development and Construction Division
Continue to set up an automatic gateway management system	Complete an "automatic gateway management system for back entrance of Terminal No. 2 and upgrade the existing automatic gateway management system.	Information Technology Division
Review mode of transportation to reduce ineffective transportation	Coordinate with container shipping carriers and container trucking carriers to set up a container truck forecasting system.	Information Technology Division and Harbor Management Division

4.4 Ship Exhaust Emissions

The Port of Kaohsiung is the biggest commercial port in Taiwan, so exhaust emitted by commercial ships is another major factor accounting for air pollution in the Port. As it is very difficult to monitor ship exhaust, ship exhaust emission in Taiwan and abroad is often estimated. The Kaohsiung Branch of TIPC has referred to the study conducted by Harbor and Marine Technology Center, Institute of Transportation, MOTC, "The research to promote the benefit of energy conservation and carbon reduction in Taiwan harbor area." The project started in 2011 and will end in 2014. Samples are collected from vessels berthed in the Port of Kaohsiung from 2011 to 2014 to estimate the total annual emission of greenhouse gases (GHG) by vessels, trucks and cargo handling equipment at the Port. The estimation so far has shown that vessels, heavy trucks and cargo handling equipment produce more CO_2 emission than the total emission of CO_2 produced due to consumption of resources in the Port of Kaohsiung. Among them, ship exhaust emission accounts for most of the carbon emission. Therefore, it is very important for the Port of Kaohsiung to manage ship exhaust emission in order to improve air quality and reduce carbon emission.

Year	NOx	THC	CO	SOx	DPM	CO_2e
2009	18,181	857	2,175	16,244	1,444	1,645,069,000
2010	16,953	804	2,056	15,238	1,332	1,541,803,000
2011	16,230	783	2,124	13,180	1,299	1,473,369,000
2012	10,353	619	1,292	14,135	1,094	952,795,000

DPM: Diesel Particulate Matter

Table of Greenhouse gases emissions by vessels, heavy trucks and cargo handling equipment

At present, the project to reduce ship exhaust emission promoted by the Kaohsiung Branch of TIPC includes a shore power system, speed reduction within the Port area and switching to low sulfur fuel; these measures can all reduce ship exhaust emission and improve air quality in the port. However, considering the cost, the high price of electricity and wide variety of facilities, it is difficult to ask all vessels to follow these recommendations. At the same time, the Port needs to consider the willingness of the terminal operators. With neither legal requirements nor subsidies, it is difficult to ask terminal operators to reduce speed within the port or switch to low sulfur fuel. Take the results of the Harbor and Marine Technology Center as an example: among the 60 ships and vessels randomly sampled, the sulfur content of fuels used these vessels all meet the regulations of MARPOL. However, among the 60 vessels, 25 container vessels all use heavy oil and 21 out of the remaining 35 cargo steamer switch the fuel of the main engine to low-sulfur diesel shortly before entering the Port. Hence, legal requirements are needed to help the Port reduce air pollution and reduce carbon emission.

Shore Power System

Action Plans of Ship Exhaust Emissions

Key points	Plans	To be implemented by
Replace old work boats and harbor crafts regularly	Replacement of towing vessels from 2011 to 2013	Harbor Management Division
Encourage vessels to lower speed when entering the Port	When a vessel navigates within 20 nautical miles control area of the Port, the VTC tower will ask the vessel to reduce its speed to lower than 12 knots.	
Encourage vessels entering the Port to switch fuel	When a vessel navigates within 5 nautical miles, the VTC tower will ask the vessel to switch from C fuel to A fuel.	
Designate berth to reduce unnecessary navigation	Assign work boats at different docks to designate berths for vessels and reduce the distance required for work boats to travel among different docks	
Encourage cruise ships to use low-polluting facilities (such as shore power system)	Promote the concept of energy conservation to terminal operators and ask them to use the shore power system to reduce energy consumption	
Reduce energy consumption of cruise ships	Improve the accuracy of cruise ship arrival time to reduce the impact on the port environment	
Install a shore power system	Install a shore power system to reduce pollution generated by vessels berthing at the Port	Development and Construction Division

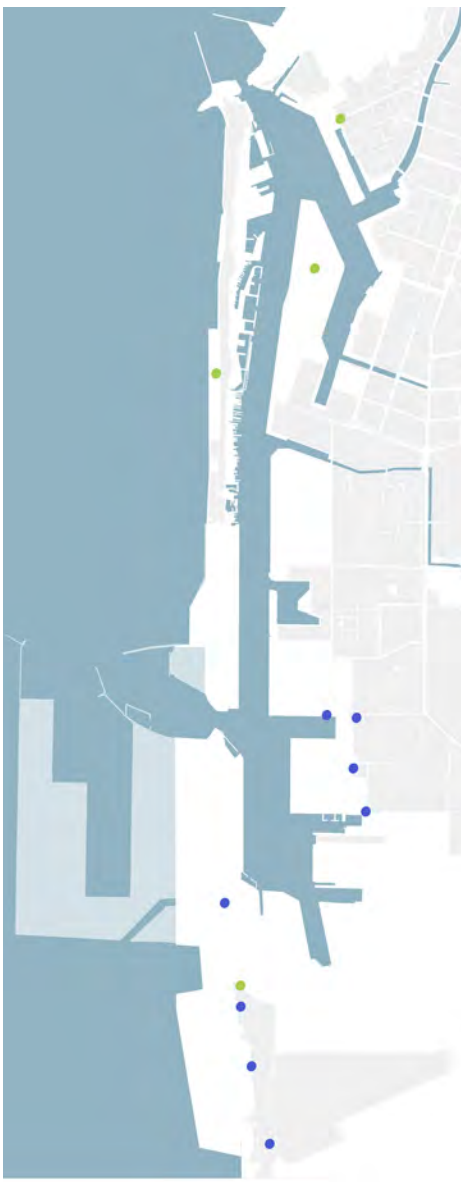
4.5 Noise

The Port of Kaohsiung borders the downtown area of Kaohsiung City to the north and a heavy industry area to the south, so noise generated during loading/unloading and transportation, as well as activities in the industrial areas, influences the quality of life of residents in the nearby neighborhood. According to "Principles for delineation of control zones" in Article 7 of the Noise Control Act, different classes of noise control zones and different time periods should be delineated. The map of noise control zones delineated by the EPB of Kaohsiung City Government, the Port of Kaohsiung is a class 4 noise control zone.

Considering the fact that the neighboring areas might be affected by noise of traffic in the Port, Article 15 of Noise Control Act specifies environmental sound level standards for roads along different classes of noise control zones, so the external access of Port of Kaohsiung will also need to follow the sound level standards.

At present, the Kaohsiung Branch of TIPC does not have its own noise monitoring mechanism for the Port area, so we rely on data from the EPB of the Kaohsiung City Government, as well as the environmental assessment and monitoring data of the past two years. Monitoring of noise level in Port of Kaohsiung is carried out all year round. The results of the monitoring stations show that most of the time, the noise levels meet the legal requirements, but some areas neighboring the main transportation routes experience noise levels that exceed the noise stipulated by the laws. For instance, the CSC community and Dalinpu community readily suffer from noise pollution. Hence, the Port of Kaohsiung has proposed its action plan for improvement.

Acoustic Barrier



- Kaohsiung Branch of TIPC
- Environmental Protection Bureau, Kaohsiung City Government

To reduce the noise of traffic and road dust generated by huge volume of traffic, the Kaohsiung Branch of TIPC has proposed various major construction projects to improve traffic and the transportation network of the Port in "Plan for the future development and construction of the Port of Kaohsiung (2012-2016)". These projects include the network to connect various commercial ports, an extension of National Highway No. 1 to the Port, connecting the Port to National Highway No. 3, an extension of Zhonglin Road, 80-m road for Nansing Project, construction of National Highway No. 7, etc. Through these construction projects, we aim to improve the transportation network of Kaohsiung Port and improve traffic safety, reduce road dust and noise, so as to lower the impact on neighboring areas.


Green Belt and Acoustic Barrier

Action Plans of Noise

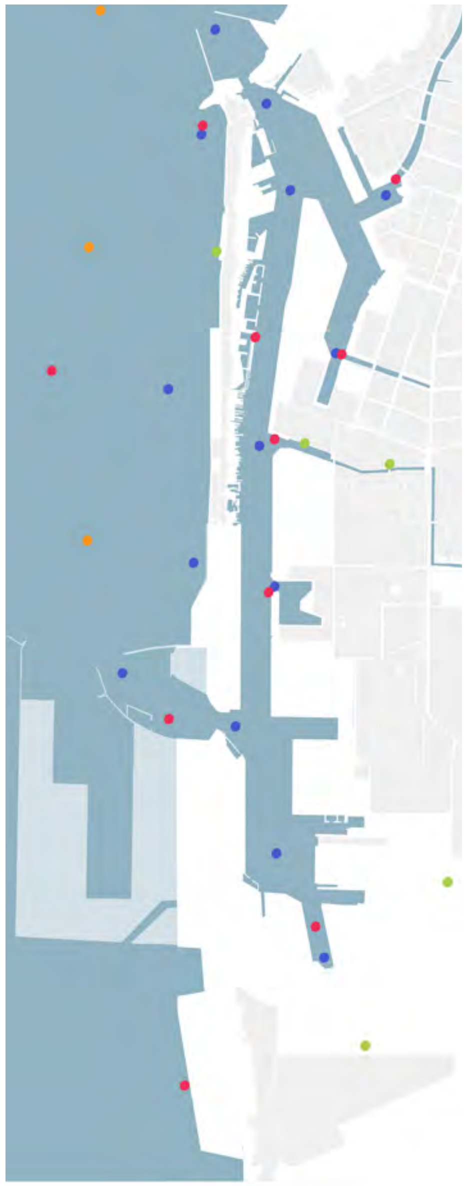
Key points	Plans	To be implemented by
Use machinery and equipment with low noise level	In the bidding document and before the pre-construction coordination meeting, Kaohsiung Port will encourage and advise contractors to use low noise machinery and formulate noise control regulations for construction projects related to the port area	Development and Construction Division
Road and pavement improvement	Allocate budget to maintain and repair the road and pavement according to the extent of damage every year	
Noise reduction along Nan-sing Road.	Identify areas along Nansing Road (from Fengbei Road to Yanhai 3rd Road) that are close to residential areas and install noise barriers. Different layers of trees and shrubs will be planted in the remaining sections.	Harbor Management Division
Speed reduction for vehicles entering the Port	Ask Harbor Police to assist with the campaign for speed reduction in the port area	
Improve cargo-handling	Campaign for reduction of mishandling of cargo	Stevedoring and Warehousing Business Division
Improve transportation network system and improve road quality	Daily inspection and repair of roads and pavements.	Development and Construction Division and Maintenance Division
	Complete the renovation of the motorway of Cross-Harbor Tunnel of Kaohsiung Port	

4.6 Water Environmental Monitoring

The Port of Kaohsiung is located near the mouth of several rivers and canals. Sewage, industrial wastewater and domestic wastewater discharged from factories all flow into the Port area. The industrial and domestic wastewater could pollute the water in the Port. In addition, ballast water illegally discharged by vessels and heavy metal from surrounding heavy industry could all lead to the deterioration of the water environment in the Port. The Kaohsiung Branch of TIPC recognized this problem very early on and efforts have been made to conduct long-term water quality monitoring to understand and reduce water pollution in the Port.

4.6.1 Water Quality

Within the Kaohsiung Port area, four entities are monitoring water quality: the Kaohsiung Branch of TIPC, EPA of the Executive Yuan, EPB of Kaohsiung City Government and Marine Bureau of Kaohsiung City Government. The Kaohsiung Branch of TIPC started its own long-term water quality monitoring in 1982 and 14 monitoring stations were set up in the port area. The EPA of the Executive Yuan set up four monitoring stations within the port area, focusing mainly on the river mouth. The EPB of Kaohsiung City Government started to monitor the water quality of rivers and river mouths in 1993, and set up 8 monitoring stations in the Port area. The Marine Bureau started to monitor water quality of the coastal area of Kaohsiung in 2004 with 11 monitoring stations in the Port area. All of these



- Marine Bureau of Kaohsiung City Government
- Kaohsiung Branch of TIPC
- Environmental Protection Bureau, Kaohsiung City Government
- Environmental Protection Administration, Executive Yuan

Sea Water Quality Sampling

entities focus on different parameters of water quality, but basically these parameters include DO, BOD, SS, chloride salt, phenols, oil, number of coliform bacteria, nitrate, mercury, zinc and copper.

According to "marine environment categories and marine environment quality standards" specified in Article 8 of Marine Pollution Control Act, the marine environment can be divided into categories A, B and C according to the water quality. The coast of Kaohsiung belongs to category B. When we compare the data obtained from the monitoring stations to the standards specified for category B, the outcomes of monitoring meet all the legal requirements. In other words, the long-term effort of the Kaohsiung Branch of TIPC to improve water quality has shown some progress. However, the data obtained from the monitoring stations located near the confluence of Canal No. 1, Love River, Canal No. 5, Qianzhen River and Yanshui Stream show that the results are slightly below the legal requirements. The results also show that domestic wastewater from the upper stream area could bring pollutants and pollute the water in the Port.

At present, the water quality improvement strategy of the Kaohsiung Branch of TIPC is to build a sewage system to ensure that domestic wastewater will not be discharged into the Port. We are also working with the EPB of Kaohsiung City Government to monitor and control wastewater from discharging into the port area, so as to reduce potential water pollution.

Action Plans of Water Quality

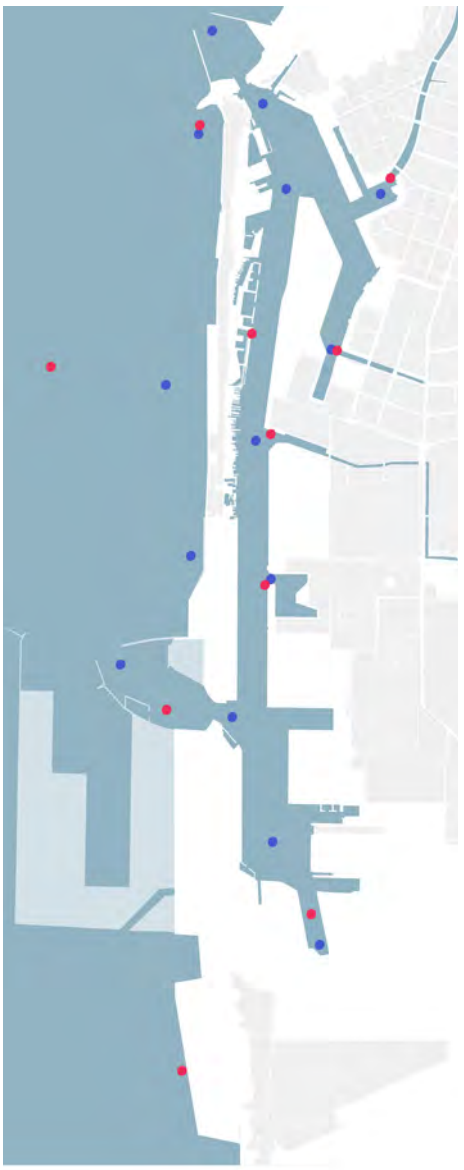
Key points		Plans	To be implemented by
Reduce the number of fuel-spill incidents or pollution from marine shipping		Comprehensive management of vessels within the 20 nautical miles radius, and issue warning in time to reduce the number of marine accidents	Harbor Management Division
Improve water quality	Cleaning of water area	Three mechanical cleaning vessels and 1 cleaning truck remove wastes found in public water area on a daily basis.	Occupational Safety Division
	Install port area sewage pipes and increase use of reclaimed water	Install sewage pipes to be used by the new inspection and control station, future terminal operators, public warehouses and contractors stationed in the rear end of Terminal No.2. The sewage pipes will be connected to the sewage system of the city.	Development and Construction Division

4.6.2 Water Ecological Quality

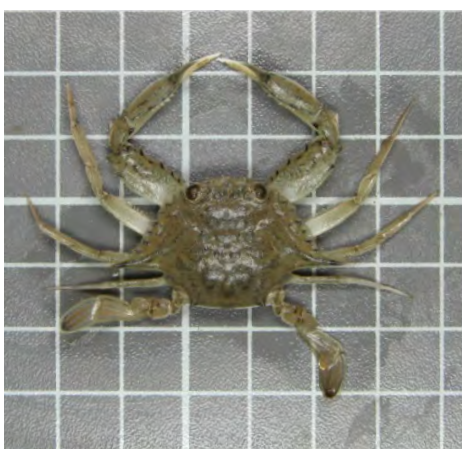
Ecological quality within the Port of Kaohsiung is monitored by two entities: the Kaohsiung Branch of TIPC and the Marine Bureau of Kaohsiung City Government. The Kaohsiung Branch of TIPC set up 14 monitoring stations in the Port area while the Marine Bureau set up 11 monitoring stations in the Port area.

Items being monitored include zooplankton, phytoplankton and benthic organisms. The results of monitoring in recent years show that there has been no significant increase or decrease of organisms, which means that the water quality in the Port area has remained stable. Moreover, the results also show that no exotic species have been found among all the items being monitored, including zooplankton, phytoplankton and benthic organisms. In other words, at present, the water area of the Port has not been threatened by exotic species.

Despite the fact the water area of the Port is considered stable, the Kaohsiung Branch of TIPC will continue to collaborate with the Southern Taiwan Service Center of MPB, MOTC to control the discharge of ballast water to prevent any exotic species or bacteria from entering the Port and damaging the ecological environment.



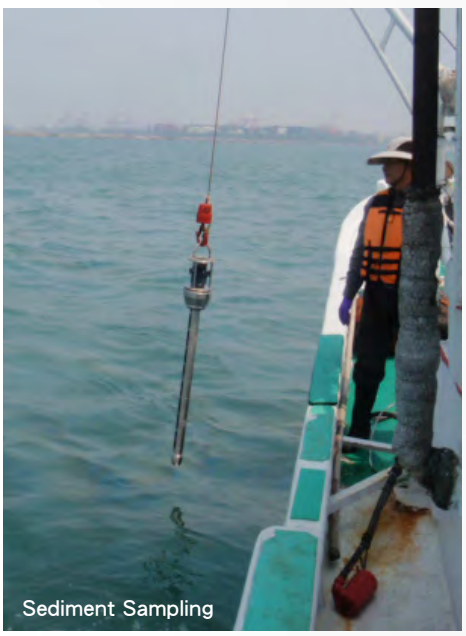
Marine Bureau of Kaohsiung City Government
Kaohsiung Branch of TIPC



4.6.3 Sediment Quality

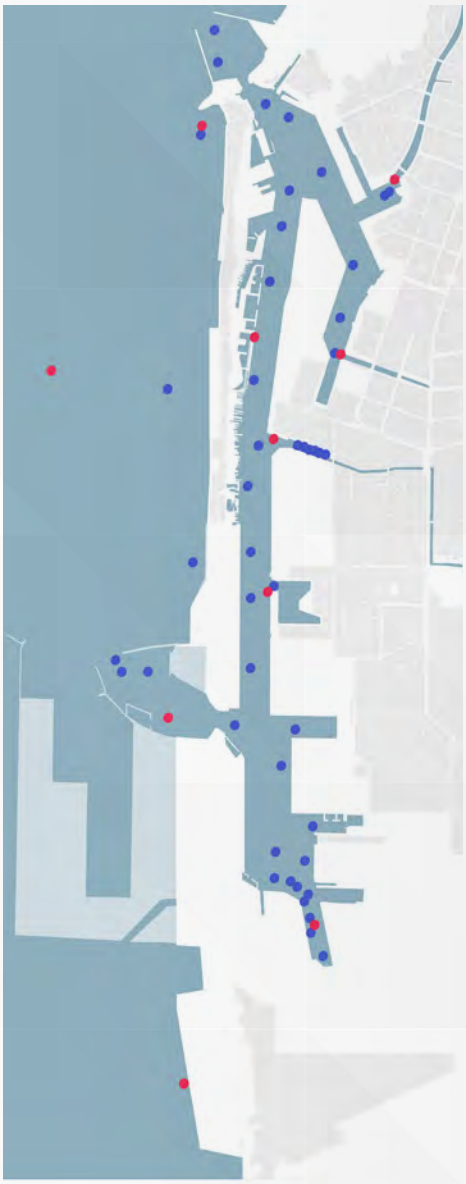
In the Kaohsiung Port area, two entities are in charge of monitoring sediment quality: the Kaohsiung Branch of TIPC and the Marine Bureau of Kaohsiung City Government. The Kaohsiung Branch of TIPC set up 46 monitoring stations and the Marine Bureau set up 11 monitoring stations in the Port area.

According to Article 8 of Marine Pollution Control Act, marine environment categories and marine environment quality standards are divided into three categories: A, B and C. When we compare the outcomes of monitoring with the standards, it has been found that the concentrations of chrome, mercury, copper and zinc have all exceeded the standards specified by the Act. The amount of copper is even 100 times the standard value. The monitoring data are often obtained from locations close to river mouths or areas close to industrial docks; it means that industrial wastewater from the upper stream area or wastewater discharged with hidden pipes have resulted in heavy metals accumulating in the sediment and affecting the water environment of Kaohsiung Port.

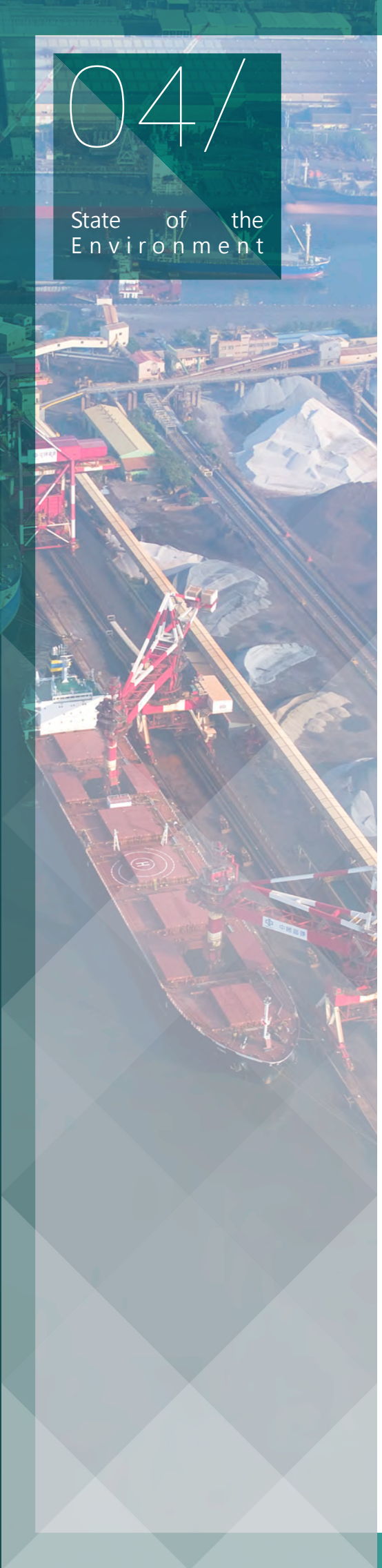


Sediment Sampling

The strategy of the Kaohsiung Branch of TIPC for managing the heavy metal pollution in the sediment is to regularly remove the sediment in the water area of the Port. For sediment suffering serious pollution, Kaohsiung Port is planning a sediment treatment plant to treat sediment and recycle treated sediment for future construction.



- Marine Bureau of Kaohsiung City Government
- Kaohsiung Branch of TIPC



04/ State of the Environment

4.7 Dredging Management

Sedimentation in the Port of Kaohsiung comes from four sources: mud brought in from rivers and streams, sand brought in from the outer sea, construction projects within the Port area and solid participles in the atmosphere. Among the four sources, the majority of sedimentation comes from mud and sand brought into the Port area from upper stream areas of the rivers (Love River, Canal No. 5, Qianzhen River and Yanshui Stream) and littoral drift brought into Terminals Nos. 1 and 2 with the tides. To maintain clear channels in the port area and access to the berth wharfs, the Kaohsiung Branch of TIPC carries out annual dredging in the Port area and proposes a plan to dispose of dredged sedimentation. At the same time, the Port of Kaohsiung carries out environmental monitoring and alternative treatment to reduce the potential impact on the environment when we dispose of the sedimentation.

The EPA of the Executive Yuan amended the "Waste Materials Classification Standards for Marine Disposal" (Shu Shui, Huang No. 0950086167) on November 2, 2006. It is used to help Kaohsiung Port classify the sedimentation dredged from the Port area of Kaohsiung. Sedimentation dredged from the Port of Kaohsiung is classified as category B waste material, which could be disposed in the ocean, but the Port of Kaohsiung should submit an application to the competent authorities, and total amount control should be carried out.

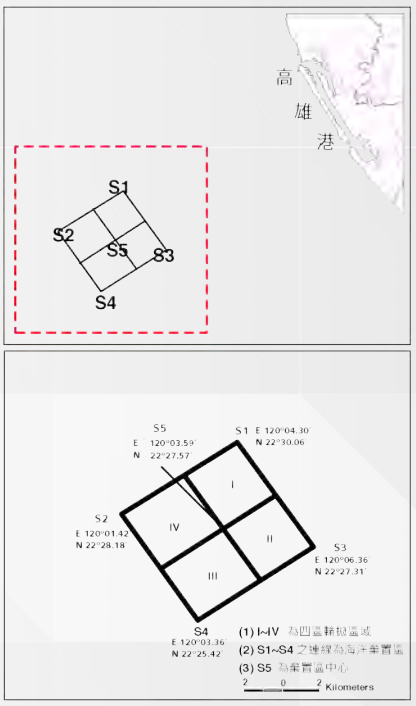
Every six months, the Kaohsiung Branch of TIPC carries out depth measurement of the entire Port area. For channels and wharfs where the level of sedimentation has exceeded the design depth, the Port of Kaohsiung will calculate the quantity of sedimentation to be dredged for the year and apply for a disposal permit. Marine disposal should be the last resort for the dredged sedimentation. Hence, before disposing of the sedimentation, the Kaohsiung Branch of TIPC looks for other approaches to use the sedimentation, such as beach nourishment and reclaimed land. At present, a feasible alternative approach is the development project of Kaohsiung International Container Terminal. The development project requires millions to tens of millions of cubic meters

Year	Actual dredging volume	Permitted disposal volume	Actual amount of dredging sludge disposal	Actual amount of commitment alternative's dredging mud	Actual amount of alternative's dredging mud	
2005	44.7	59.4	44.680	0.0	0.0	
2006	38.6	51.5	34.730	3.9	3.9	
2007	64.5	72.8	55.500	8.2	9.0	
2008	46.1	63.0	29.320	9.0	16.8	Siz
2009	107.1	67.2	41.060	10.0	66.0	
2010	93.6	64.2	21.620	11.0	72.0	
2011	71.5	34.2	19.302	15.0	52.2	Inter
2012	60.6	64.0	34.600	20.0	26.0	

Table of the Amount o

of earth every year, which is far more than the annual amount of sedimentation dredged by the Port of Kaohsiung. Originally, the development project planned to extract sands from the outer sea for the earth volume needed. Now sedimentation dredged from the Port of Kaohsiung can replace some of the earth volume. This approach can help the Port dispose of the sedimentation, save money needed to purchase earth and reduce the cost of transportation. This is the best approach to dispose of the sedimentation.

The allocated marine disposal area of the sedimentation is 36 square kilometers. The Kaohsiung Branch of TIPC carries out quarterly environmental monitoring and investigations every year. The scope and items of monitoring and investigation include the water quality at the mouths of the four rivers, sedimentation and quality of bottom water at various channels of the Port, water quality, currents and ecology inside and outside the disposal area. Results of monitoring in the past five years showed no significant change in water quality, currents and ecology inside and outside the disposal area. In other words, after disposing of the sedimentation, through dilution, diffusion and self purification, the disposal area has gradually been restored to the background quality. However, pollutants brought into the Port area with the rivers have resulted in higher concentrations of copper and zinc. Higher concentrations of heavy metal in the sedimentation means higher concentration of heavy metals in the disposal area but, at present, the concentrations of heavy metals in the disposal area are below the standards of low to medium pollution stipulated in the laws. As the disposal area has been in use for 9 years (2005 - 2013), to avoid the accumulation of pollutants, the Kaohsiung Branch of TIPC is now looking for a new disposal area.



Alternatives	Remark
-	-
Cijin beach protection	
Sizihwan Beach Protection	
nternational container terminal reclamation	Including the amount of backfill in Xinda port offshore unloading dock and the port of Kaohsiung
	Port dredging volume of outsourcing

nt of Port of Kaohsiung's Sedimentation Disposing in 2012-2013

Action Plans of Dredging Management

Key points	Plans	To be implemented by
Increase recycling and the reuse rate of sedimentation dredged from the Port area.	Sedimentation generated from dredging operation should be used for landfill.	Maintenance Division, Development and Construction Division

4.8 Water Related Port Development

The project for the construction of the Kaohsiung International Container Terminal is a major marine development project for the Port of Kaohsiung from 2000 to 2020. The project is divided into 2 phases. Phase 1 of the Kaohsiung International Container Terminal Project (also known as Terminal No. 6) uses the existing 112 hectares of land area of the original Dalin Commercial Port to build four deepwater container docks with draft exceeding 16 meters. The four docks is green terminals of Kao Ming Container Terminal Corp. (KMCT). Phase 2 of the Kaohsiung International Container Terminal Project plans to create 422.5 hectares of reclaimed land along the south side of the sea dike of Terminal No. 2 of the Port of Kaohsiung for 5 deepwater container docks with draft exceeding 18 meters, and 14 bulk and sundry goods docks/petroleum product docks. The Port of Kaohsiung is also planning to build a center for the storage of energy and petroleum materials, and a new container base so that the old dock used for petroleum products can be moved and a container logistic center can be built.

The environmental assessment report of the Kaohsiung International Container Terminal has been reviewed by the EPA of the Executive Yuan, and received conditional approval in December 2003. To fully understand the potential impact to the environment before the commencement of the project, and to meet the recommendations suggested in the review of the environmental assessment report, the Kaohsiung Branch of TIPC started the "Environmental Monitoring for Kaohsiung International Container Terminal" in 2006.

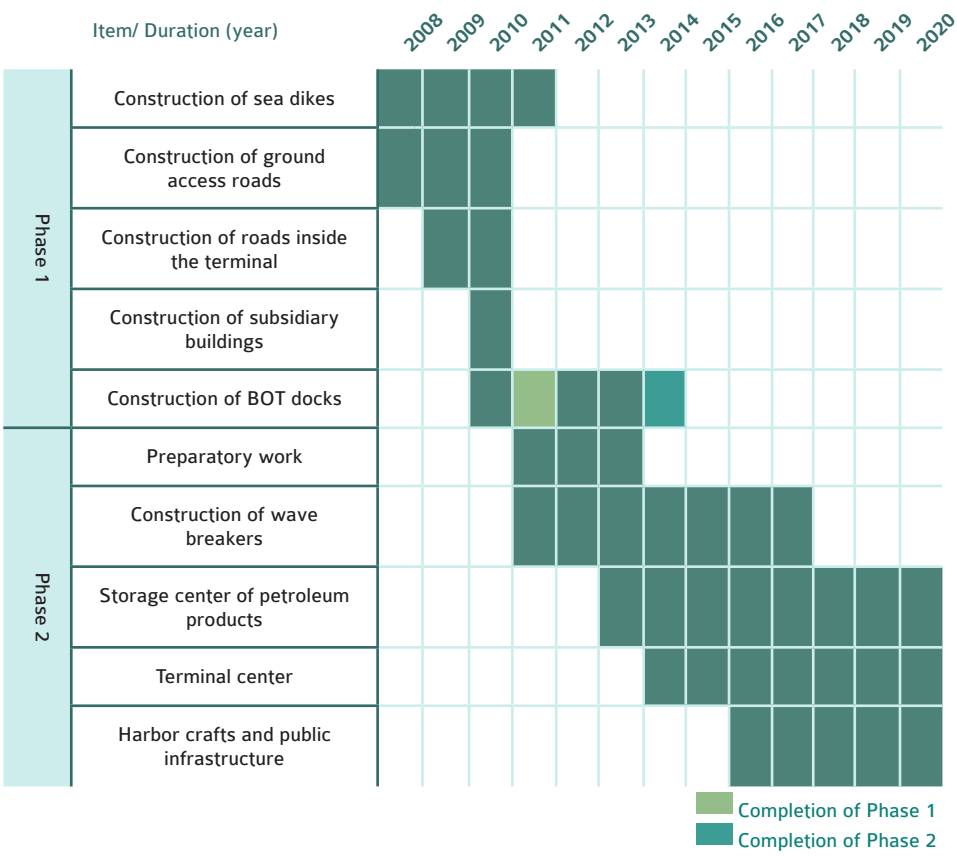


Table of Construction schedule of Kaohsiung International Container Terminal

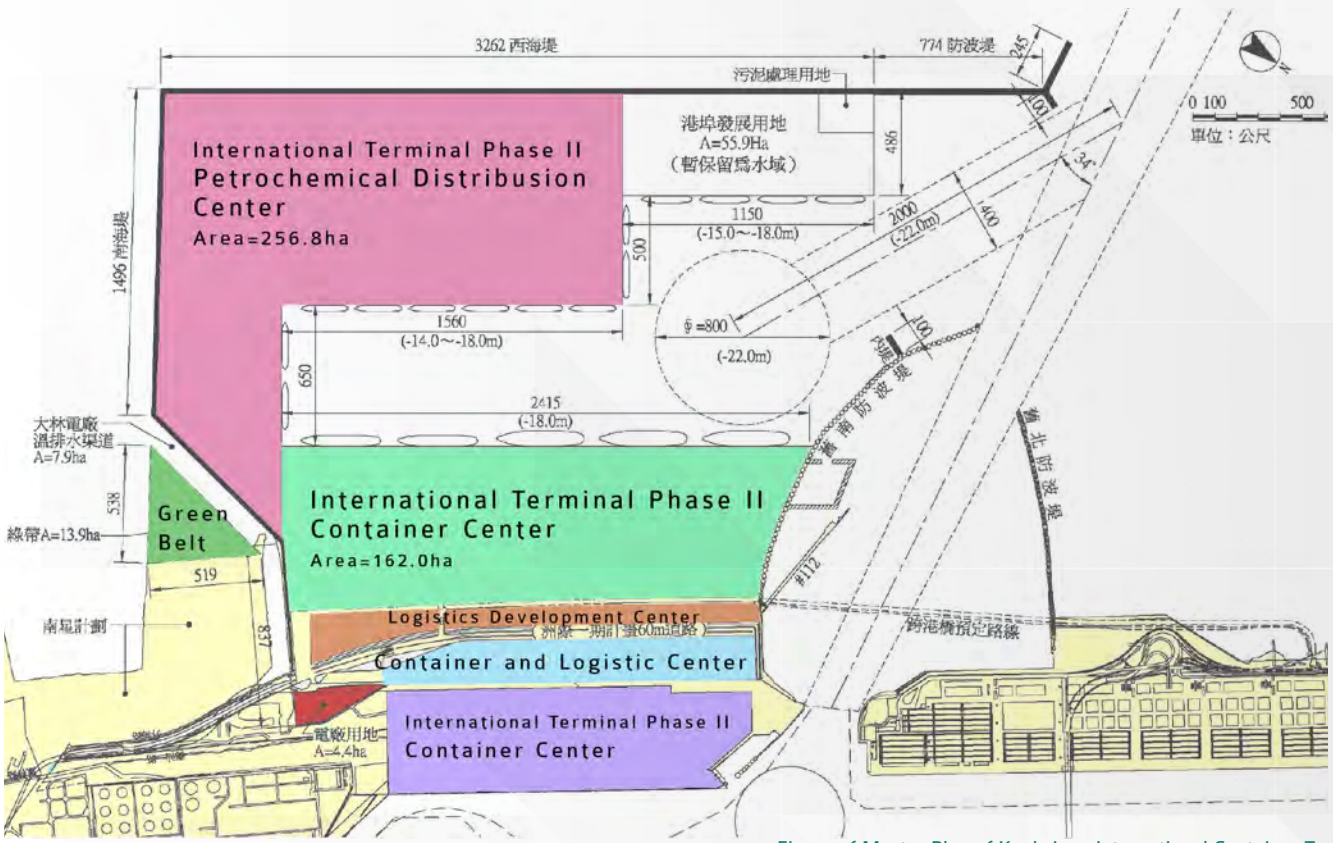


Figure of Master Plan of Kaohsiung International Container Terminal

04/ State of the Environment

The "Environmental Monitoring for Kaohsiung International Container Terminal" investigates 7 items: air quality, noise and vibration, marine water quality, marine ecology, coastal landform, road traffic and land subsidence.

Air quality: The results of monitoring the total suspended particulate (TSP), PM10 and NO2 show that all these items have met the values of air quality standards during the environmental assessment phase, before and during the construction. However, the concentration of ozone has exceeded the standard values. It is believed that because the terminal is located close to Linyuan Industrial Park, the monitoring results have been affected by the background air quality, which leads to a high concentration of ozone;

Noise and vibration: Data on noise and vibration include only data monitored during the construction period. The results show that the noise level still meets the noise control standards, and the vibration monitored meets the vibration regulations of Japan;

Marine water quality: In the past few years, various items related to marine water quality all meet the standards for Class B marine water quality. The results of monitoring during the construction phase all fall within the range of values from all previous monitoring results. No abnormal changes were detected. In other words, the construction of this project has not resulted in significant change to the marine water quality of the area;

Marine ecology: The results of marine ecological investigation shows no significant change in the number of phytoplankton, zooplankton and benthic organisms, but the number of fish species significantly drops after the construction;

Coastal landform: Generally speaking, there is no significant change to the northern side (coastal area north of Tsoying Port), but the draft of the southern side has changed due to the dredging operation and sand extraction. Erosion and sedimentation occur in other areas. Hence, continuous monitoring is needed to understand the impact of the construction and natural climate on the coastal landform;

Road traffic: There is no significant difference on the service levels of various roads before and after the construction. Most service levels fall between A and C;

Land subsidence: Meters are installed in front of the offices of China Engineering Consultants, Inc. and CECI Engineering Consultants, Inc. Measurements are taken at different times and the results are within the instrument error scope. Continuous monitoring will be carried out in the future.

Air Quality Monitoring

Items		Frequency
Air Quality	Total suspended particulates (TSP), PM10, NO2, ozone, wind direction, wind speed, temperature, humidity	Once quarterly for 24 hours
Noise and vibration	Noise: Leq, Lmax, Lx (x=5,10,50,90,95), daytime, nighttime, night equivalent noise level, day-night level (Ldn)	Once quarterly for 24 hours
	Vibration: Lveq, Lvmax, Lvx (x=5,10,50,90,95)	
Marine water quality	pH, DO, BOD, COD, SS, mineral oil, organic phosphorus, nitrate nitrogen, nitrite nitrogen, kjeldahl nitrogen, ammonia-N, Echinoidea coli, total organic carbon, chlorophyll a, temperature, stream velocity, flow direction.	Once quarterly
Marine ecology	Types and density of phytoplankton, types and density of zooplankton, types and density of benthic organisms and Ichthyoplankton	Once quarterly
Coastal landform	Bathymetric chart with 200 meter intervals from the Yongan Liquefied Natural Gas Plant in the north to the river mouth of Gaoping Stream.	Once every six months
Road traffic	Running speed, delay and number of vehicles	Once quarterly for two days continuously
Land subsidence	Land subsidence level (Plate load test)	Once every six months within 1 year after burying the plates

Table of Items of Environmental Monitoring for Kaohsiung International Container Terminal

Action Plans of Water Related Port Development

Key points	Plans	To be implemented by
Ask for collaboration from neighboring large plants and companies to reduce pollution	Planning for the storage center of petroleum products in the 2nd phase and helping CPC Corporation, Taiwan and companies of petroleum products in the old Port area to move to the new center.	Business Division
Reduce pollution caused by handling of large bulk and sundry goods	Prepare bulk and sundry goods docks in the 2nd phase that are away from the City center and establish closed cargo handling facilities	

Black Paradise Flycatcher
Photo by CHeng-ching, Cheng

4.9 Habitat Restoration

As the Kaohsiung Branch of TIPC develops the Port area, we also work to protect the existing ecological environment and habitats within the Port area. Take South Star Free Trade Port Zone as an example; the site to be developed is located on reclaimed land of the Nansing Project. In the past, this area, known as Dalinpu, suffered from the intrusion of seawater. The remote location, low human disturbance and trees planted in the area have made the forests in the area a new haven for migratory birds in the winter and birds of passage in spring and fall.

According to the description of environmental impact for phases 1 and 2 of the South Star Land Development and Free Trade Port Zone conducted by TIPC, and according to the field investigation of Kaohsiung City Wild Bird Society, within the area to be developed, there are 8 mammalian species, over 100 bird species, 16 species of amphibians and reptiles, 40 butterfly species, 5 Taiwan endemic species (such as Formosan mouse, Rattus losea, Swinhoe's Japalura) and 19 endemic subspecies (such as Accipiter trivirgatus formosae, Phasianus colchicus, Accipiter virgatus fuscipectus, Prinia inornata flavirostris), 2 rare and valuable species (Falco tinnunculus interstinctus and Sternula albifrons sinensis) and 3 protected species (Glareola maldivarum, Lanius cristatus cristatus and cobra).

South Star Free
Trade Port Zone

Erithacus akahige
Photo by Mu-tsuen, Ke

The environmental assessment report for the Kaohsiung Branch of TIPC's plan to develop the Nansing Free Trade Port Zone has been submitted to the EPA of the Executive Yuan, and phase 1 has received conditional approval in September 2012. Phase 2 is still under review. For the area designated for development, the Kaohsiung Branch of TIPC plans to use mitigation measures, including avoidance, minimization and compensation during planning, construction and operation period. These mitigation measures are explained as following:


Emberiza Elegans
Photo by Jian-de, Wang


Narcissus Flycatcher
Photo by Wen-hua, Li

1. Keep the 13.2 hectares of windbreak forest and surrounding green space as they constitute an important habitat for migratory birds.
2. Establish a 20-meter green belt along Nansing Road. Within the green belt, endemic trees in Taiwan will be planted to connect to the existing forest as a biological corridor.
3. Inside the planned area, 10 hectares of the land will be used as a park. With vegetation and plants, the park can provide birds and butterflies with food and foraging.
4. The planned area will be planted with multi-layered plantation, with the focus on endemic trees. In addition to enhanced biodiversity of the local vegetation, the planned green space can also provide diverse habitats.
5. During the construction period, barriers will be placed around the construction area. Low-noise construction method and machinery will be used. Construction will be carried out by sections and the pavement will be porous concrete pavement.
6. During the operation period, chemical fertilizer and pesticide should be avoided. The plantation and vegetation plan should be followed. The BOT terminal operator will also need to comply with relevant regulations of the Wildlife Conservation Act and prohibit capturing, selling, buying and eating of wild animals.

Action Plans of Green landscaping

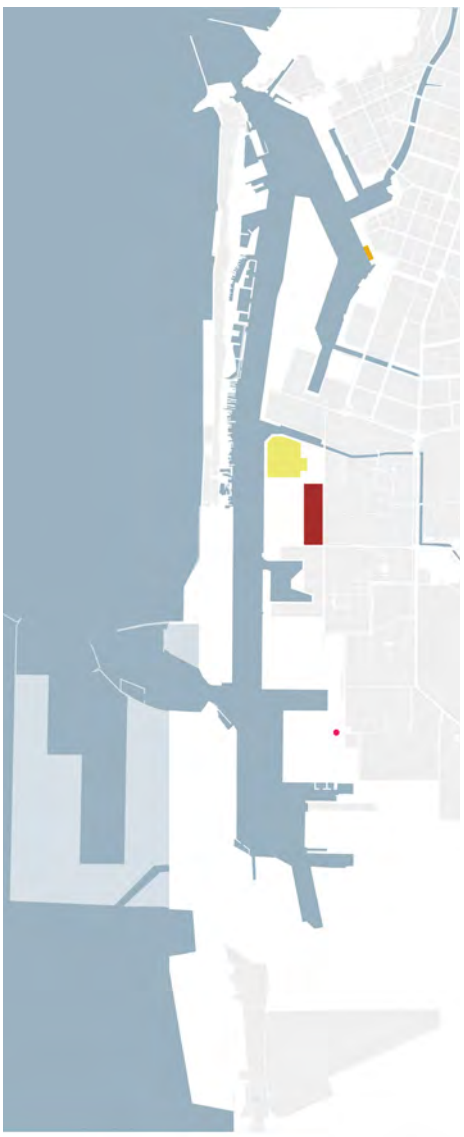
Key points	Plans	To be implemented by
Improve the open area, water front area and green corridors within the Port	Commission contractors to maintain the open area of the Port and provide tourist information and services	Harbor Management Division
	Improve the landscape to attract more visitors	
	Increase vegetation and green space in suitable areas in the Port to increase the size of green corridors	Maintenance Division

4.10 Contaminated land

The Port of Kaohsiung is surrounded by heavy industry enterprises, so there is more likelihood for the land in the Port area to be polluted. According to Article 6 of Soil and Groundwater Pollution Remediation Act, competent authorities at all levels shall regularly monitor the quality of the soil and groundwater in areas with high risk of land pollution, in order to ensure the quality of soil and ground water. Hence, the Environmental Protected Bureau of Kaohsiung City Government collects and tests soil in the Port area randomly. When the concentration of pollutants reaches the control standards of soil or groundwater pollution, relevant units will be notified and the unit(s) responsible for the pollution will be held responsible.

In addition, when land used by a heavy industry enterprise within the Port is transferred, according to Article 8 of Soil and Groundwater Pollution Remediation Act, the original land user shall conduct a soil pollution assessment investigation and provide test data to ensure that the quality of soil meets the specified standards. According to Article 26 of Soil and Groundwater Pollution Remediation Act, if the soil is found to be polluted, the land should be designated as a control site for soil remediation. The land cannot be transferred until the remediation process has been completed and no further pollution is found.

Soil Pollution Sampling



- Dock No. 19
- Qianzhen Storage Station
- Tang Eng Iron Works Co, Ltd
- Docks No. 76 and 77

When we review the use of land within the Port area in the past five years, we can see that land pollution inspection and remediation have been carried out for several sites, including Qianzhen Commercial Port (Tang Eng Iron Works Co, Ltd.), gas stations at dock Nos. 76 and 77, and dock No. 19.

Tang Eng Iron Works Co, Ltd. was established and registered in 1985. The operation of the Company continued until 2000. The registration of the Company was cancelled in 2008. The ade procedures announced by the EPA (NIEAS102.61B). The results of analysis show that the soil meets the soil quality standards. At present, the site is used as a warehouse for the Port of Kaohsiung.

Docks No. 76 and 77 of the Port of Kaohsiung are located in Terminal No. 5. The address is Nos. 2 to 9, Dongya South Road, Siaogang District, Kaohsiung City. Pollution was found near the intersection between the fuel tanks and discharge pipes of the gas stations; the area of soil pollution is 36.2 square meters. The pollution is as deep as 3 meters below the surface, and it is estimated that the polluted earth volume is 108.6 cubic meters. The land was listed as a control site for remediation in 2010. Remediation of the pollution follows the " Operation Directions for Removal of Polluted Soil" specified by the Soil and Groundwater Pollution Remediation Fund Management Board. Polluted soil is removed and replaced with clean soil. Polluted soil will be re-used again by mixing the soil with cement. Remediation of the polluted soil of the site was completed in 2011, and no further pollution ws found after conducting environmental pollution monitoring.

Dock No. 19 is located near the intersection of Sanduo 5th Road and Lingnan Road of Lingya District, Kaohsiung City. The site is about 3 hectares; it used to be the old site of Lingya Storage of Refining Business Division of CPC Corporation, Taiwan. Since 1947, pipes were installed in Docks No. 18 to 20 in the Port of Kaohsiung for crude oil, fuel oil and gasoline. These pipes were used for unloading crude oil and transportation of diesel oil, premium diesel, aviation fuel oil and

Soil Pollution Sampling


Soil Pollution Sampling


Soil Pollution Sampling

fuel oil. The storage site was abandoned in 1996 and oil tanks and pipes were removed. At present, the land was managed by TIPC. In 2000, according to "The Integrated Overall Development Plan of Taiwan's Ports", the Executive Yuan plans the overall development and future development of Kaohsiung Port. One of the projects is to extend Docks No. 17 to 20 by 20 meters, and to increase the draft to 10.5 meters for large vessels. In 2014, the EPB of Kaohsiung City Government confirms that the land pollution of the site exceeds the standards; the affected area is about 3 hectares and 1.5 to 5.5 meters deep. At present, remediation measures for the polluted soil include biological remediation and oil washing. The remediation plan is scheduled to be approved this year and to be completed within 3 years. In the future, the site will be the site for the Kaohsiung Port Terminal, and Light Rail Rapid Transit (LRRT) will be built in the surrounding area to make it an important location for both marine and land transportation.

In response to future expansion of Kaohsiung Port, the petroleum industry is scheduled to be moved to the Storage Center of Petroleum Products in 2019. The Storage Center away from the city center is to be built in phase 2 of the Kaohsiung International Container Terminal. According to the present plan, Qianzhen Storage Station will be moved. From the planning and design stage in 1968 to operation in 1973, the Storage Station has been in operation for 46 years. The old facilities in the plant could increase the potential danger of pollution.

Qianzhen Storage Station is located in No. 11, Sinsheng Road, Qianzhen District, Kaohsiung City, close to Docks No. 59 to 62 of Kaohsiung Port. It belongs to the Petrochemical Business Division of CPC Corporation, Taiwan, and is used mainly for export/import of liquefied petroleum gas (LPG), xylene, toluene, lubrication oil, as well as the export of diesel oil and asphalt in bulk. It is an important hub for exports and imports of petrochemical material in southern Taiwan. Because the petrochemical industry is governed by the Soil and Groundwater Pollution Remediation Act, a soil pollution assessment investigation will need to be carried out. Once no pollution is found on the site, the move of the plant and transfer of the land will be approved.

19號碼頭
陳敏明 攝


高雄港務消防隊

05 Emergency Response

05/

Emergency Response

5 Emergency Response

One of the main tasks of the Kaohsiung Branch of TIPC is to maintain the safety of the Port area. Every month, the Pollution Control Section of Occupational Safety Division of the Kaohsiung Branch of TIPC assigns personnel to investigate land and water area of the Port. When they discover any act of pollution, they will ask the perpetrators to stop immediately and start an emergency response. They may also notify competent public authorities for punishment.

In 2012 and 2013, within the Kaohsiung Port area, major accidents include fishing vessels blocking the navigation routes, followed by small scale fuel spill, garbage and fire, ship collision, fire, explosion, fuel spill, chemical spill and ship breakdown and tilt that did not affect the safety. For pollution and accidents within the port area, the Kaohsiung Branch of TIPC, the EPB of Kaohsiung City Government and the Marine Bureau of Kaohsiung City Government have hotline services for the public or terminal operators to notify the relevant units.

Kaohsiung Branch of TIPC has also established 14 standard emergency response procedures for accidents and disasters, including: shipwreck, fire and explosion, fuel spill, major accidents, spill of announced controlled toxic chemicals, disease and natural disasters.

In addition to hotlines and emergency responses, the Kaohsiung Branch of TIPC also works to improve labor safety, environmental education and training, in order to reduce the number of accidents in the Port area. Joint exercises are conducted every year with other units related to Port management. The exercises focus on fuel spill, International Ship and Port Facility Security (ISPS), port security and anti-terrorism, and shipwrecks. In 2012 and 2013, the commercial port area of Kaohsiung held 3 joint exercises, and participants included the Kaohsiung Branch of TIPC, Kaohsiung Harbor Police Department, Kaohsiung Harbor Fire Brigade, National Fire Agency, MOI, South-

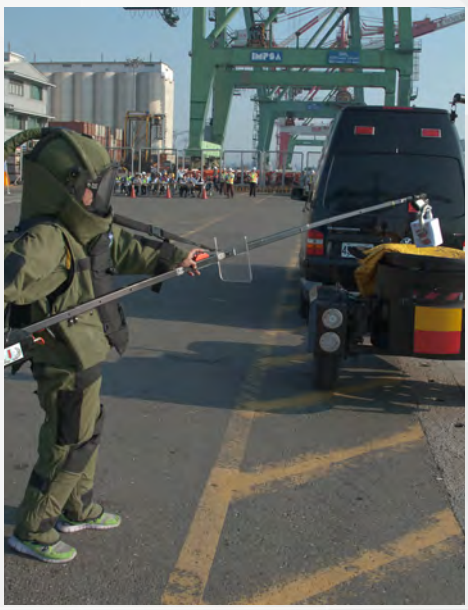
Item/Year	2012	2013
Number of patrols(water area and land area)	463	508
Notification(water area and land area)	96	97
Exhaust emission	66	44
Environment and hygiene inspection in ship making plants	62	105
Oil fence (vessels)	114	133
Joint inspection	11	11
Admonishment for improvement	1296	1895
Admonishing ticket	12	49
Penalty (Maritime and Port Bureau)	3	2

Table of Environmental Inspection and Punishment in Port of Kaohsiung

ern Coastal Patrol Office, Coast Guard Administration, Executive Yuan, Southern Taiwan Service Center of MPB, MOTC, and Marine Bureau of Kaohsiung City Government. The joint exercises aim to maintain Port safety and security through inter-agency collaboration.

Accidents	2012	2013
Ship collision, fire, explosion, fuel spill, chemical spill	28	31
Ship breakdown, tilt (no affecting safety)	19	32
Fire and/or explosion of warehouse or fuel tank	2	0
(Small) fuel spill, garbage and fire in the port area	60	78
Others	170	123

Table of Number of Accidents in the Port of Kaohsiung



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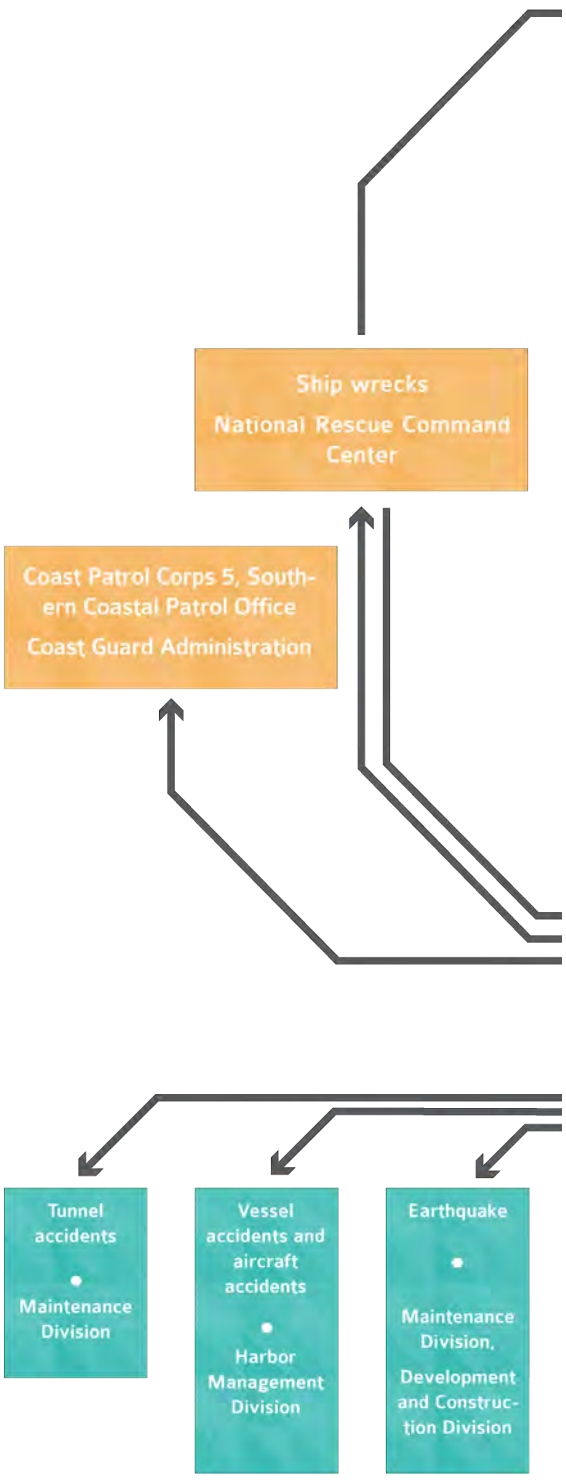
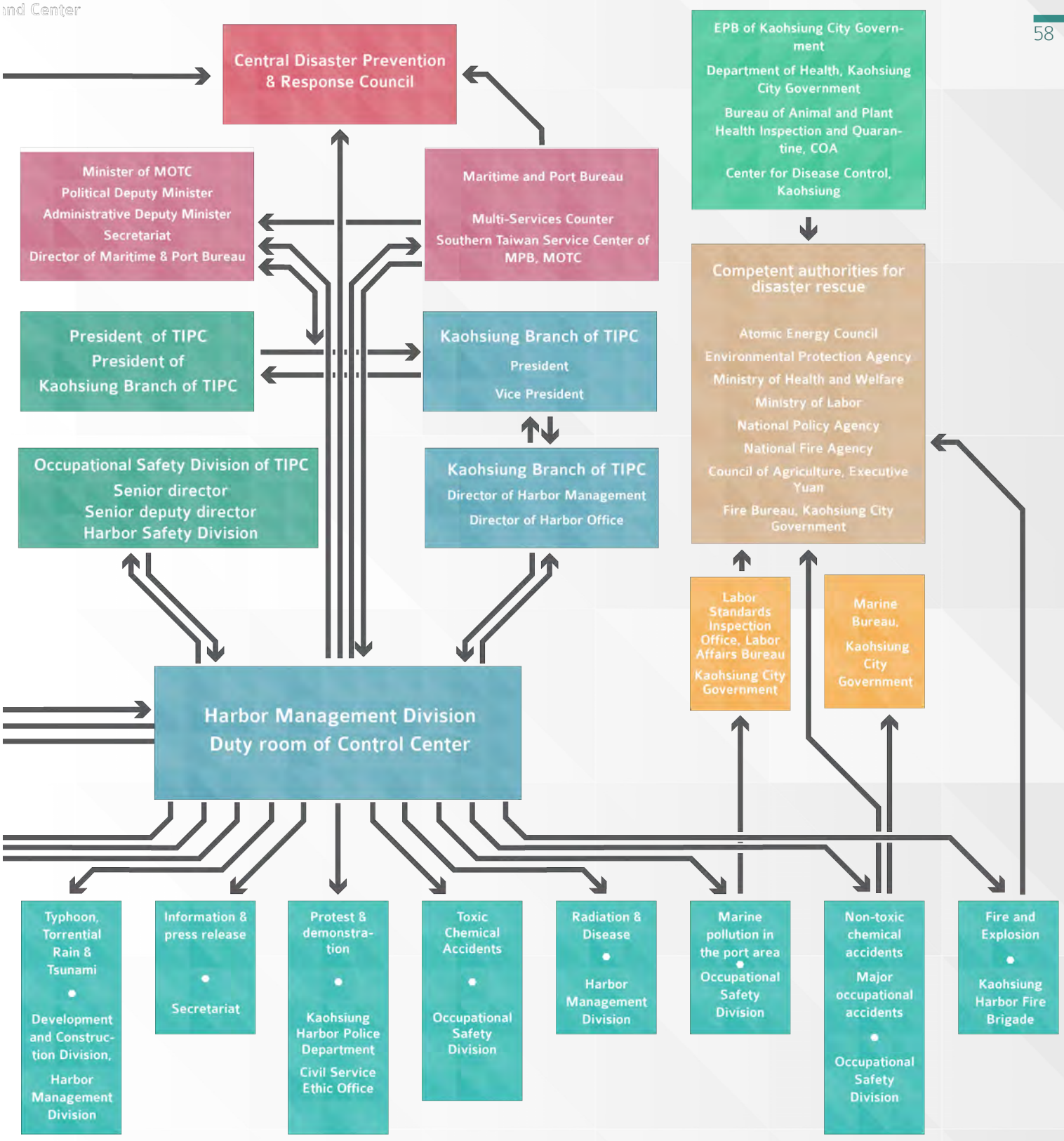
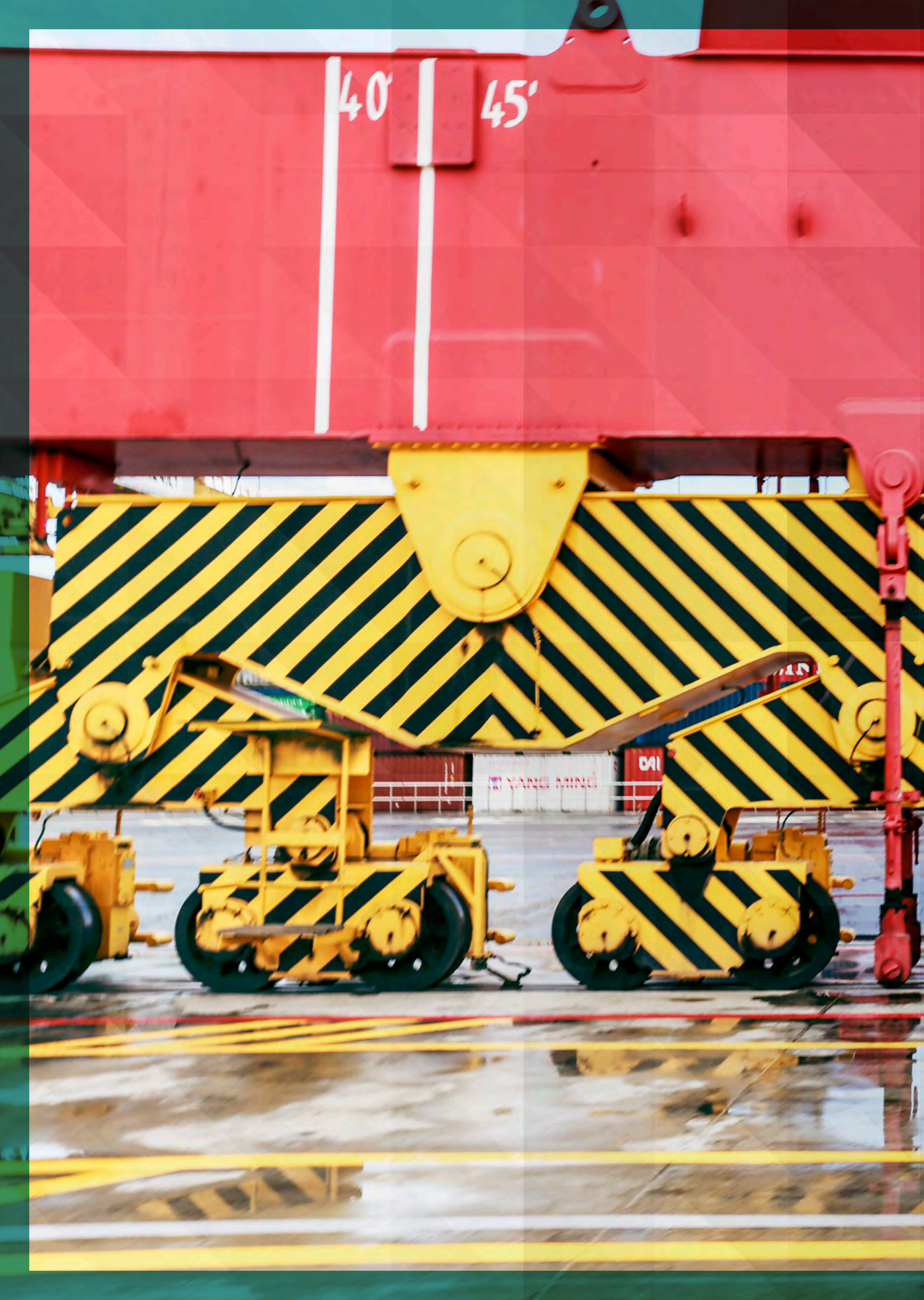
Emergency Response

Flow Chart for Disaster and Accident Notification in Port of Kaohsiung




nd Center
Central Disaster Prevention & Response Council
EPB of Kaohsiung City Government
Department of Health, Kaohsiung City Government
Bureau of Animal and Plant Health Inspection and Quarantine, COA
Center for Disease Control, Kaohsiung
Minister of MOTC
Political Deputy Minister
Administrative Deputy Minister
Secretariat
Director of Maritime & Port Bureau
Maritime and Port Bureau
Multi-Services Counter
Southern Taiwan Service Center of MPB, MOTC
Competent authorities for disaster rescue
Atomic Energy Council
Environmental Protection Agency
Ministry of Health and Welfare
Ministry of Labor
National Policy Agency
National Fire Agency
Council of Agriculture, Executive Yuan
Fire Bureau, Kaohsiung City Government
President of TIPC
President of Kaohsiung Branch of TIPC
Kaohsiung Branch of TIPC
President
Vice President
Occupational Safety Division of TIPC
Senior director
Senior deputy director
Harbor Safety Division
Kaohsiung Branch of TIPC
Director of Harbor Management
Director of Harbor Office
Labor Standards Inspection Office, Labor Affairs Bureau
Kaohsiung City Government
Marine Bureau, Kaohsiung City Government
Harbor Management Division
Duty room of Control Center
Typhoon, Torrential Rain & Tsunami
•
Development and Construction Division, Harbor Management Division
Information & press release
•
Secretariat
Protest & demonstration
•
Kaohsiung Harbor Police Department
Civil Service Ethic Office
Toxic Chemical Accidents
•
Occupational Safety Division
Radiation & Disease
•
Harbor Management Division
Marine pollution in the port area
•
Occupational Safety Division
Non-toxic chemical accidents
Major occupational accidents
•
Occupational Safety Division
Fire and Explosion
•
Kaohsiung Harbor Fire Brigade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YANG MING

06 Innovation & Cooperation

06/

Innovation & Cooperation

6 Innovation and Cooperation

6.1 Best Practice

The best solutions that the Kaohsiung Branch of TIPC proposed for the environmental issues of the Port, and demonstrates its ability to implement environmental management of the Port. Besides, the best practices will be provided to the ECOPORT Foundation as examples for other ECOPORT members.

1. Vehicle Cleaning Pool

The involved environmental issues - Air quality, Dust

Environmental Management Strategies: Exemplifying, Enforcing, Enabling

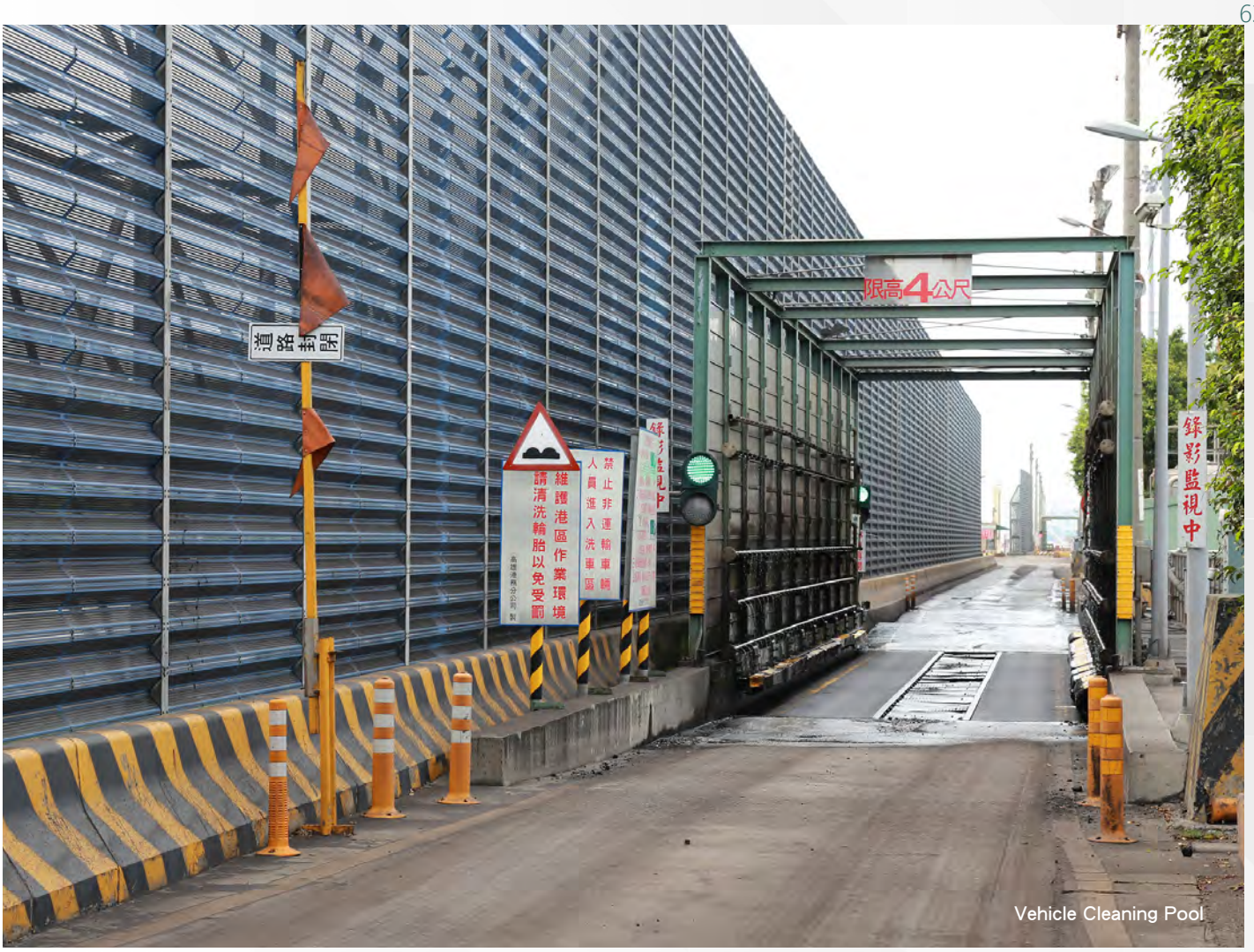
Content

Attention/Motives

Docks No. 48 to No. 56 in Zhongdao Commercial Port of Kaohsiung Port are the loading area of large bulk and sundry goods. The types of goods are mainly coal, scrap iron, wood dust, gravel and cement clinker that produce particle pollution; most of the goods are transported to other places by truck. Nearly 100 thousand trucks enter or leave the Port every year. As a result, the fugitive particulate pollutants on the surface of trucks affect the air quality at the Port, export processing zone and the neighboring communities.

Solutions

In order to reduce fugitive dust pollution caused by the vehicles entering and leaving the Port, and to meet the requirements according to the Guidelines for Fugitive Sources Control and Management established by the Environmental Protection Administration, the Kaohsiung branch of TIPC has set 4 qualified automatic car wash systems at the exit of the loading area of large bulk and sundry goods in Zhongdao Commercial Port. The body shell and tires of a vehicle have to be washed with high pressure water jet equipment before leaving the Port.



Vehicle Cleaning Pool

Implementation/Timeline

July, 2009
Final bid of the installation of the vehicle cleaning pool
September-October, 2010
Installation of the vehicle cleaning pool
The end of October, 2010
Operation of the vehicle cleaning pool

Investment Amount

NT$32 million (€797000)

Effect/Benefits

The percentage of the washed vehicles is 99%

2. Kao Ming Green Terminal


Reference: Kaohsiung Development Bureau, Kaohsiung City Government

Content

Attention/Motives

Kao Ming Container Terminal (KMCT) is also known as Phase 1 of Kaohsiung International Container Terminal Project (Terminal No. 6). The initial reason for starting the project was to offer a solution to problems in Kaohsiung Port, such as ship size has increased, cargo has been handled to capacity, and terminal operators' container terminals are scattered throughout the Port area, which are unfavorable for operation. In 2008, Kao Ming Container Terminal Corp. (a member of the Yang Ming Group) and Kaohsiung Harbor Bureau (today's Kaohsiung Branch of TIPC) collaborated through BOT to invest in the project. Meanwhile, to follow the trend of environmental protection, KMCT has endeavored to meet the goals of saving energy, reducing carbon emissions and improving operational efficiency of the terminal by means of high automation, in order to make a Kao Ming Container Terminal a world-class green modern terminal.

Solutions

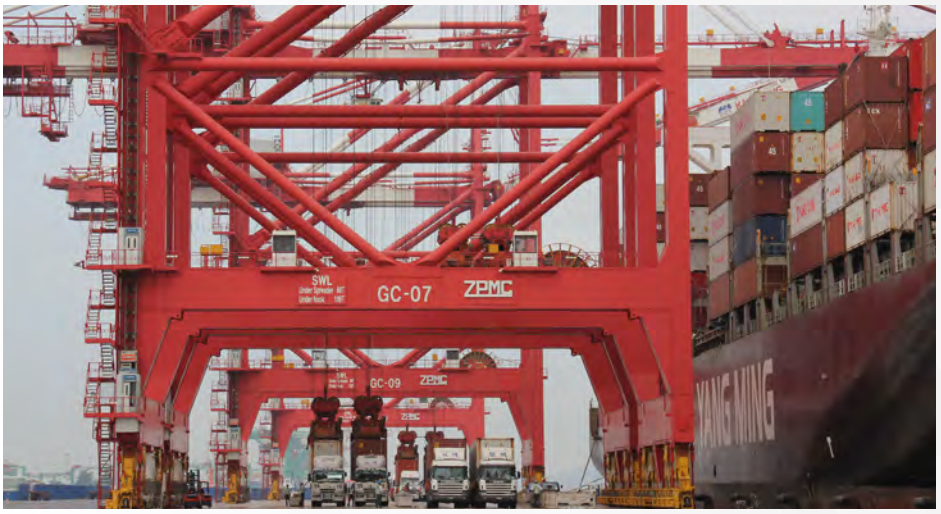
Green Terminal

From infrastructure, hardware and software facilities to machinery and terminal operational procedures, Kao Ming Container Terminal adopts the most advanced technology that saves energy and recycles resources; trees are planted and the terminal is going green.

Terminal Administration: The main building of the administration complex meets six Green Building Standards of Taiwan (such as Greenery Indicator and Water Resource Indicator), and it is the first container terminal building that was granted a Green Building Label.

Operating Machinery: The terminal is equipped with a power recycling system for retrieving electricity. "Alternative Maritime Power" (AMP) is also installed to provide shore power for modern ships during berthing. Electric vehicles were purchased as internal shuttles.

Infrastructures: Both the administrative building and the gate complex were installed with solar power panels on the roof, and complex solar and wind power lights were put in the administrative zone. Those green power resources are estimated to generate up to 139kw of power in total, and 170,000 watts of electricity per year. The roadbed and the ground of the terminal were backfilled with sands obtained from dredging. A sewage processing system was installed for disposing of wastewater and sludge oil. Thus, 100% of industrial and 80% of household



Implementation/Timeline

September 2007- KMCT signed an investment contract with Kaohsiung Branch of TIPC

April 2008 - The government released the lands designated to the project (the land of Hungmaogang Village and non-Hungmaogong Village and the land of No. 111 Coal wharf); KMCT BOT terminal project was started.

June 2008 - The coffer of Dalin offshore reclamation area completed

December 2010- The projects of Port public waters dredging, access road improvement project and relocation of Dalin Coal Wharf completed

January 2011 - The first and second docks (No. 108 & 109) in Phase I completed

September 2014 - The third and fourth docks (No. 110 & 111) in Phase II completed

wastewater could be recycled. The original trees of Hong-Mao Gang (San Domingo Harbor) were preserved and a green belt was established. By means of the pervious surface technology, water can be recycled and reused.

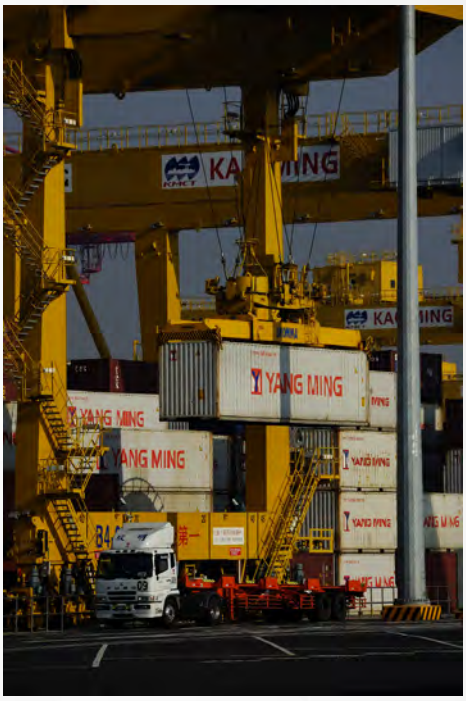
Hi-Tech Berths

KMCT is committed to high-quality service, safety, efficiency and energy saving in choosing scope, machinery and facilities.

Pier Specifications: KMCT operates four berths for a total length of 1500 meters and with a draft of 16.5 meters that can accommodate 10,000-TEU and bigger container vessels. The container yard has functional areas, including 11,480 ground slots for laden containers and 2,490 ground slots for empty containers.

Operating machinery: KMCT is equipped with the Dual-Hoist Quayside Gantry Crane with maximum loading up to 100 tons, which can hoist two 40-foot containers of four 20-foot containers in one move. The equipment has enhanced productivity to 200 containers per hour, dramatically reducing the berthing time.

Cabinet field facilities: The container yard is operated with Automated Rail Mounted Gantry Crane (ARMG) and Radio Frequency Identification (RFID) technology to enhance safety and efficiency. This



is in addition to an Auto Gate System to accelerate the speed of traffic flow. The elimination of manual control has shortened the transit time of trailers to 15 minutes.

Investment Amount

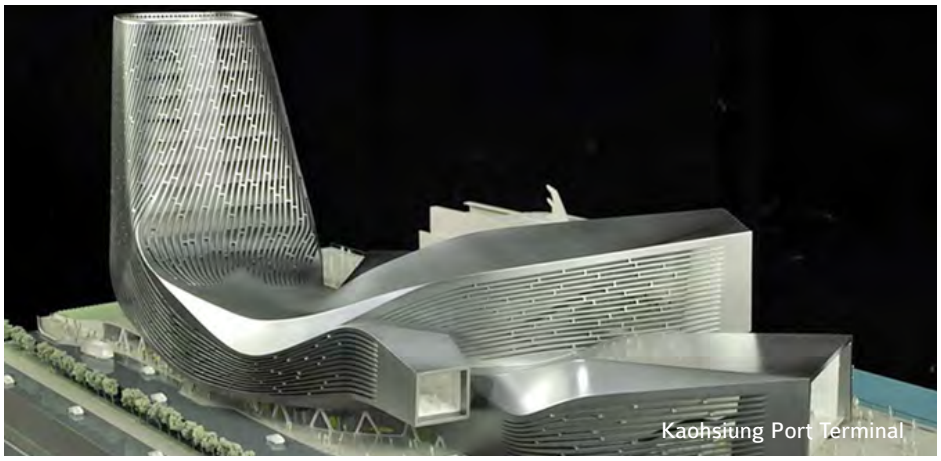
Government investment: NT$ 24.77 billion. (NT$ 3.29 billion on construction)

Private investment (KMCT): approximately NT$ 18.124 billion.

Effect/Benefits

1. In response to the trend of growing ship size and the needs of growing numbers of containers in Kaohsiung Port, the project will solve problems such as the shortage of a large terminal in Kaohsiung Port and the scattered operators' terminals, which are unfavorable for operation.
2. The highly efficient machinery not only reduces the operation time, but also decreases the berthing/idling time of container ships or towed vehicles so that the energy consumption is reduced as well.
3. The electric vehicles and shore power system in the container yards can reduce the vessels' fuel consumption and the carbon dioxide emissions during loading operation so that the goals of energy conservation and carbon emission reduction are achieved.
4. The solar power panels and complex solar and wind power lights installed on the administrative building and in the administrative zone can generate up to 170,000 watts of electricity per year and reduce 108,120kg of carbon dioxide emissions.
5. Filling the roadbed and the ground of the terminal with dredged mud and sand not only reduces resource consumption, but also the amount of waste generated during construction.
6. A sewage processing system to recycle waste water and oil from the containers in the operational and administrative zones and the pervious surface technology to recycle and reuse water can prevent the polluted water from being discharged from ships and drains into the Port so that the Port water quality can be improved.

3. Old Kaohsiung Harbor Regeneration Plan



Environmental Management Strategies: Exemplifying, Engaging

Content

Attention/Motives

In the early days, Kaohsiung Port was used as a port only, and there was a power division between the central and local governments that governed the Port. As a result, the Port is not connected to the City and people became alienated from the Port and were unfamiliar with it. After the 1990s, due to the increasing vessel size and the transformation of the economy, the commercial Port area gradually moved to the southern part. Consequently, the area in the northern part of the Port neighboring the City was left unused.

Solutions

Port land use strategy in the initial stage

Functional adjustment of the urban area

In 1998, by means of land readjustment, Kaohsiung City Government planned the Kaohsiung Multifunctional Commerce and Trade Park covering an area of 590 hectares. Some parts of the industrial area within the Port were transfigured and used as cultural and leisure area, commerce and trade area and warehousing area. The development focused on waterfront leisure and recreational business.

Bringing people to the Port

In 2005, the Kaohsiung Branch of TIPC collaborated with Kaohsiung City Government. A Development Commission Administrative Contract was signed in order to start the construction work of the Old Kaohsiung Harbor Development. The walls between the Port and the City were removed. Several piers no longer serve (including Love Pier, Glory Pier and Singuang Wharf). Instead, big events such as lantern festivals and Kaohsiung Maritime Expo have been held here and have brought people here.

Building a wonderful Port space

The area surrounding the Port which was released has infrastructure construction with green design. The walking trails, greenway, sidewalks and secondary roads have been linked into an open green network. At the same time, the old railway of the Harbor line (from Chenggong Road to Kaohsiung Port station, a total distance of 5.7 km) is transfigured into Harbor Line Bike Path and Urban Greenway that are part of the new Kaohsiung Railway Cultural Park, to encourage the use of public transport and to serve as recreational space.

Introducing industry

Kaohsiung Branch of TIPC rented some of the old Harbor warehouses to the Bureau of Cultural Affairs, Kaohsiung City Government. These warehouses, along with the old warehouse of Taiwan Sugar Corporation, were transformed into art warehouses and given a new name, Pier-2 Art Center. It serves not only as an art exhibition site, but also as a station of cultural and creative industry. Covering an area


Development Site of Kaohsiung Marine Culture and Pop Music Center

of about 6600 square meters with a total of 21 exhibition halls, the art center has created development opportunities for the cultural and creative industry. It has become an important venue for international arts in Kaohsiung.

Asia New Bay Area

Located at the center of Kaohsiung Multifunctional Commerce and Trade Park, Asia New Bay Area is a collaboration project of the Port-City transformation development jointly carried out by the Kaohsiung Branch of TIPC and Kaohsiung City Government, to achieve the goal of collaborative development of the Port and the City.

Covering culture, environmental protection, commerce and trade, travel and transportation, the Asia New Bay Area plan is centered on four world-class architectures: Kaohsiung Maritime Cultural and Pop Music Center, Kaohsiung Port Terminal, Kaohsiung Public Library and Kaohsiung Exhibition and Convention Center, along with the Waterfront Line of the Light-Rail Transit. All of the buildings are designed based on an international competition with green building concepts. With a total investment of over of NT$2 billion, it is expected to encourage the development of the audiovisual industry, digital content industry, convention and exhibition industry, cultural and creative industry, waterfront recreation industry and yacht industry in Kaohsiung City.

Implementation/Timeline

1998 Land readjustment for Kaohsiung Multi-functional Commerce & Trade Park

2002 Completion of Pier-2 Art Center project

2005 Cessation of service of Love Pier and Glory Pier

2006 The Kaohsiung City Bureau of Cultural Affairs took over the Pier-2 Art Center

2010 Takao Railway Museum opened in the Railway Culture Park of Kaohsiung Port Station

2011 Completion of Bike path of Kaohsiung Harbor Station

2013 Completion of Kaohsiung Exhibition and Convention Center

2014 Completion of Kaohsiung Public Library

2015 Phase 1 operation of the Waterfront Line of Light-Rail Transit

2017 Completion of Kaohsiung Port Terminal, Kaohsiung Marine Culture and Pop Music Center & Phase 2 operation of Waterfront Line of Light-Rail Transit

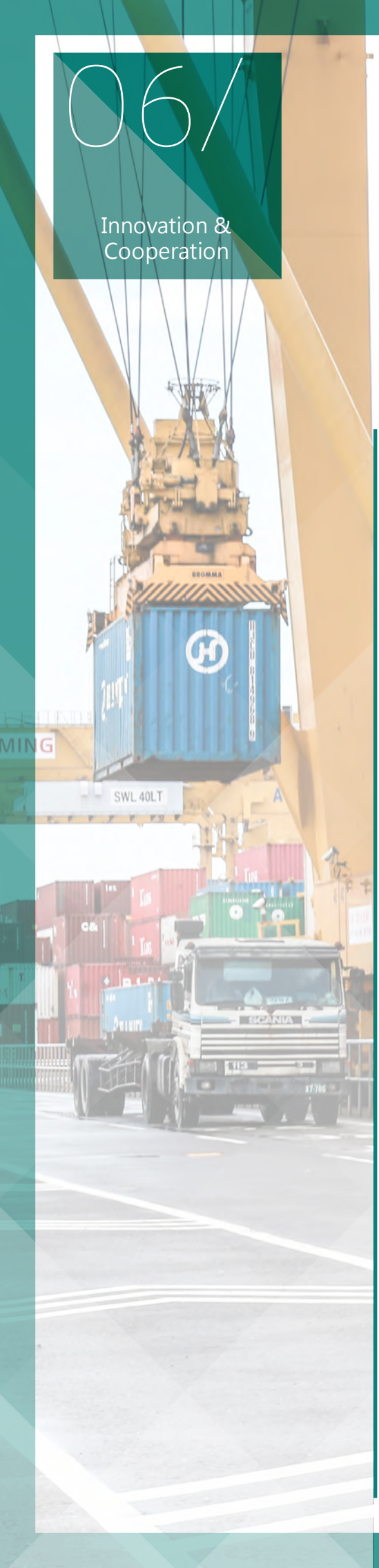
Investment Amount

Total investment is approximately NT$ 20 billion.
Kaohsiung Marine Culture and Pop Music Center: NT$ 5.45 billion
Kaohsiung Exhibition and Convention Center: NT$ 3.68 billion
Kaohsiung Public Library: NT$ 1.5 billion
Kaohsiung Port Terminal: NT$ 4.5 billion (from TIPC)
Waterfront Line of Light-Rail Transit: NT$ 4.7 billion from Kaohsiung City Government and NT$ 3.6 billion from Taiwan Central Government
Railway Culture Park of Kaohsiung Port Station: NT$ 120 million

Effect/Benefits

The redevelopment projects of the old Harbor and the Asia New Bay Area project will transform the northern part of the Port into an industrial center of finance, cultural and creative business, tourism, knowledge and travel, as well as introduce long-term development that helps the Port coexist with the City well so that Kaohsiung's competitive advantage will be increased among the commercial ports in the Asia-Pacific region. The Asia New Bay Area project is expected to result in the following benefits for Kaohsiung Port and Kaohsiung City.

1. Promoting and accelerating the redevelopment of the area that connects the Port and the City - The materialization of the project will encourage the land and industrial development of the area near the Port. The unused space of the old Harbor (Piers 1-10) is scheduled to be released in 10 years in succession, likely for hotels, shopping centers, offices and meeting halls in the future.
2. Expanding value-added development of the cultural industry- The success of Pier-2 Art Center has encouraged the Kaohsiung Branch of TIPC, through the collaboration with Kaohsiung City Government, to expand the transformation work of the old Port warehouses and to create a cultural park surrounding the Port which will become a new popular spot in the City. There will be clusters of related industries as well.
3. Promoting the economic development of Kaohsiung- With the completion of the major construction projects step by step, related industries will be stationed one after another. More than 8,000 new jobs will be created in Kaohsiung City. At the same time, numerous travelers: visitors and participants of the cultural, music, convention, exhibition and yacht events will bring great economic opportunities for Kaohsiung Port.
4. Increasing opportunities to get close to the Port for the general public - The opening of the old Port area is not only for the establishment of the new industries and recreational activities, but also for the general public. People can enter the Port and understand its operation. It also helps to create a positive Company image of the Kaohsiung Branch of TIPC.
5. Enhancing Kaohsiung's international visibility - Asia New Bay Area will become a new landmark for Taiwan. The four world-class architectures, designed via an international competition, will enhance Kaohsiung's position in the world, as well as provide the best business environment to attract foreign companies.



6.2 Involvement and Cooperation

The Kaohsiung Branch of TIPC has been very active in collaborating with the private sector, public sector and academia in Taiwan and abroad on issues related to the environment. In addition to understanding environmental development trends in the international arena, the Port of Kaohsiung also works to achieve the goal of becoming a sustainable green port through technological cooperation, joint venture, joint investigation and seminars.

Participation in international organizations

Terminal operators

Kao Ming Container Terminal Corp. -Kao Ming Green Terminal

In 2008, the Kaohsiung Branch of TIPC and Kao Ming Container Terminal Corp. (KMCT) collaborated through BOT to invest in the first world-class green terminal in Terminal No. 6 of Kaohsiung Port, using automation and other high-tech systems to improve the operation efficiency of the terminal and achieve the goals of carbon reduction and energy saving.

Yes Logistics Corp.

The Kaohsiung Branch of TIPC cooperated with Yes Logistics in 2013 to install a solar photovoltaic system on the rooftop of the warehouse (KLC2). The system can generate 411.72kWp of electricity.

Association

Association of Pacific Ports(APP)

The Association of Pacific Ports is an association of port authorities or port management committees. Through regular meetings and seminars for industry, public sector and academia, APP provides ports in the Pacific area with a platform to exchange professional knowhow, management knowledge and practical experiences. The Port of Kaohsiung attends the annual seminars to exchange experiences with member ports and to understand the present status and trends of port management in the Pacific area.

The International Association of Ports and Harbors(IAPH)

The International Association of Ports and Harbors (IAPH) is the most influential port association in the international community. As a non-governmental organization, IAPH gives advice to UN agencies (ECOSOC, IMO, UNCTAD, UNEP, ILO and WCO). The Port of Kaohsiung attends the biennial World Ports Conference to understand world trends of port development.

Cooperation

Nansing Free Trade Port Zone

Nansing Free Trade Port Zone will be the hinterland for the Kaohsiung Free Trade Port Zone in the future. The existing windbreak forest within the Zone will be kept. An insulation green belt will be added around the Zone with multi-layered endemic vegetation. The administrative center and other public buildings (such as transforming substation and checkpoint) will all be green buildings to reduce carbon emission.

Construction of warehouses for Multiple Country Consolidation (MCC)

The Kaohsiung Branch of TIPC has built new warehouses in Qianzhen Commercial Port for multiple country consolidation (MCC) (in 2013). Solar panels are installed on the rooftop of the warehouses.

Cooperative Working Group between Taiwan International Ports Corporation and Shanghai International Port (Group) Co. Ltd.

Since 2014, TIPC has formed a cooperative working group with Shanghai International Port (Group) Co. Ltd. The working group aims to improve the engineering and technology of both ports through exchanges of ideas and experiences in maintenance of equipment, energy reduction, environmental protection and application of new technology.

Academia

Academia

To enhance our international competitive edge and quality of shipping operation, to create a good environment for education and academic research so international ports and universities can prosper, TIPC has signed an MOU with three national universities since 2012. In the future, under the principle of mutual benefits, parties of the MOU will conduct academic exchanges and research, academia-industry collaboration, education and training, internship programs and seminars on port management. In addition to the improvement of teaching quality, universities can act as the think tanks of terminal operators and play a more active role in helping ports improve port management.

Environmental protection groups

Kaohsiung Wild Bird Society

The Kaohsiung Branch of TIPC discusses ecological protection in Nansing Free Trade Port Zone with the Kaohsiung Wild Bird Society. Existing habitats will be kept and a multi-layered microhabitat environment will be created for migratory birds and birds of passage. Members from Kaohsiung Wild Bird Society are invited to teach our staff about ecology in the Nansing Free Trade Port Zone.

06/

Innovation & Cooperation

Public sector

Institute of Transportation (IOT), MOTC

The Institute of Transportation (IOT) provides competent authorities of transportation in Taiwan with various research reports and proposals to "reduce congestion", "ease traffic gridlock", "increase traffic volume" and "expand and use existing transportation facilities". The IOT also formulates mid-term and long-term transportation development plans. The Kaohsiung Branch of TIPC has cooperated with the IOT on several projects, such as "research of Taiwan green port establishment" (2011-2014), "Operating strategies on the Port of Kaohsiung for the changes in the container hub-and-spoke network of the Asia Pacific region" (2012-2013) and "A Study on the Innovation of Kaohsiung Harbor" (2013-2014).

Marine Bureau, Kaohsiung City Government

Kaohsiung Branch of TIPC works with the Marine Bureau of Kaohsiung City Government, and forms an ocean protection alliance with 33 entities from private sector, public sector, academia and the military to prevent ocean pollution.

Bureau of Cultural Affairs, Kaohsiung City Government

The Kaohsiung Branch of TIPC has signed a contract with the Bureau of Cultural Affairs (BCA), Kaohsiung City Government, to provide some of its warehouses for art exhibition, and to promote the cultural and creative industry with the BCA. Functions of the warehouses near The Pier 2 Art Center have changed accordingly.

Ministry of Economic Affairs, Executive Yuan

The Kaohsiung Branch of TIPC works with the Export Processing Zone Administration of the Ministry of Economic Affairs in Kaohsiung and EPB of Kaohsiung City Government monthly to conduct joint inspections of the public bulk cargo dock of Zhongdao Commercial Port to prevent pollution in the Port area.

Environmental Protection Administration, Executive Yuan

The EPA of the Executive Yuan and the US Environmental Protection Agency cooperate according to an "Agreement between the American Institute in Taiwan and the Taipei Economic and Cultural Representative Office in the United States for Technical Cooperation in the Field of Environmental Protection" (1993). The agreement also covers a series of cooperation strategies for the zPort environment, so American experts are regularly invited to Taiwan for seminars, offering technical assistance and sharing information (such as regional partnership for "Port Air Quality Improvement Strategies and US-Taiwan Sustainability Forum").

Southern Taiwan Service Center of MPB, MOTC

The Kaohsiung Branch of TIPC works with the Southern Taiwan Service Center of MPB, MOTC to conduct joint inspections of the Port area.

Environmental Protection Bureau, Kaohsiung City Government

The Kaohsiung Branch of TIPC works with EPB of the Kaohsiung City Government to encourage diesel vehicles entering the Port area to join Kaohsiung City's autonomous management project to set up a vehicle license plate recognition system at Checkpoint No. 55 for joint inspection.


口設施保全(ISPS)
TAIWAN
CDC

07 Training

07

Training

7. Training

In compliance with its environmental policies, the Kaohsiung Branch of TIPC provides suitable environmental education and training to improve staff's awareness of environmental protection, enhance staff's knowledge of environmental protection and improve the competitiveness of the Port of Kaohsiung.

In 2011, the Environmental Education Act was announced. Public institutions should formulate their own annual environmental education programs. Each staff member should receive at least four hours of environmental education per year. In 2012 and 2013, the Kaohsiung Branch of TIPC organized 12 environmental education courses for internal staff members, with over 1,300 participants in total (In 2012, the Company employed 1,21 persons and 1,088 person in 2013). The courses included: pollution prevention, natural disaster, environmental impact assessment and ecological education.

In 2014, the Kaohsiung Branch of TIPC organized 12 environmental education courses for internal and external staff (excluding labor safety training). Participants included: general staff members, operation staff, port security, ISPS staff and executive managers, navigation and port facilities managers. The total number of participants in 2014 is more than 1,000.


年度港口設施保全(ISPS)
、海洋油污染、疑似生恐事件演習
港
101年度港口設施
(ISPS)·港安反恐暨
火災·海洋油污染
生恐事件應變演習
中華民國10
11月23日

08/ Communication & Publication

7. Training

The Kaohsiung Branch of TIPC works to provide information related to the Port through activities, seminars, workshops, publications, websites and exhibitions to ensure that the general public, terminal operators, academic institutions and competent authorities can have a better understanding of the Port.

First Green Port Festival

Publication /Promotion

KaoPort Newsletter

KaoPort Newsletter is an English language quarterly periodical issued by the Kaohsiung Branch of TIPC, providing information to Port operators, academic institutions and staff in TIPC. The quarterly is available on the English website of the Kaohsiung Branch of TIPC.

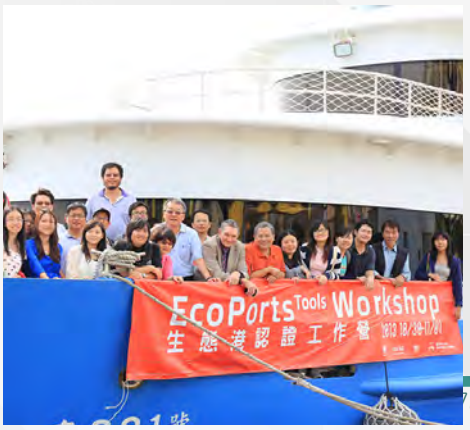
KaoPort Newsletter

"Maritime and Port Newsletter" is a monthly periodical issued by China Maritime Institute and the Kaohsiung Branch of TIPC, providing information to Port operators, academic institutions and staff in TIPC.

Seminars/ Workshops

US – Taiwan Sustainability Symposium

Port-City Collaboration Forum



Educational Workshop for EcoPort Accreditation

Activities

First Green Port Festival

The first Green Port Festival in Taiwan was organized by the IOT, National Sun Yat-sen University (NSYSU) and TIPC. A series of activities was organized in the Pier 2 Art Center to allow the public to know Kaohsiung Port and green ports better through cruise tours, photo contests of the Port and the City, and a interactive exhibition.

Rubber duck in Kaohsiung

The Kaohsiung Branch of TIPC provided Kaohsiung City Government with Glory Pier for the exhibition of the rubber duck in Kaohsiung, and notified relevant authorities to ensure the event was smooth and the cruise ships were safe.

Commencement of the Green Port Project

Through this event, TIPC announces the project to transform the seven ports into green ports. TIPC also presents future plans and present achievements of green ports, including current progress of TIPC's green ports.

Website

Chinese and English web pages for the promotion of green ports in Taiwan

To present the achievements of TIPC in promoting green ports, Chinese and English web pages have been set up on our website. These web pages can also enhance communication between Taiwan and other countries.

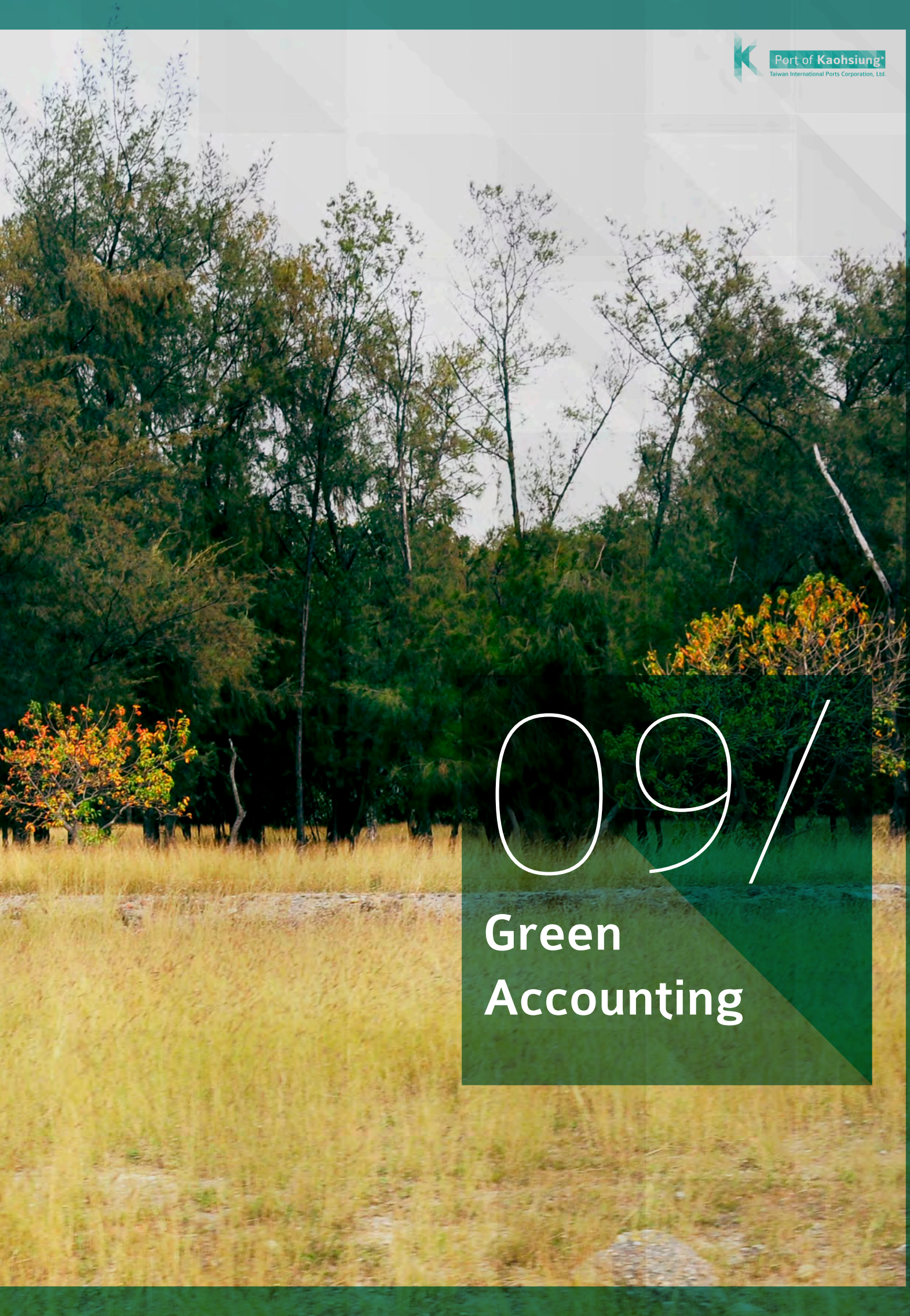
"Contact us" on World Wide Web of Kaohsiung Branch of TIPC

Kaohsiung Branch of TIPC, the general public and consumers can provide us with their feedback through the e-mail information on "contact us".

Exhibition

The Kaohsiung Harbor Museum

The Kaohsiung Harbor Museum used to be an office for the Customs Office and the Harbor Bureau. It later became a historic building and an exhibition space to display photos and models of Kaohsiung Port to tell the story of Kaohsiung Port. The Museum preserves the history of the Port and educates the public about the Port.



09
Green Accounting

09

Green Accounting

9. Green Accounting

9.1 Environmental costs

Regarding environmental issues, the Kaohsiung Branch of TIPC has spent funds on their employees, environmental maintenance and management, environmental monitoring, publications, emergency response and communication, with the aim of enhancing employees' environmental awareness and environmental maintenance, to improve environmental quality and ability of emergency response, and to increase the public's understanding of the port. The various costs are as follows:

- Employees: Personnel costs of environmental control, and environmental education and training
- Environmental maintenance and management: Port green landscaping, waste disposal and dredging
- Environmental Monitoring: Monitoring the air, noise, water, sediment, dredging as well as environmental patrol
- Emergency Response: The costs of accident management, laboratory test fees for materials and dangerous goods that pollute the Port, and so on
- Communication and Publications: Website maintenance, promotional activities and environmental publications

Unit: NTD thousands

Items of Expenses	2012	2013
Employees	49,306	67,710
Environmental Maintenance and Management	74,524	67,907
Environmental Monitoring	27,609	27,774
Emergency Response	1,494	3,853
Communication and Publication	3,704	5,519
Total	158,143	172,763

Table of Costs related to Environmental Issues, Kaohsiung Branch of TIPC in 2012

9.2 Environmental Assets

In order to develop Kaohsiung Port into a transshipment hub in the Asia-Pacific Region, an all-aspect logistics transshipment port and an environmentally friendly green port, Kaohsiung Branch of TIPC has promoted a series of Port development projects (which can be subdivided into follow-up projects and new projects) and projects of general constructions and equipment. Some of them involve environmental issues. For example, new buildings are designed and constructed as green buildings, and also in a way to increase opportunities for the public to get close to the Port; the wharfs are reconstructed with shore power systems; old vessels and vehicles are removed or replaced in order to increase the effectiveness and reduce pollutant emissions. The total amounts that Kaohsiung Branch of TIPC invested in the fixed assets regarding environmental issues are NT$4,130,694,000 (approximately €99,777,000) in 2012 and NT$4,667,880,000 (approximately €112,840,000) in 2013.

Assets invested in Environmental Issues in 2012

Unit: NTD thousands

Fixed assets \ Items		Land	Land Improvement	Buildings	Machinery and Equipment	Transportation Facilities	Miscellaneous Equipment	Total
Development Plan	Follow-up Projects	0	1,112,500	250,000	87,500	430,000	0	1,880,000
	New Projects	1,506,791	275,000	5,000	28,000	0	0	1,814,791
General Building and Equipment Plan		0	139,000	53,392	149,331	80,264	13,916	435,903
Total		1,506,791	1,526,500	308,392	264,831	510,264	13,916	4,130,694

Table of Assets in which Kaohsiung Branch of TIPC invested, in regard to Environmental Issues in 2012

Assets invested in Environmental Issues in 2013

Unit: NTD thousands

Fixed assets \ Items		Investment Property	Land Improvement	Buildings	Machinery and Equipment	Transportation Facilities	Miscellaneous Equipment	Total
Development Plan	Follow-up Projects	552,500	1,962,465	913,335	252,280	910,000	0	1,880,000
General Building and Equipment Plan		0	6,636	0	46,364	14,363	7,937	435,903
Total		552,500	1,969,101	913,335	300,644	924,363	7,937	4,130,694

Table of Assets in which Kaohsiung Branch of TIPC invested, in regard to Environmental Issues in 2013

10/ Improvement Recommendations

10

Immrovement Recommendations

10. Improvement Recommendations

Taiwan is an island country; hence, the country's economy and trade are closely connected to the management of its ports and development of harbor cities. As the biggest international commercial port in Taiwan, the Port of Kaohsiung has played an important role in the history of Taiwan. Since the Port opened in 1906, it has created high economic value for the country. However, the rapid development of the Port has resulted in pollution of the environment, abandonment of the land, and decreased biodiversity; in other words, the local ecological environment, culture and society have all been affected.

The concept of sustainable development was first proposed in 1992 at the Earth Summit. Since then, this concept has become the goal pursued by humankind as we strive to find a balance among environment, society and economic development. In recent years, the shipping industry around the world has also incorporated environmental friendliness into our operation, which explains the emergence of such concepts like "Eco- Port" and "Green Port". In the future, port development around the world will be guided by these green concepts.

The Port of Kaohsiung of TIPC became a public entity in 2012. While the Port continues to be a hub port for container freight in the Asia Pacific region and strives for economic value, the Port is also committed to share its responsibility for sustainable development of the world. Hence, the Port will implement its environmental policies and its short-term, mid-term and long-term green port development measures and action plans from four different aspects: "travel", "shipment", "port environment" and "city/community development". The ultimate goal of the Port is to become an international green port.

For the purpose of attaining freedom in the world of nature, man must use knowledge to build, in collaboration with nature, a better environment. To defend and improve the human environment for present and future generations has become an imperative goal for mankind-a goal to be pursued together with, and in harmony with, the established and fundamental goals of peace and of worldwide economic and social development.

- Declaration of the United Nations Conference on the Human Environment(1972)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PORT OF KAOHSIUNG, TAIWAN INTERNATIONAL PORTS CORP.,LTD

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MEPM