Port of Kaohsiung

Environmental Report

▶ 2016

Environmental Report Work Team

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Port of Kaohsiung
Environmental Report

This environmental report presents Kaohsiung Port' s achievements in environmental protection from 2014 to 2015 as well as the environmental policy, commitments and action plans of the Kaohsiung Branch, Taiwan International Ports Corporation, Ltd.

If you have any inquiries regarding this report, please contact us.

Occupational Safety Department,
Kaohsiung Branch of 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.

Chih Ching Chang

Chang, Chih-Ching
Chairman of TIPC
Date: 10/14/2014

Lee Tai Hsin

Lee, Tai-Hsin
President of TIPC
Date: 10/14/2014

臺灣港務股份有限公司
高雄港務分公司
TIPC PORT OF KAOHSUNG TAIWAN INTERNATIONAL PORTS CORPORATION, LTD

Port of Kaohsiung, Taiwan International Ports Corporation

Environmental Policy

The Kaohsiung Branch of the Taiwan International Ports Corporation (TIPC) understands its role as a port management entity responsible for maintaining and improving the port environment. Additionally, we ought to consider environmental protection as a part of sustainable management. Therefore, we are committed to reducing environmental impacts resulting from port operations, as well as to providing an environmentally friendly, sustainable, and progressive port of high quality. To ensure that the port environmental performance is consistent with its environmental policy, the following principles will be implemented:

- Fully apply the environmental management system; promote sustainable development of the green port
- Follow environmental laws and regulations; endeavor to fulfill corporate social responsibility initiatives
- Provide appropriate environmental education and training; enhance the 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 adjacent communities to participate in creating a friendly environment in the port city

The environmental policy will be effectively conveyed to employees, shipping companies, lessees (or contractors), and residents of adjacent communities. The policy is available on the official website of the Kaohsiung Branch of the TIPC.

Huang Kuo Ying

Huang, Kuo-Ying

President of Port of Kaohsiung, TIPC

Date: 2016. 6. 8

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臺灣港務股份有限公司
高雄港務分公司
TIPC PORT OF KAOHSIUNG TAIWAN INTERNATIONAL PORTS CORPORATION, LTD

Environmental Objectives

To achieve our commitments in environmental policy, the following environmental objectives are set according to the ten major environmental impacts from the port:

- **Improvement of air quality in the port:**
  To encourage speed reductions for vessels entering and leaving, reduce air pollution emissions from loading and unloading operations, and continuously monitor air quality at the port
- **Reduction of noise within the port area:**
  To build an access transportation system, improve traffic, and control construction noise
- **Improvement of water quality in the port:**
  To implement wastewater and sewage collection and treatment within the port area, and conduct long-term water quality monitoring
- **Marine sediment pollution monitoring:**
  To treat and reuse dredging sediment, improve sediment contamination in the port, and monitor the dredged-sediment disposal area
- **Strengthening relationships with local communities:**
  To disclose information, encourage public participation, and increase opportunities to interact with local communities
- **Close attention to port development:**
  To coordinate with harbor city development, follow mitigation measures, and implement environmental monitoring for water-related development
- **Reduction of land contamination within the port area:**
  To continuously monitor and remedy the contaminated sites of the port and reuse them through brown field revitalization
- **Control of port resource consumption:**
  To reduce resource usage and waste generation and promote the port resource reduction and control plan
- **Implementation of habitat restoration:**
  To reduce development impact by implementing compensation measures as well as maintaining and restoring the existing environment of the port
- **Improvement of energy efficiency :**
  To increase energy efficiency of port operation and promote the development and use of renewable energy

The President of the Kaohsiung Branch of TIPC is responsible for implementing, upholding, and communicating the environmental policy, and for reviewing the environmental policy annually to meet commitments, make continuous improvements, and achieve environmental objectives.

Huang kuo ying

Huang, Kuo-Ying

President of Port of Kaohsiung, TIPC

Date: 2016 6 8

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Message from TIPC

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Message from the Chairman of Taiwan International Ports Corporation ,Ltd

The Taiwan International Ports Corporation (TIPC) operates as Taiwan’ s largest port authority, with direct administrative and management responsibility for seven international commercial ports. TIPC is committed to operating as a model business in terms of becoming a sustained and powerful engine of national industrial and economic growth. Moreover, we are firmly committed to giving our ports streamlined, state-of-the-art operating environments, to fostering emerging business sectors, to facilitating the globalization of our industries, and to stimulating economic growth in the communities and regions around our ports. Meanwhile, TIPC is dedicated to leadership in environmental stewardship and sustainability.

Developing Taiwan’ s international commercial ports in a strategic and sustainable manner is central to the TIPC mission. Therefore, we listen closely to the concerns and demands of the shipping industry and other shipping-related sectors and take resolute action to continually create new value for our clients. TIPC upholds professionalism in all its activities. As a dedicated, service-oriented business, TIPC will always work to make its ports exceptional platforms for investment as well as welcoming, attractive environments for neighboring communities and visitors.

Taiwanese ports establish comprehensive environmental management systems to improve the quality of port areas and reduce the negative impact of ports on the environment as well as increase the confidence of port clients on the port services. We began to apply for EcoPort certification one by one, with Port of Kaohsiung, Taichung and Keelung being certified individually. TIPC will continue to partner with ship owners, tenants, nearby residents, and local governments and work together with port stakeholders to build the ideal international ports.

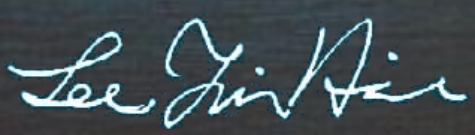
Chang, Chih-Ching
Chairman
Taiwan International Ports Corporation, Ltd.

Message from the President of Taiwan International Ports Corporation ,Ltd

Changes in the global climate and the quality of the marine environment have contributed to a wide attention on pollutions created during ship operations as well as greenhouse gas emissions produced during international shipping. As one of the world’ s most advanced port operators, the Taiwan International Ports Corporation, Ltd. (TIPC) takes into account climate risks when designing its port facilities. Moreover, we actively establish environmental management system and enable public access to port-related environmental information..

Environmental policy is the guiding principle of environmental management in our ports. We work toward minimization of the negative impact on port environment during port operations and development. As of today, the Ports of Kaohsiung, Keelung, and Taichung have received the EcoPort certification of the European Sea Ports Organisation. The Ports of Hualien and Taipei are planning to implement such certification system this year and thus joining the global network of EcoPort.

As a transportation hub in the Asia-Pacific region, Taiwan ports shoulder the responsibility of promoting international trade and shipping development. TIPC will continue to provide the shipping industry with high-quality services so that ports and the local cities coexist in harmony and work jointly to facilitate mutual developments. Such partnership will allow the ports to continue to innovate and will improve our competitiveness. Now and in the future, all of our staff members will work diligently to protect the environment and ensure sustainable port development.



Lee, Tai-Hsin
President
Taiwan International Ports Corporation, Ltd.

Message from the President of Port of Kaohsiung Taiwan International Ports Corporation ,Ltd

The gradually growing awareness at major ports around the globe that port development and environmental protection are inseparable has created a trend of port development that focuses on environmental sustainability. Advanced countries have focused on combining the concepts of green operations and sustainability with port management. With port development aims of achieving low pollution, low energy consumption, environmental restoration, and combined benefits for the surrounding communities while sustaining economic benefits, focuses have been placed on designing suitable port plans, production operations, and protective measures of the surrounding environment.

The Port of Kaohsiung is the largest international commercial port in Taiwan; in addition, the Port of Kaohsiung serves as the main hub port for container transshipments in Asia Pacific, and is responsible for promoting international trade and maritime development. The Kaohsiung Branch of the Taiwan International Ports Corporation, Ltd. (hereafter referred to as the "Kaohsiung Branch") was transformed into a state-owned enterprise in 2012. To promote the Port of Kaohsiung as a main trade and transshipment center in Asia Pacific to pursue a development in the economic benefits of this port, the Kaohsiung Branch, as a port management authority, recognizes its responsibility in sustaining and improving the port environment. Therefore, the Kaohsiung Branch promises to incorporate environmental protection in port operations to ensure sustainable development of the Port of Kaohsiung. Moreover, the Kaohsiung Branch is committed to reducing the impacts of port operations on the environment and to developing a green port. In 2014, the Port of Kaohsiung became the first port in Asia to receive the EcoPorts Certification by the European Sea Ports Organisation. The Kaohsiung Branch plans to continuously promote measures corresponding to the benchmark of green port development to simultaneously attain the goals of ecosystem protection and urban development.

Huang, Kuo-Ying

Huang, Kuo-Ying
President of Port of Kaohsiung
Taiwan International Ports Corporation, Ltd.

Port Profile

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02/

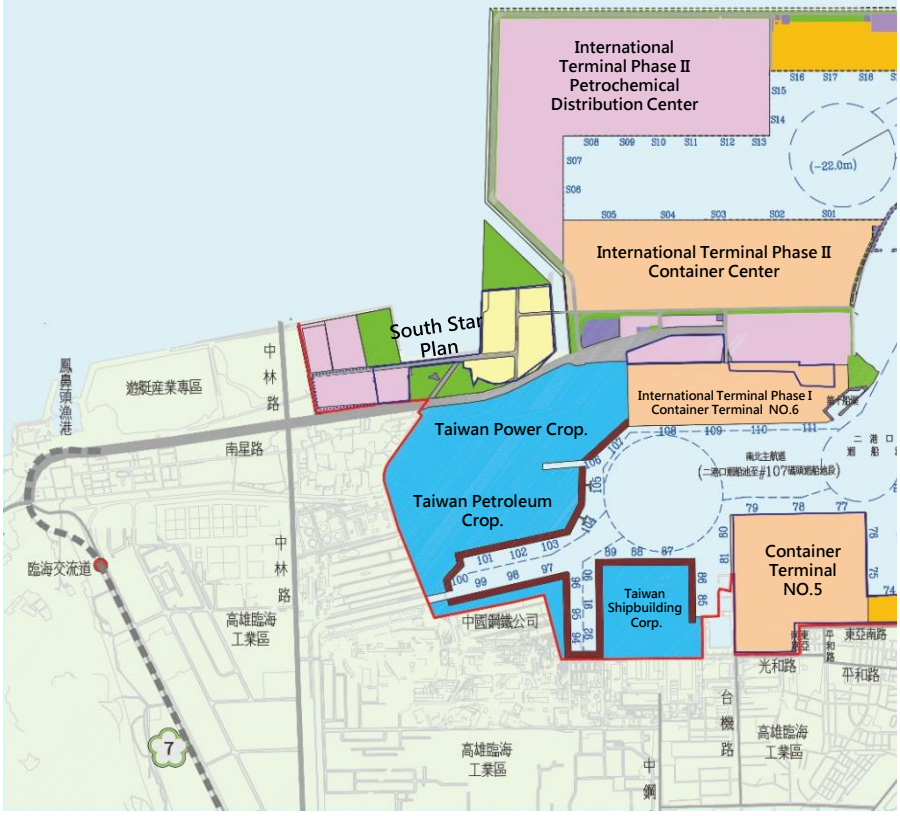
Port Profile

2.1 Port Location and Port Area

The Port of Kaohsiung is located on the southwest coast of Taiwan (22°27 north latitude and 120°10' East longitude) 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 (Cijin 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 (Cijin Seashore). In addition, the Love River, Qianzhen River, Canal No. 5 and Yanshui Stream all flow into the ocean through the Port.

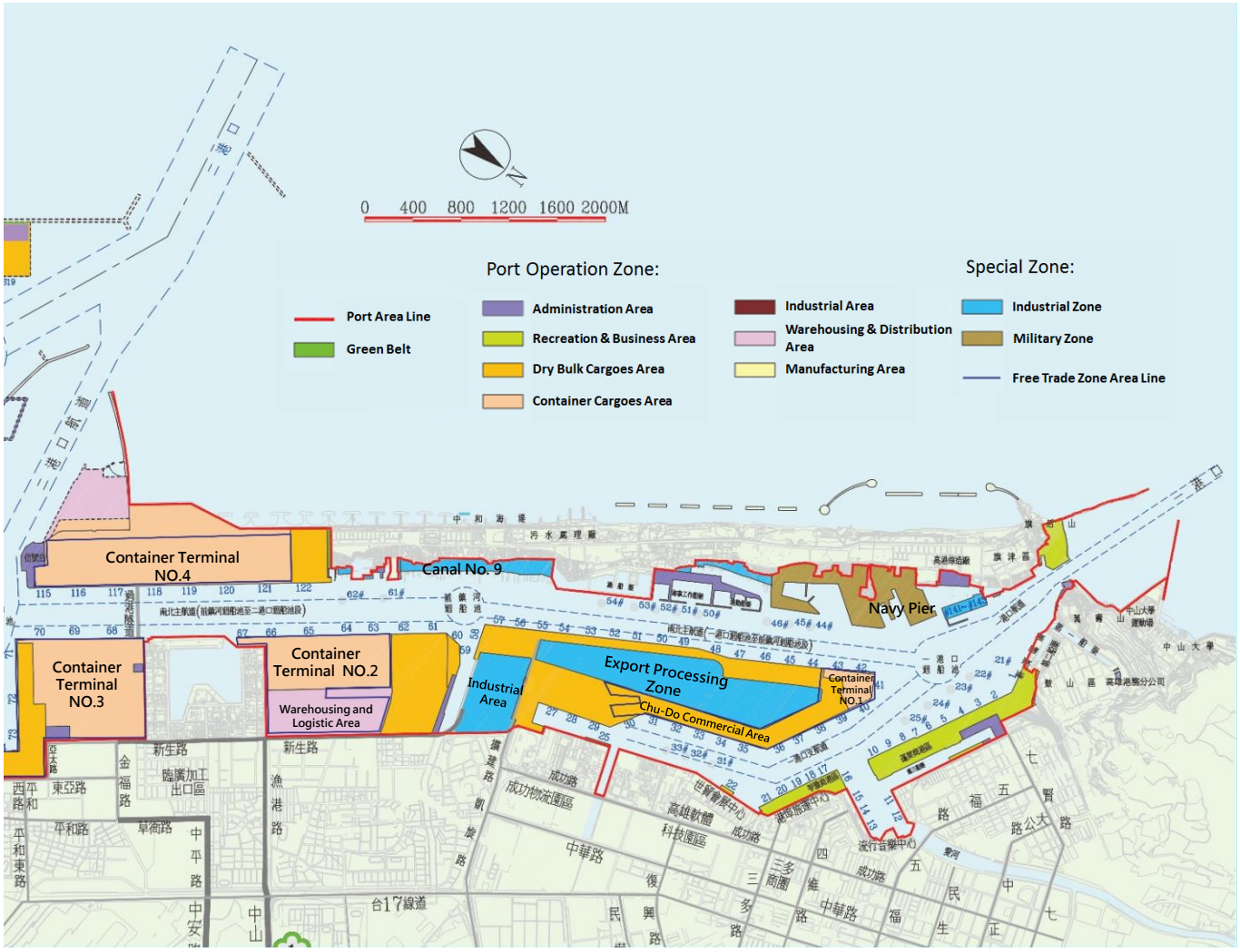
Master Plan of Port of Kaohsiung



Source: Kaohsiung Branch of TIPC

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 reduce legal and institutional restrictions on commercial port operations, enhance the ability of ports to respond to market changes, and increase their competitiveness. 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.



02/ Port Profile

2.3 Commercial Activities

At present, the commercial section of the port include 121 operating docks, whose full length is 27,778 m, 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.

2.4 Main Cargoes

In 2015, the inbound cargo of the Port of Kaohsiung mainly includes mineral products (62.92%), base metals and articles therefore (13.30%), vegetable products (7.66%), and products of chemical or allied industries (5.05%). The outbound cargo primarily includes base metals and their products (34.11%), plastics, rubber, and articles thereof (19.13%), and products of chemical or allied industries (9.29%).

Main Commercial Activities and Cargo Handling of Port of Kaohsiung

Commercial Activities	
Ship building and repair	Petroleum product processing
Marinas / Leisure	Chemical industry
General manufacturing	Storage and packaging
Refrigerated cargo	
Cargo Handling	
Dry bulk	Liquid bulk (non-oil)
Petroleum / Oil products	Ro-Ro
General cargo	

source: Kaohsiung Branch of TIPC

2.5 Port Business

2014-2015 Business of Port of Kaohsiung

Item		2014	2015	Difference	%
Incoming & Outgoing Ships	V.	34,593	34,456	-137	-0.40%
	G.T.	783,937,719	833,810,522	49,872,803	6.36%
Volume of Cargo Handled	Cargo (Revenue ton)	381,360,069	369,519,129	-11,840,940	-3.10%
	Dry bulk and Groceries (Revenue ton)	53,884,777	51,966,064	-1,918,713	-3.56%
	Pipeline cargo (Revenue ton)	32,564,583	28,898,134	-3,666,449	-11.26%
	Total (Revenue ton)	467,809,429	450,383,327	-17,426,102	-3.73%
Number of Cargo Handle	Incoming Cargo(TEU)	5,284,335	5,127,165	-157,170	-2.97%
	Outgoing Cargo(TEU)	5,309,000	5,137,255	-171,745	-3.23%
	Total (TEU)	10,593,335.25	10,264,420.25	-328,915	-3.10%
Volume of Imports & Exports	Incoming Cargo(TEU)	83,825,101	74,179,582	-9,645,519	-11.51%
	Outgoing Cargo(TEU)	31,972,629	29,796,247	-2,176,382	-6.81%
	Total (TEU)	7,153,082	6,926,100	-226,982	-3.17%
	Imports (ton)	122,950,812	110,901,929	-12,048,883	-9.80%
Incoming & Outgoing Passenger	Exports (ton)	76,882	78,835	1,953	2.54%
	Domestic (ton)	137,534	128,608	-8,926	-6.49%
	Total (ton)	214,416	207,443	-6,973	-3.25%

Source: Annual Statistical Report, TIPC, 2014-2015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Environmental Management

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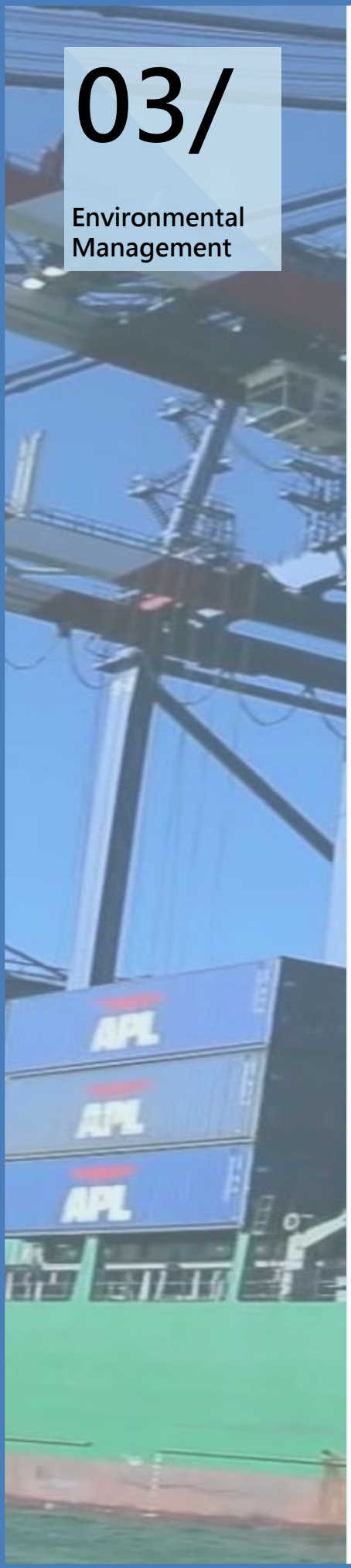

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Environmental Management

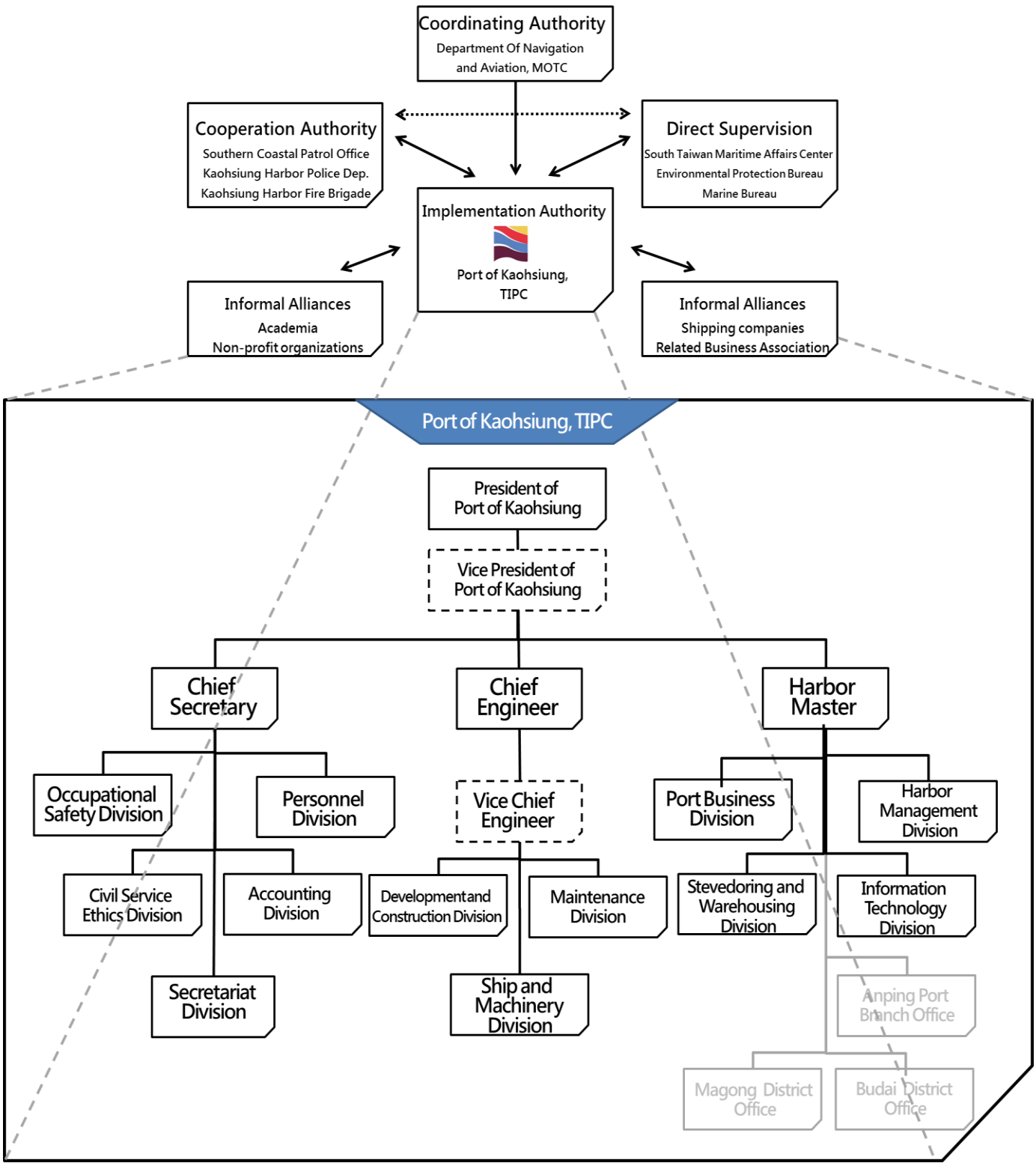
3.1 Organizational Structure

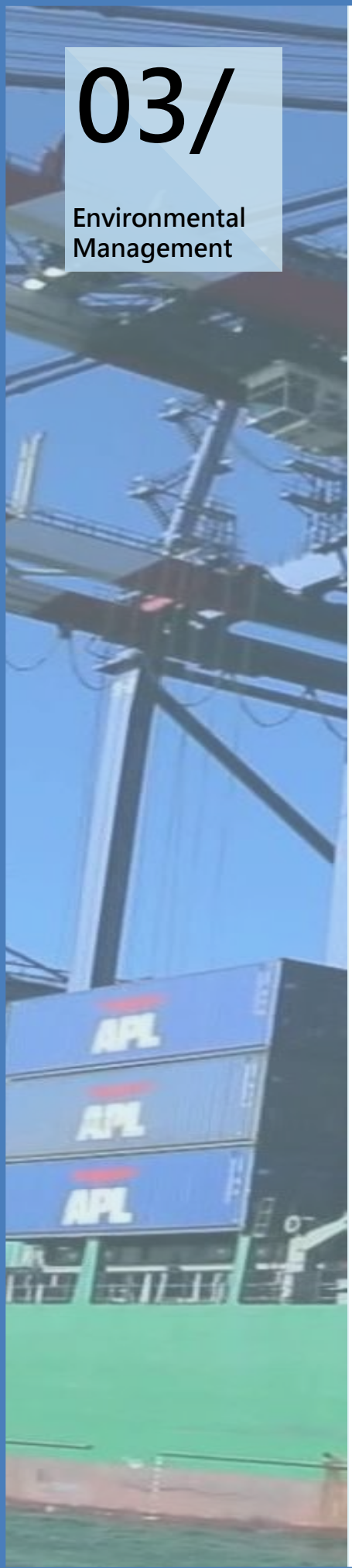
In addition to port environmental management, the Kaohsiung Branch of TIPC is responsible for addressing environmental concerns involved in port operation and management, as indicated by the attribution of responsibilities specified in the Commercial Port Law and the Marine Pollution Prevention Act. The South Maritime Affairs Center is in charge of coping with environmental issues related to public authority. The Marine Bureau of Kaohsiung City Government (hereafter referred to as "Marine Bureau") is in charge of handling environmental issues associated with the Marine Pollution Prevention Act.

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 Section, Pollution Control Section and Environmental Management Section. The Safety and Hygiene Section is in charge of management of occupational safety and hygiene; the Pollution Control Section deals with pollution control, environmental laws, environmental impact assessment, environmental monitoring, oil pollution, chemical accidents, emergency management and environmental education in the port; the Environmental Management Section manages conservation, plant conservation, waste treatment and recycling. Among the staff members, 55 are involved in environmental protection issues.

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

Figure of Organization chart of Kaohsiung Branch of TIPC





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Environmental Management

3.2.1 Relevant international regulations

The Kaohsiung Branch of TIPC follows relevant international specifications, such as International Convention for the Prevention of Pollution From Ships (MARPOL 73 / 78), London Dumping Convention, International Convention on the Control of Harmful Anti-fouling Systems on Ships etc..

>> Relevant Environmental Laws and Regulations Related to Ports in Taiwan

Competent Authorities	Laws Title
Sectors in the Ministry of transportation and communications	The Commercial Port Law
	The Law Of Ships
	Act for the Establishment and Management of Free Trade Zones
Sectors in the Ministry of the Interior	Fire Services Act
Sectors related to agricultural	Wildlife Conservation Act
Sectors related to environmental protection	Marine Pollution Control Act
	Air Pollution Control Act
	Water Pollution Control Act
	Waste Disposal Act
	Environmental Impact Assessment Act
	Environmental Education Act
	Noise Control Act
	Indoor Air Quality Act
	Toxic Chemical Substances Control Act
	Soil and Groundwater Pollution Remediation Act
	Greenhouse Gas Reduction and Management Act
	Public Nuisance Dispute Mediation Act
Intersectoral	Disaster Prevention and Protection Act

source: Kaohsiung Branch of TIPC

3.2.2 Relevant Environmental Laws and Regulations in Taiwan

In addition to the international environmental specifications and conventions, 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 follow table lists the relevant environmental laws and regulations related to ports in Taiwan.

		Central Competent Authority	Local Law Enforcement Agencies
	2011/12/28	Ministry of Transportation and Communications	South Maritime Affairs Center, Maritime and Port Bureau, MOTC
	2010/12/08		
	2012/12/28		
	2011/12/21	Ministry of the Interior	Fire Bureau, Kaohsiung City Government
	2013/01/23	Council of Agriculture	Marine Bureau/ Agriculture Bureau, Kaohsiung City Government
	2014/06/04	Environmental Protection Administration	Marine Bureau, Kaohsiung City Government
	2012/12/19		Environmental Protection Bureau, Kaohsiung City Government
	2015/02/04		
	2013/05/29		
	2003/01/08		
	2010/06/05		
	2008/12/03		
	2011/11/23		
	2013/12/11		
	2010/02/03		
	2015/07/01		
	2009/06/17		Public Nuisance Disputes Mediation Committee, Kaohsiung City Government
	2016/04/13	Ministry of the Interior	Kaohsiung City Government


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State of the Environment

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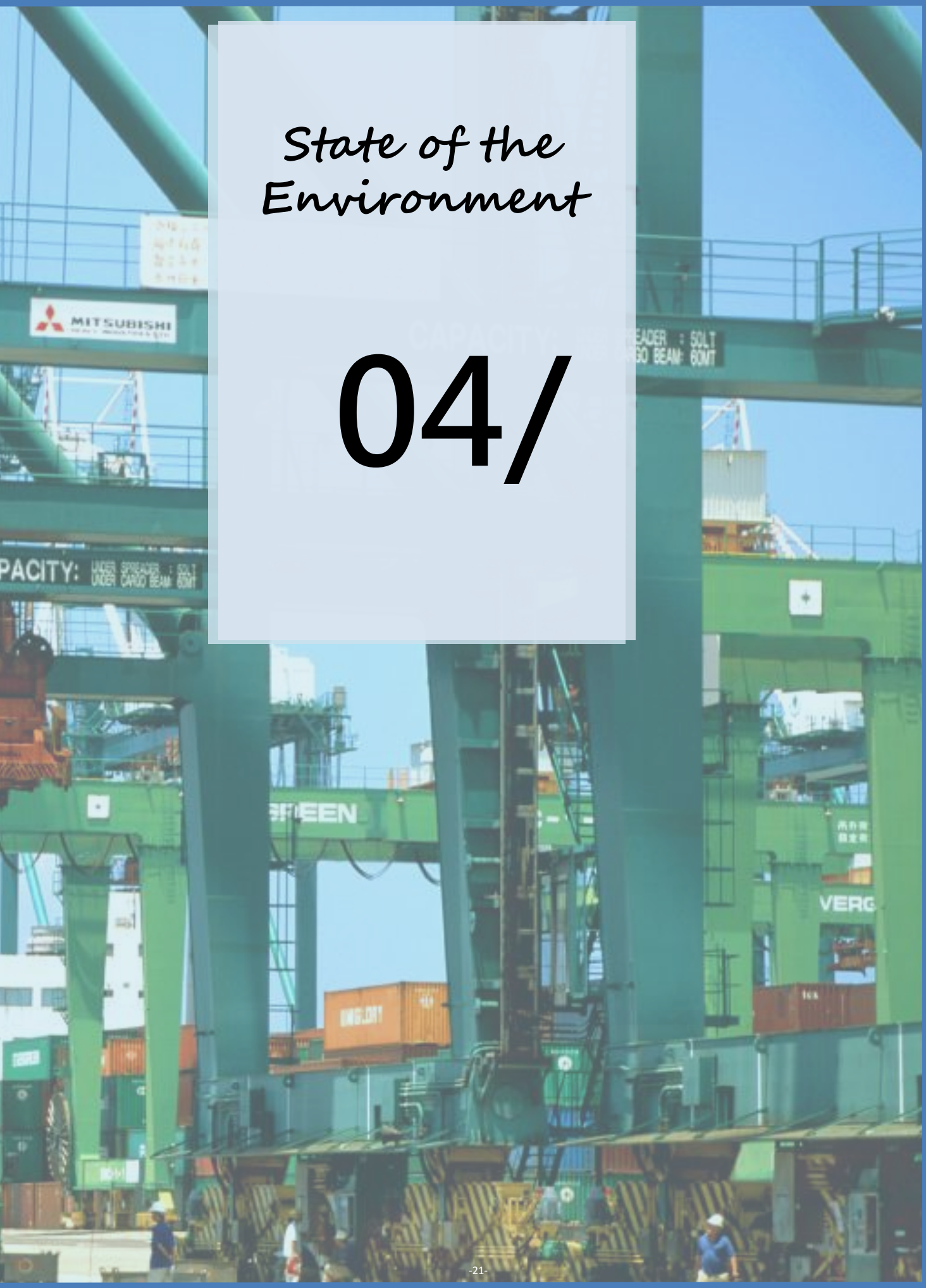


04/

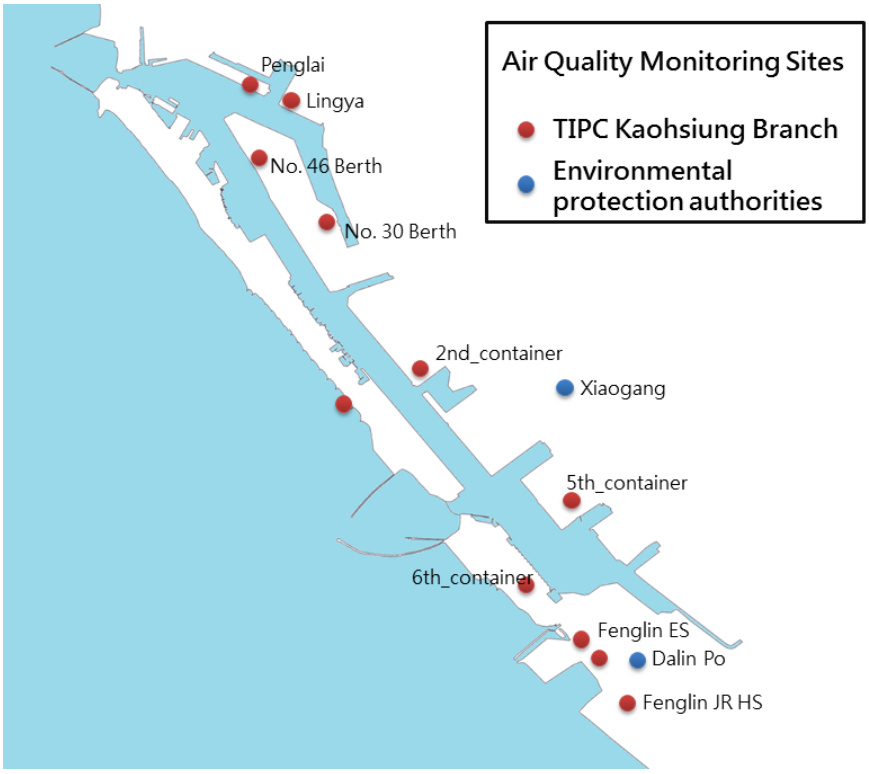
State of the Environment

4.1 Air Quality

The air pollutants in the Port of Kaohsiung mainly include nitrogen oxides (NO_x), sulfur dioxides (SO_x), and suspended particulates. Ocean-going vessels are the greatest contributor of pollutant emission, followed by in-port ships, heavy-duty vehicles, and steve-doring equipment. Pollutants from ocean-going vessels are mainly derived from emissions caused by the fuel combustion of auxiliary boilers and engines when such ships approach and berth in a port, thereby generating SO_x as the primary pollutant. Pollution released from heavy-duty trucks is mainly caused by engine idling during freight handling. Therefore, to reduce pollution and green-house gas (GHG) emissions, the Kaohsiung Branch of TIPC has focused on promoting eco-friendly practices among incoming ships and freight forwarders, improving handling equipment, decreasing fugitive substances produced during handling, and controlling transportation vehicles.

4.1.1 Air Quality Monitoring

Currently, 10 air quality monitoring stations are set up in the Port of Kaohsiung, among which 3 are located in the construction development district and 7 in the operation district. The monitoring items include total suspended particles (TSP), particulate matters (PM_{10}), fine suspended particles ($PM_{2.5}$), SO_2, NOx, and ozone (O_3). These indicators are monitored quarterly. In addition, two monitoring stations are established in the neighboring areas of the Port of Kaohsiung, namely the Xiaogang Monitoring Station and the Dalin Po Monitoring Station, respectively set up by the EPA and EPB.



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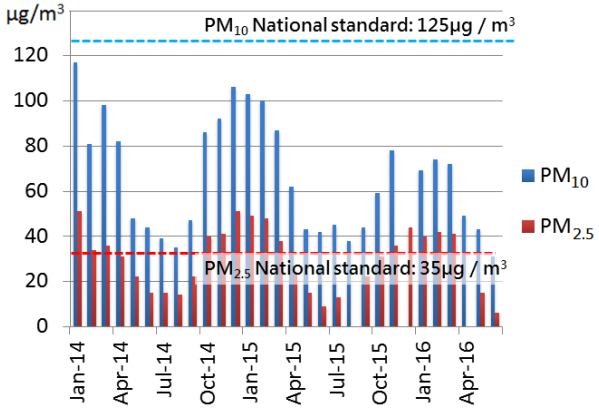
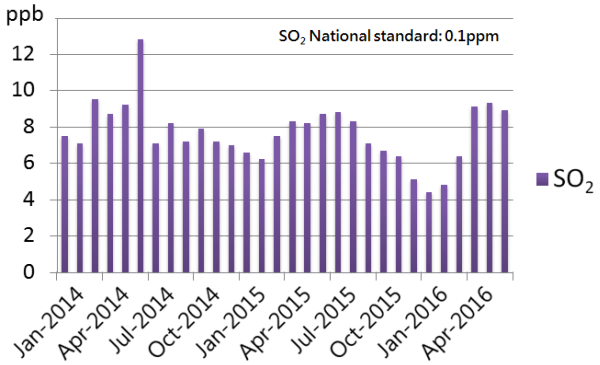
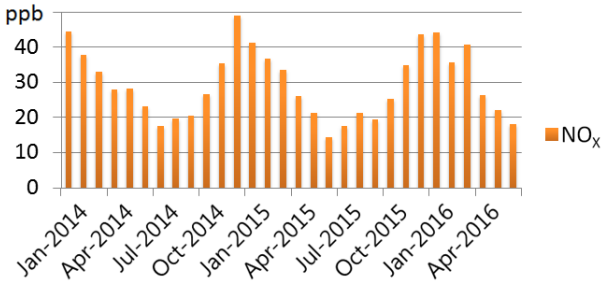
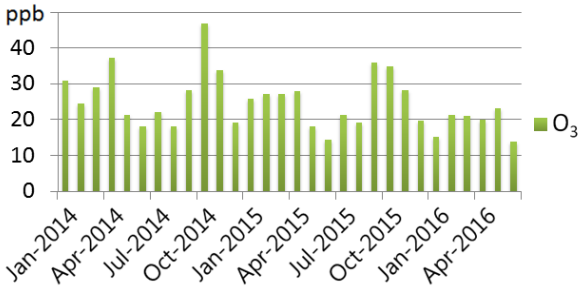








source：EPA Xiaogang station air quality monitoring data

>> During 2014–2015, the Kaohsiung Branch of TIPC has conducted 40 port environmental inspections jointly with the EPB and the EPA, and has been notified of more than 30 pollution cases.

4.1.2 Improvement Strategy

To reduce ship pollution, the Port of Kaohsiung has established an automatic identification system (AIS) for vessel speed reduction in 2015 to record the speed of inbound and outbound ships. At the Port Affairs Meeting, an air pollution control policy, which advises speed reduction to 12 knots among incoming and outgoing ships within 20 nm away from the port, has been introduced and promoted to shipping lines, shipping agents, and stevedoring companies.

The Port of Kaohsiung has established 11 shore power systems at Wharves No. 108 and 109 of the Kao-Ming Container Terminal, Wharf No. 115–117 of the Evergreen Marine Terminal, and Wharf No. 96 of China Steel Terminal. In addition, low-voltage power supply systems have been established at harbor craft terminals to provide power for ship operation and substantially reduce pollutant emission.

>> From July to December in 2015, a total of 3,822 incoming or outgoing ships reduced their speed to 12 knots within 20 nm away from the Port of Kaohsiung, attaining an a 32% achievement rate of the speed reduction goal.

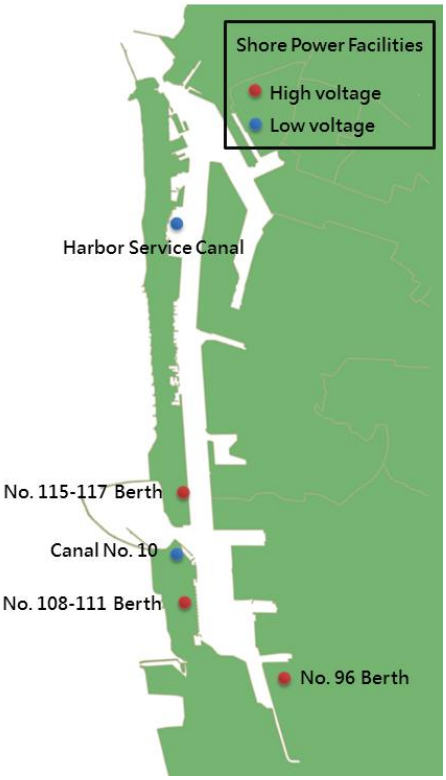
04/

State of the Environment

Shore-side Power Supply

NO.96 Berth high voltage shore power facility

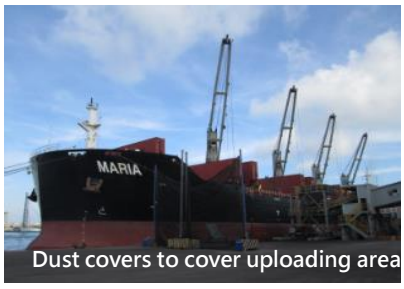
Using high voltage shore power facility



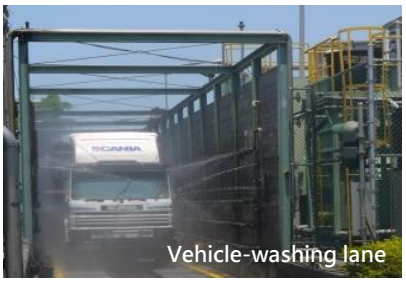
Dust Pollution Reduction

Dust in the Port of Kaohsiung is mainly derived from stevedoring operations at bulk and general cargo terminals (Wharves 48–56) as well as from wind erosion and vehicle-based road emission.

In terms of dust reduction, closed (covered) warehouses are under use currently, which enhances unloading efficiency and controls fugitive dust generated during stevedoring. At Wharves No. 48–56, stevedoring companies are instructed to set up fixed and mobile dust nets because the small operational areas in the backlands of these wharves are too small to accommodate closed (covered) stevedoring systems. Wharves No. 50, 52, 54, and 55 are equipped with truck washing platforms; incoming and outgoing vehicles that carry cargo containing fugitive particles are required to clean their bodies and wheels before leaving the wharves.



Dust covers to cover uploading area



Vehicle-washing lane

Covered Warehousing Facilities at Wharf No. 49

The covered storage facilities at Wharf No. 49 have effectively reduced dust generated during coal stevedoring, through the incentive facilities rates, Wharf No. 49 become a priority choice for collier ships. By December 31st in 2015, the wharf has handled approximately 700,000 tons of coal.

From January to April in 2016, 11 coal carriers have stopped by the wharf, unloading approximately 220,000 tons of coal. The highest amount of coal unloaded in on day at this wharf was approximately 9,700 tons.

Covered warehousing facilities

Automatic watering system

Mobile Pollution Source Control

Vehicles traveling on land in the Port of Kaohsiung are another source of air pollution. The Kaohsiung Branch of TIPC conducts inspection jointly with the Environmental Protection Bureau of Kaohsiung City Government. At the quarterly Port Affairs Meeting, the branch also advises shipping lines to have their trucks join the diesel vehicle self-management program, and encourages stevedoring companies to shift to electric or hybrid machinery. In addition, the Port of Kaohsiung has established 40 automated identification roadways in total at 16 locations, 20 for incoming vehicles and 20 for outgoing ones, to reduce idling and thus exhaust emissions from trucks.


Automatic gate system

>> The carbon reduction of heavy trucks through automatic gate lanes

Year	No. of Passing Container Trucks	Fuel Consumption Reduction	Carbon Emission Reduction(Kg)	Total Carbon Reduction(Kg)
2013	7,858,423	24.6 g/ per passing	0.152Kg/per passing	1,194,480
2014	8,581,882			1,304,446
2015	8,860,126			1,346,739

Automotive Research & Testing Center

EPA "Eco Life" Website (ecolife.epa.gov.tw)

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4.1.3 Green house gas emissions

Carbon Emissions from Ships

The Taiwan air pollution emission [TEDS 8.1] line source manual calculation formula was adopted to estimate carbon emissions by ocean-going vessels:

Note:
Fuel consumption amount (L) = Cargo throughput (L)× Energy density (L/ton kilometer)× Harbor travel distance (km)×1000 (kg/metric ton)

A ship entering the harbor may switch to marine diesel oil, the properties of which are similar to those of regular diesel fuel. Therefore, the 2015 diesel fuel carbon emission factor in the EPA carbon factor database is used as a reference for the emission factor.

Ocean-going ship carbon emissions($KgCO_{2e}$) =
Fuel consumption amount (L)× Emission factor($KgCO_{2e}$/L)× Control factor

>> 2014-2015 Ocean-Going Ship Carbon Emissions in Kaohsiung Port

Year	Total Cargo Throughput (metric ton)	Energy Density (liter / metric ton km)	Harbor Travel Distance(km)	Fuel Consumption (L)	Emission Factor ($KgCO_{2e}$/ Liter)	Carbon Emissions (ton)
2014	122,950,812	0.003	12	4,426,229,232	2.65	11,729,507
2015	110,901,929	0.003	12	3,992,469,444	2.65	10,580,044

Carbon Emissions from Resource Consumption

>> 2014-2015 Resource Consumption Carbon Emissions in Kaohsiung Port

Resource	2014		2015	
	Amount of Resource Consumption	Carbon Emissions (ton)	Amount of Resource Consumption	Carbon Emissions (ton)
Electricity	8,301,209 kwh	4,383	8,200,240 kwh	4,330
Water	87,450 CMD	14	88,961 CMD	14
Paper	1,990,000 sheets	11	2,288,300 sheets	13
Fuel	69,598 liters	164	61,939 liters	146
Total	-	4,572	-	4,503

Note: CO_2 factor-
- Power: 0.528 $KgCO_{2e}$ /kwh(2015);
- Water: 0.155 $KgCO_{2e}$ /CMD (2014);
- Fuel: 2.36 $KgCO_{2e}$ /liter;
- Paper: 0.0056$KgCO_{2e}$ / sheets(A4,70 pounds)

Carbon Emissions of Port Vehicles

The Taiwan air pollution emission [TEDS 8.1] line source manual calculation formula was adopted to estimate carbon emissions by inbound and outbound container trucks:

Note:
Total number of vehicles per year={Total cargo throughput (TEU) – Container transhipment throughput (TEU)}÷2

Automotive Research & Testing Center data were reviewed to determine the average fuel consumption rate in the port area. The monthly fuel consumption rate was 2.47 km/L. The research findings of Harbor and Marine Technology Center, MOTC, were also reviewed. The average travel distance to Kaohsiung port is 4.19km, and the round-trip distance is 8.38km. Thus, Kaohsiung port fuel consumption was estimated to be 3.4L.

Container truck carbon emissions($KgCO_{2e}$)=
Total number of vehicles per year × Average fuel consumption(L) in the port area× Emission factor($KgCO_{2e}$/L)× Control factor

>> 2014-2015 Carbon Emissions of Container Truck in Kaohsiung Port

Year	Inward / Outward Container Throughput (TEU)	Heavy Goods Vehicle Carrying Limit (TEU)	Unit	Total number of passes per Year	Fuel Consumption (liter)	Emission Factor ($KgCO_{2e}$/ Liter)	Carbon Emissions (ton)
2014	10,593,335	2	NO. of vehicles	2,789,964	3.4	2.65	25,138
2015	10,264,420			2,721,987	3.4	2.65	24,525

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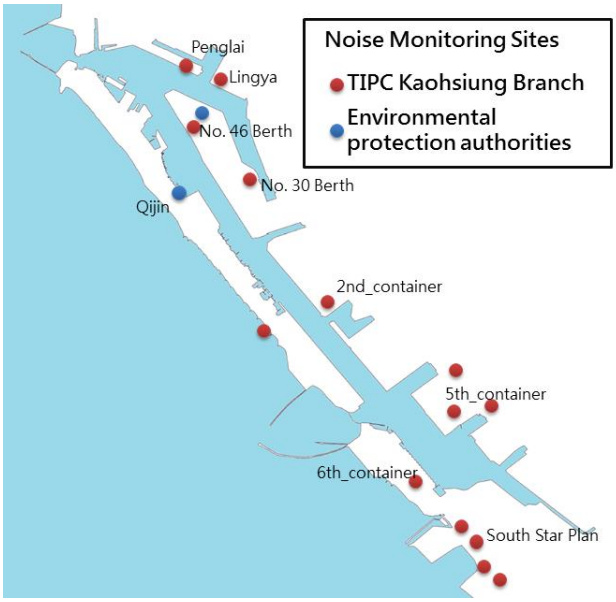
4.2 Noise

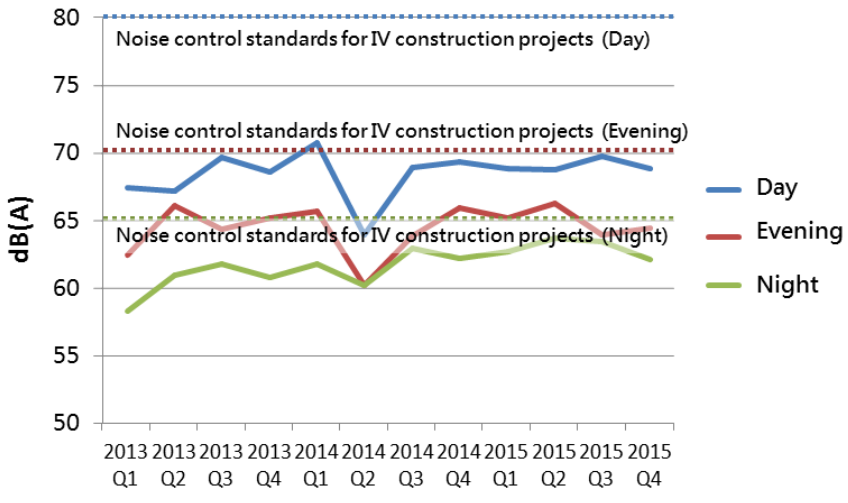
The Port of Kaohsiung is adjacent to urban areas on the north side and next to the industrial district on the north. Consequently, the industrial activities and cargo transport in and nearby the port, as well as the noise caused by port construction, tend to affect nearby residents' quality of life. In addition, complaint about noise have been the most common among residents living in the neighboring districts of the Port of Kaohsiung.

4.2.1 Noise Monitoring

The commercial port districts in the Port of Kaohsiung are classified into the D category of control areas. In addition to two noise monitoring stations, one at Cijin and the other at Cianjhen, set up by EPA, the Kaohsiung Branch of TIPC has independently established an additional 11 stations to monitor noise levels in neighboring areas susceptible to noise, main roads, and stevedoring areas.



>>Quarterly monitoring result for new development area



Source: TIPC environmental monitoring project

4.2.2 Improvement Strategy

The Kaohsiung Branch of TIPC has continuously promoted the electrification of lifting systems in container yards and the replacement of polluting machinery. In addition, the branch encourages stevedoring contractors in the port to automate and electrify their terminal operating machinery and equipment as a major strategy for environmental protection. By replacing combustion engines with electric power, the contractors can enhance operational efficiency and reduce the emission of air pollutants, thus improving the environmental quality in the operational areas of the port.

In addition, access roads to the Port of Kaohsiung are built to separate port traffic from the commuting routes of nearby residents and avoid disturbing community life. Particularly, the traffic corridor (Yugang Road) extended from the Freeway 1 and the northern section of the Xinsheng Elevated Road have been built in December, 2015 as collector roads connecting the Chungtao and Cianjhen Commercial Port Districts to the Freeway 1, thus improving the port' s access and transportation efficiency, reducing conflicts between different traffic flows, and facilitating port–city coordination and development.


Connecting transportation system

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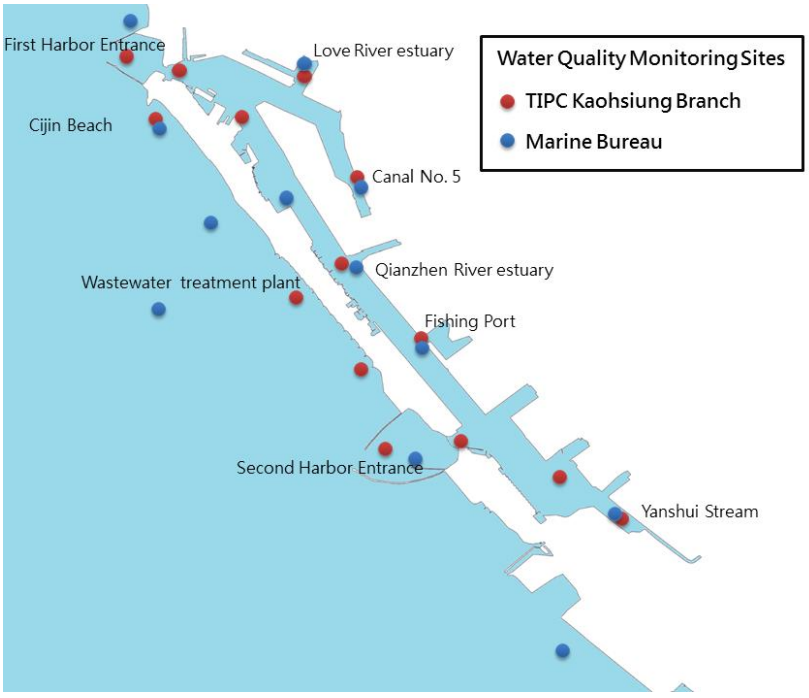
4.3 Water Quality

The Port of Kaohsiung is located at the mouths of Love River, Cianjhen River, and various watercourses. Large volumes of household sewage and industrial wastewater in the Kaohsiung City, either treated adequately or not, are discharged into the port basin through rivers and canals. Moreover, the port is semi-enclosed from the ocean, thus impeding water exchange between the basin and ocean. Consequently, pollutants tend to accumulate in the basin. In addition to urban sewage, ships in the port occasionally discharge waste oil and sewage into the basin, and oil transportation facilities could discharge oil due to inappropriate operations or outdated equipment. Both the two sources of discharge can affect the water quality in the basin.

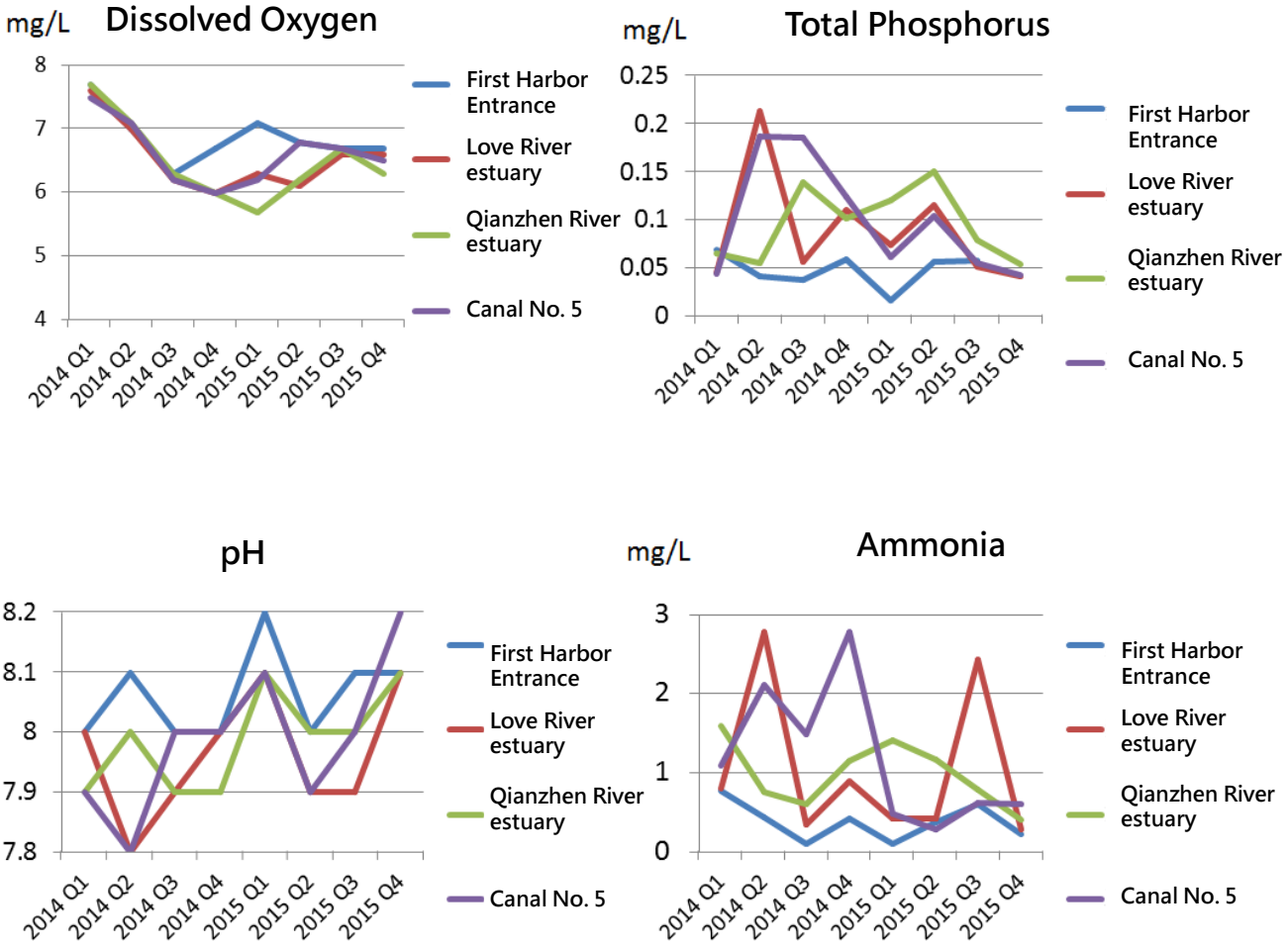
4.3.1 Water Quality Monitoring

Currently, the Port of Kaohsiung has 14 water quality measuring stations that are commissioned to conduct quarterly inspections. Since 2004, the Marine Bureau of the Kaohsiung City Government has set up marine monitoring stations to monitor water quality according to the Marine Pollution Control Act. Among all the marine monitoring stations, 7 are located in commercial port districts.



Water quality sampling

Results



Source: Kaohsiung Port Sediment, Water Quality and Monitoring and Ecological Assessment Report

Most of the water quality levels within the Port of Kaohsiung have met the criteria. However, the content of dissolved oxygen (DO) is lower at the mouths of Love River, Watercourse No. 5, and Cianjhen River. The monitoring results indicate that household sewage and industrial wastewater in the urban area of Kaohsiung City discharged through rivers to oceans has significantly influenced port water quality. In addition, the levels of total phosphorus and BOD_5 are higher at stations near the mouths of Lover River, Watercourse No. 5, and Yanshui Port River, indicating that the three rivers are the major sources of organic pollutants for the Port of Kaohsiung. The concentration of E. coli is considerably higher at the mouths of Love River, Watercourse No. 5, Cianjhen River, and Yanshui Port River because these rivers have received more household sewage from the neighboring rivers, watercourses, or drain ditches. The content of heavy metals, by contrast, is far lower than the marine environmental quality standard set for protecting human health.

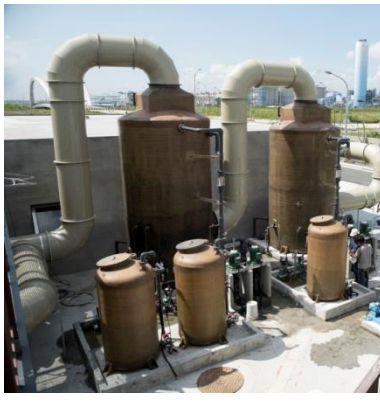
4.3.2 Improvement Strategy

Currently, the Kaohsiung Branch of TIPC has complied with the guidelines for handling waste oil, sewage, and waste from ships. To reduce the environmental impact caused by ships berthing in the port, their waste oil and sewage are collected by qualified providers of slop disposal services commissioned by shipping lines, and the waste is handled by qualified disposal companies commissioned by the Kaohsiung Branch of TIPC.

The Kaohsiung Branch of TIPC has committed to establish wastewater treatment facilities. For example, domestic sewage, stormwater and port operations wastewater are discharged to wastewater treat ment plants or sewage systems, to effectively prevent pollution

South Star Plan Wastewater Treatment Plant

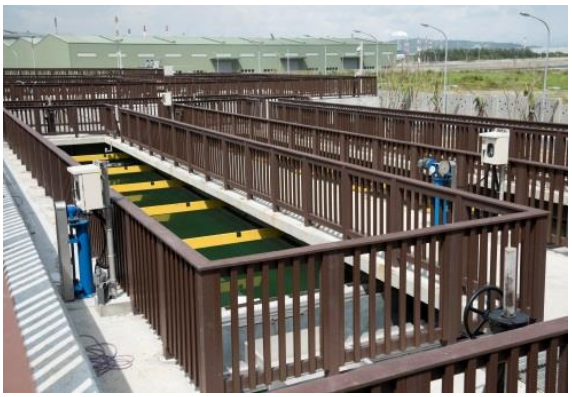
Wastewater Treatment Facilities



caused by direct discharge.

To improve upstream pollution that affects the port, the Kaohsiung Branch of TIPC has communicated effectively with other responsible authorities (e.g., Water Resources Bureau and EPB of Kaohsiung City Government) and actively requested them to reduce the upstream pollution sources.

In addition, the Kaohsiung Branch of TIPC has also cooperated with government authorities and private sectors to establish an emergency response and contact mechanism. In emergencies, members of the network can contact one another through horizontal and vertical integrations. In addition, drills can be regularly held to enhance the members' ability to respond to marine pollution emergencies.



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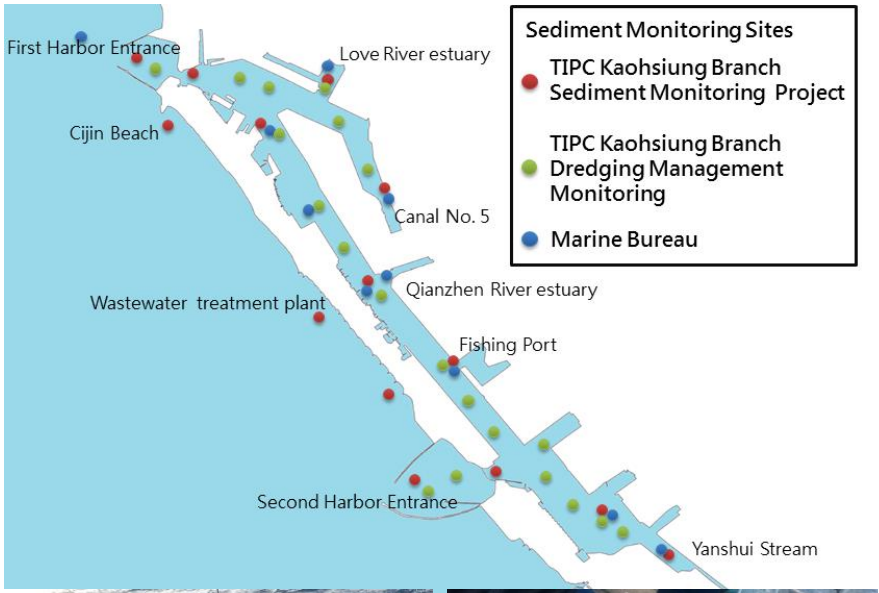
4.4 Marine Sediments

Heavy metal contamination in the sediments is more difficult to remediate compared with the other types of pollution in Kaohsiung mainly because gravity causes the heavy metals from upstream wastewater to accumulate in the port. These substances can only be removed unless the sediments in the mouths of the port are dredged in large scale. However, dredging in the port is mostly conducted for watercourses and berths, and consequently the sediments contaminated by heavy metals in the river mouths are difficult to remove. Therefore, this pollution problem can currently be alleviated through reducing the related pollution sources of pollution. Specifically, the Kaohsiung Branch continuously communicated with relevant government authorities to advise them should strengthen their inspection on the inadequate wastewater discharge by factories near the Port of Kaohsiung to preclude the discharge of new pollutants into the port.

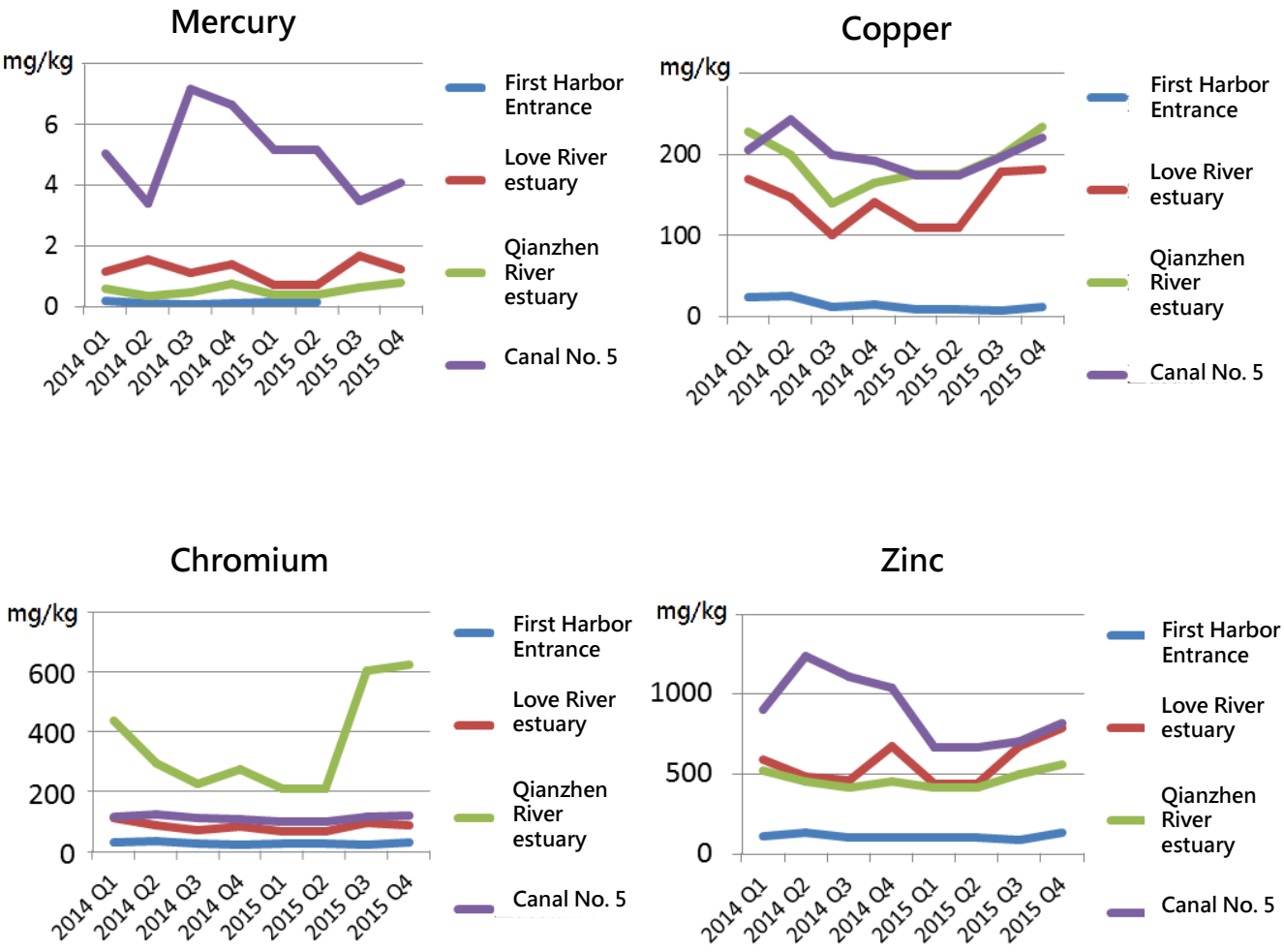
4.4.1 Sediment Monitoring

The Kaohsiung Branch of TIPC includes 14 sediment monitoring stations, and 20 monitoring stations have been set up for watercourse dredging, which sample and monitor indicators such as sediment thickness, specific gravity, total nitrogen, total oils and grease, heavy metals, organic tin, and polycyclic aromatic hydrocarbons. In addition, the Marine Bureau of Kaohsiung City Government has set up seven marine sediments monitoring stations in the port and conducts monitoring semiannually.




Sediment Sampling

Monitoring Results



Source: Kaohsiung Port Sediment, Water Quality and Monitoring and Ecological Assessment Report

According to the monitoring results, the pollution levels observed at the mouths of Love River and Watercourse No. 5 in recent years are substantially higher than those at other stations, indicating that the pollution is mainly derived from upstream discharge. Particularly, the sediments in the mouth of Watercourse No. 5 are severely contaminated by mercury probably because of its previous long-term exposure to the discharge of industrial wastewater from Shijia in Qianzhen . In addition, samples from the mouths of Love River, Watercourse No. 5, Cianjhen River, and Cianjhen Fishing Port have frequently been tested to contain more than 150 mg/kg of copper. The use of copper as raw material in manufacturing processes by factories in the upstream area of Yanshui Port River and the discharge of copper along with wastewater into the river might have caused the accumulation and pollution of copper in the sediments of the downstream waters of the port.

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4.4.2 Dredging Management

Waste substances dredged from the Port of Kaohsiung are classified into Category B of marine waste. These substances are mainly composed of sediments from rivers and drifting sand washed into Ports No. 1 and 2 through tides. Every 6 months, port channels depth are measured to estimate the amount of sediments to be dredged.

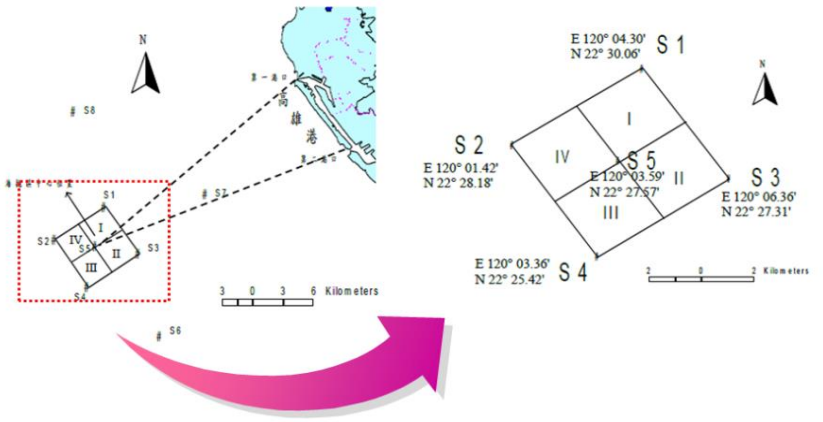
The dredged sediments are used for beach nourishment or land reclamation or are recycled and used through other methods. The remaining unused sediments are carried by sediment-dumping ships to the off-shore marine dumping area of the Port of Kaohsiung for dumping. The Kaohsiung Branch of TIPC regularly spot checks if sediment-dumping ships berth at docks according to regulations and if any leak of sediments or oil occurs. In addition, the branch continues to conduct long-term environmental monitoring on the dredging processes and marine dumping area and presents quarterly reports to the EPA.

>>Amount of Port of Kaohsiung' s Sedimentation Disposing in 2014-2015

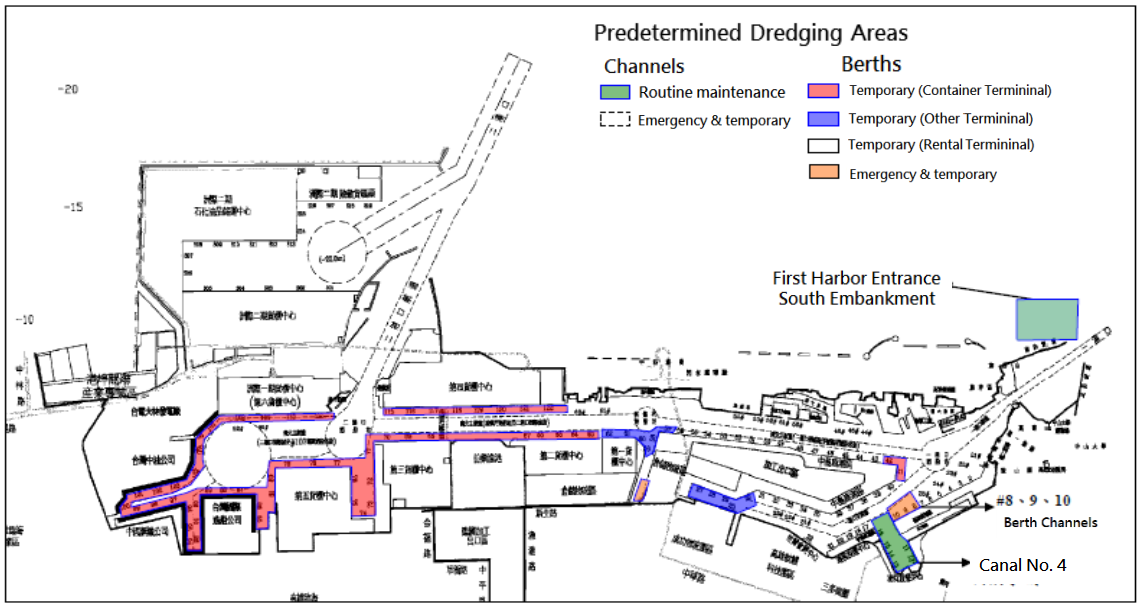
Unit: Ten thousand m^3

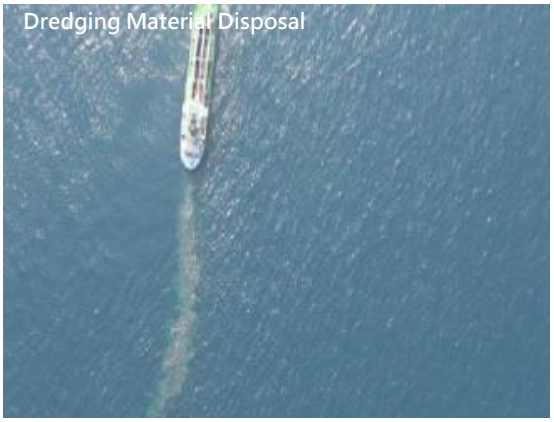
Year	Actual dredging volume	Actual amount of dredging sludge disposal	Actual amount of alternative' s dredging mud	Dredging mud reuse rate %
2009	59.4	42.6	16.8	28.3
2010	96.7	30.7	66	68.3
2011	88	16.0	72	81.8
2012	70.9	18.9	52	73.3
2013	51.7	25.7	26	50.3
2014	60	11.4	48.6	81
2015	97.4	9.3	88.1	90.5

Marine Disposal Site



2015 Predetermined Dredging Areas in Kaohsiung Port





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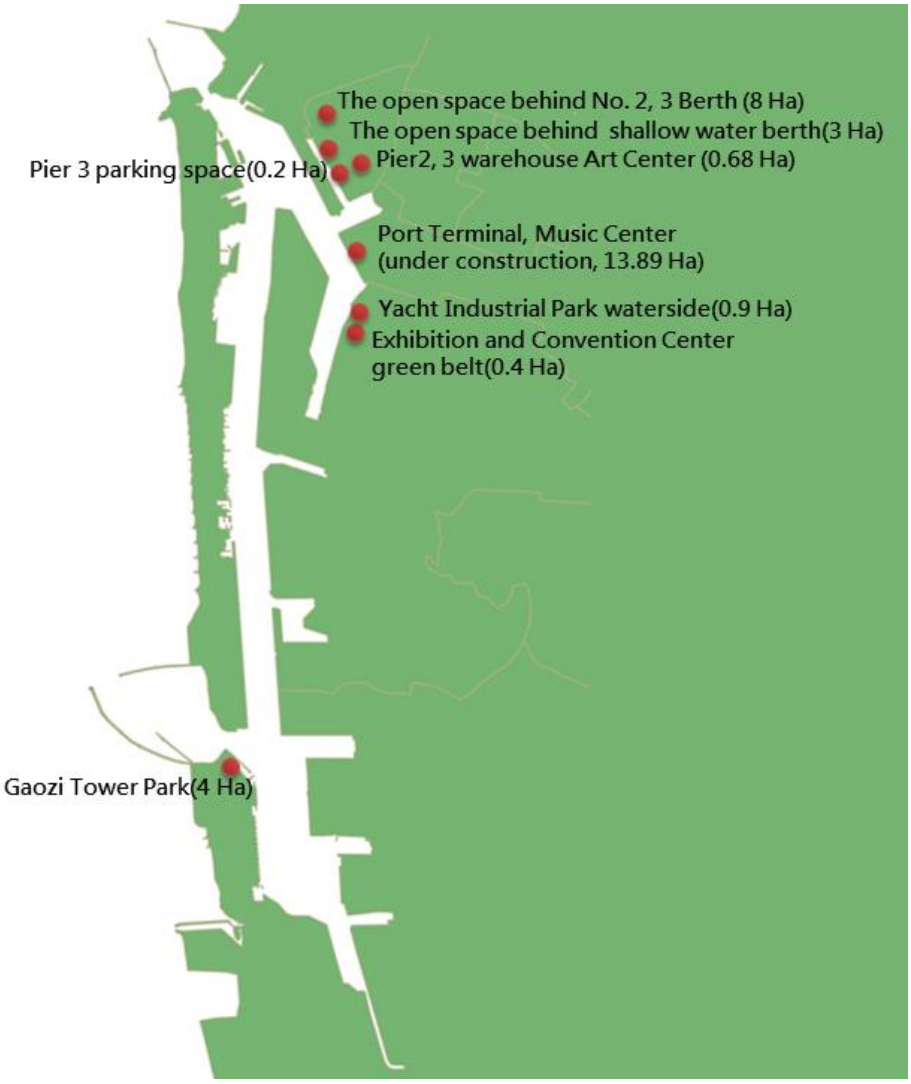
4.5 Relationship with Local Communities

The neighboring communities of the Port of Kaohsiung bear the brunt of possible environmental impacts from the port and face high environmental risks. Therefore, the branch maintains waterside recreational spaces and green belts (or buffer zones) to restore the environment and create a sustainable water–land interface. The green belts close the gap between the port and the city, improving local residents' quality of living and reducing the impact of port pollution on them. In addition, the green belts can increase habitats and thus improve the biodiversity of environments surrounding the port.

The Kaohsiung Branch of TIPC will gradually open the old port areas to the public, providing recreational spaces such as parks, activity venues, and bicycle routes. In addition, the branch will occasionally organize ocean carnivals and volunteer visits and seminars with local governments, inviting citizens to participate in the activities, maintaining public identification with the port, and engaging in favorable interaction with nearby communities.

>>Waterside recreational areas at Port of Kaohsiung



4.6 Habitat Restoration

The natural coast where the Port of Kaohsiung is located at was originally the habitat of mangroves. The coast was later reclaimed to develop the Port of Kaohsiung, and the increase of artificial coasts reduces the ecological and species diversity of the coast.

Therefore, when developing the Port of Kaohsiung, the Kaohsiung Branch of TIPC is also committed to maintaining the ecology and habitats in the port and actively protecting the existing green belts (or buffer zones) to reduce the environmental stress.

For example, the South Star Free Trade (SSFT) District is located in a remote area that is relatively free from human disturbances. According to the environmental assessment conducted on the first and second phases of this land development project, a total 68 bird species have been observed and recorded. According to the Kaohsiung Wild Brid Society, more than 210 species of migratory birds stop by the SSFT District during autumn and winter. The district is also habitat to 8 species of mammals, 6 species of amphibians, 10 species of reptiles, and 40 species of butterflies. In addition, the society found 5 species endemic to Taiwan (e.g., Formosan mouse, Swinhoe' s japalura, and takydromus stejnegeri), 19 subspecies endemic to Taiwan(e.g., phasianus colchicus formosanus, accipiter trivirgatus formosae, dicrurus macrocercus cathosecus, caprimulgus affinis, and accipiter gularis), 2 rare and protected species (i.e., falco tinnunculus interstinctus and sternula albifrons sinensis), and 3 other species that should be protected (i.e., glareola maldivarum, lanius cristatus, and cobra).

Therefore, during construction and operation processes, the SSFT District plans to preserve the existing windbreaks, protect indigenous species to green the area, set up green belts as buffer zones, and restrict the speed of incoming and outgoing vehicles to reduce the impact incurred by development. Currently, approximately 10 ha of land in the development area of the first phase of the SSFT District has been preserved as a wild bird habitat.

Habitat conservation for wild birds

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4.7 Contaminated Land

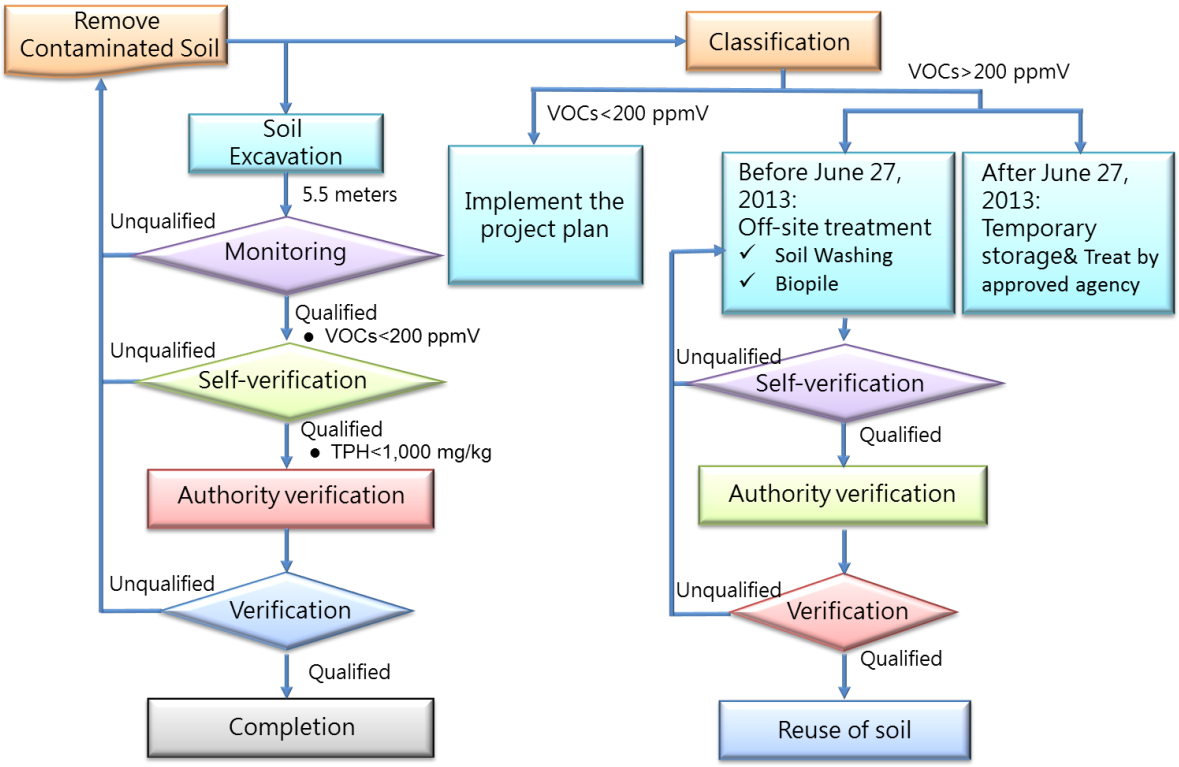
In the past, the high-pollution industries such as heavy industry, oil storage facilities, and shipbuilding surrounding the Port of Kaohsiung have contributed to the accumulation of heavy metals and toxic substances in port soil and water. The brownfields resulting from environmental remediation of chronical pollution become the greatest challenge to the port.

The site of the Kaohsiung Port Terminal in the Passenger Transportation District used to be where the old Lingyaliao Storage Station of the Refinery under the Refining Business Division of CPC Corporation (Taiwan) was located. The storage station has been completely out of service since 1996, and the oil storage tanks and delivery lines have been removed. Currently, it is the base for the construction of Kaohsiung Port Terminal. During construction, oil pollution was determined at the site; therefore, the CPC Corporation (Taiwan) remediated and removed oil-contaminated soil from the base.

9 Soil Pollution Control Sites at Former Lingyaliao Petrochemical Office

- 30m road site
- Commercial and trade park 1-1 site
- Commercial and trade park 1-2 site
- Commercial and trade park 2-North site
- Commercial and trade park 2-South site
- Kung 1-North site
- Kuang-Ting site
- 273 Land number site
- 291 Land number site

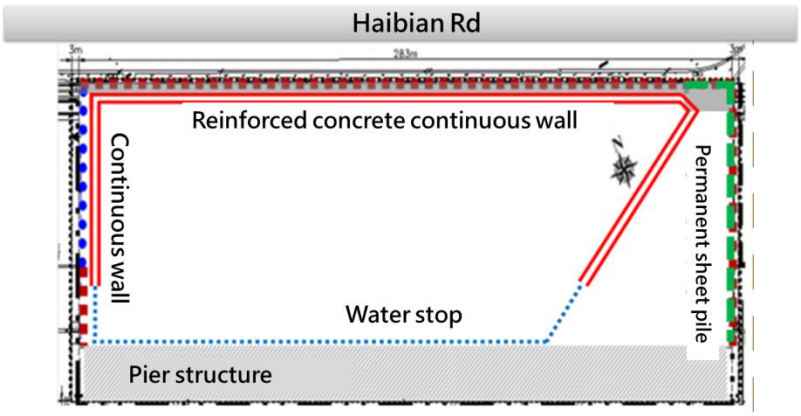
Contaminated Soil Treatment Processes



Source: Kaohsiung Port Terminal Land Use Application File

Construction Project for Brownfield Management and Containment

This project is to prevent pollution outside the site from spreading inward while protecting the structure of the light rail transit on the northern border.



Source: Kaohsiung Port Terminal Land Use Application File

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4.8 Resource Consumption

4.8.1 Waste generation in Kaohsiung Port

The disposal of general waste derived from port waters and land is outsourced according to wharf locations and types of operations required. Shipping lines, terminal tenants, and operators are responsible for contacting qualified waste disposal companies to clean up their industrial waste (including waste oil and water).

The Kaohsiung Branch of TIPC inspects the collection work at least twice a week to ensure proper execution.

Besides, waste classification is made mandatory for cruisers sailing on international routes to enhance onshore waste treatment efficiency. During collection, unclassified or unrecycled waste will be rejected when spotted. In addition, the Port of Kaohsiung will continue to promote waste reduction and classification while monitoring waste output and recycling performance.

>> Collection amount of ship waste and ship oily wastewater

Year	Ships	Waste (ton)	Oily wastewater (ton)
2013	1,580	883.65	-
2014	3,691	859.29	-
2015	3,952	922.95	47,540

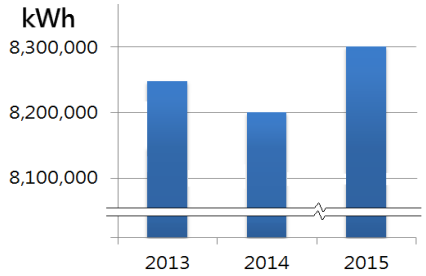
>>Waste recycle & disposal amount at the Port of Kaohsiung

Item	2014	2015
Total waste generation (ton)	2,193.27	2,286.22
Disposal (ton)	1,698.02	1,796.02
Recycle (ton)	496.65	490.20
Recycle Rate (%)	22.64	21.44

4.8.2 The Four-Saving Project

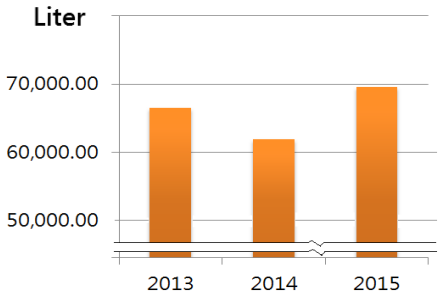
The Port of Kaohsiung applies the Four-Saving Project with the goals of annual power, fuel, water and paper consumption reduction to decrease resource consumption and waste production of the port .

Electricity Consumption



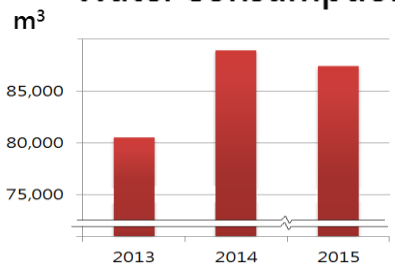
With the rise of operational volume, power demand is increasing in the Port of Kaohsiung. The rising demand for power is mainly derived from the increasing stevedoring volume at Container Terminal No. 5 and the additional power consumption by the new Intercontinental Container Center built in 2014 as well as the SSFT District and the public container port at Container Terminal No. 4 established in 2015.

Fuel Consumption



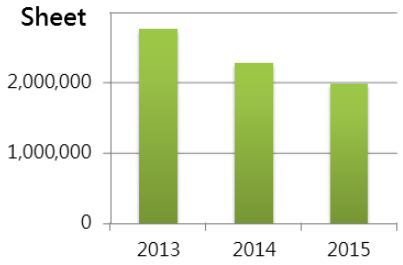
Oil consumption rises due to the increasing number and scale of environmental inspection, waste collection, and construction site inspection, as well as the increasing use of diesel by engineering vehicles at the Cihou Plant of the Ship and Machinery Division.

Water Consumption



The increase in water consumption mainly due to the new operation of International Terminal Container Center, South Star Free Trade Zone and Berth No.141 at Container Terminal No. 4.

Paper Consumption



The Kaohsiung Branch of TIPC is committed to digitizing services and administration works, increasing the ratio of auditing official documents online, and promoting the use of video conferences. Thus, paper consumption decreases as administrative operations become paperless and digitalized.

Source: The Kaohsiung Branch resources consumption in 2014-2015

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State of the Environment

4.9 Port Development

The port development policies of the Kaohsiung Branch of TIPC are aimed at creating a sustainable green port. Therefore, the compatibility with the environment and the urban area of Kaohsiung City is considered during development.

The Kaohsiung Branch of TIPC has kept its commitments listed in the reviewed conclusion in the environmental assessment of each development construction project report by monitoring the water quality, air quality, noise level, and ecology of the SSFT District and the Intercontinental Container Center in the Port of Kaohsiung.

1. Designated Warehousing & Transshipment District
2. Designated Commercial & Trade District
3. Designated Cultural& Recreational District
4. Designated Commercial & Trade District

During the land reclamation process for the Kaohsiung Harbor International Container Center Project, the Port of Kaohsiung has actively sought alternative sources of materials, including the earth works left from major public works in Southern Taiwan and the silt dredged from the port, to effectively reduce the amount of sand extracted offshore and to mitigate environmental impact. In addition, the Kaohsiung Branch of TIPC restores the brownfields left after industrial factories are relocated, facilitates a mechanism of ecological compensation, and improves related facilities to increase ecological landscape in the port to conserve biodiverse habitats while providing comfortable waterside spaces for public recreation.

For a harmonious port–city development, the Port of Kaohsiung has coordinated with the Kaohsiung City Government in continuously relocating port operational areas to newly developed districts, releasing and transforming unused land in the old port area into art districts or recreational spaces, connecting the landscapes and landmarks of the port and the city, planning accesses in and out of the port and internal roads for different purposes, and beautifying the environment of the old port area. To comply with the Kaohsiung City Government' s policy of promoting local green industry, the Port of Kaohsiung have also assessed land leases in the port and continuously conducted investment promotion to attract the green enterprises to station in the port and facilitate a green industry chain in the Port of Kaohsiung.

Source: Urban Development Bureau, Kaohsiung City Government

5. Harbor Commercial District
6. Designated Cultural& Recreational District, Commercial District
7. Designated Cultural& Recreational District

04/

State of the Environment

4.10 Energy Efficiency of the Port

In the new port area (Container Terminal No. 6) of the Intercontinental Container Center Project, all wharves are equipped with shore power systems that provide electricity required by ships during berthing, reduce their oil consumption, and mitigate port air pollution.

In addition, the administration building even satisfies green building standards and has become the first specialized terminal in Taiwan to obtain a green building certification.

Use semi-automatic equipment to enhance operational efficiency at Container Terminal No. 6

Green building - South Star Administration

Renewable Energy

To facilitate renewable power generation in the port, the Kaohsiung Branch of TIPC has leased out the building roofs in the port, providing space for the installation of solar photovoltaic power generation equipment. Currently, the total device capacity is 2 MWp. Part of the revenues obtained by the tenants through selling solar power is collected by the branch as rent. By doing so, the branch not only uses the building roofs in the port effectively, but also creates additional revenue for the port.

In addition, companies stationed in the SSFT District must install solar photovoltaic power generation equipment on the roofs of their plants or other suitable places, and apply for the green building certifications according to the Operational Guidelines for the Promotion of Green Building Label for Public-Owned Buildings. The offices and houses used by the companies stationed in the district must reach the silver certification level, and their plant buildings and warehouses must meet the qualification criteria.

Rooftop photovoltaic system at the Kaohsiung Branch of TIPC

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State of the Environment

Environmental Performance Indicators of Kaohsiung Port

Significant environmental issues	Index item	Calculation method
Air Quality	Air quality pass rate (PM_{10}、$PM_{2.5}$、SO_2、NO_2)	The ratio of the measurements in the air quality monitoring station of the port that meet the "Air Quality Standards"
	The ratio of using low-pollution fuel or biodiesel and the consumption of low-pollution fuel among harbor crafts	• Number of harbor crafts using low-pollution fuel (marine diesel oil or super diesel) ÷ Total number of harbor crafts × 100% • Consumption of low-pollution fuel among harbor crafts
	The ratio of using shore power among harbor crafts	Number of harbor crafts using shore power ÷ Total number of harbor crafts × 100%
	Ships deceleration target completion rate	The automatic identification system for ship deceleration is applied to determine the deceleration of ships within 20 sea miles from the port
	Promotion of a comprehensive use of the Automatic Gate Sentry Post Control System among shipping lines	• The ratio of incoming and outgoing roadways installed with an automatic gate sentry post control system • Number of passes
Noise	Quarterly ratio of noise levels satisfying related regulations	Daily ratio of noise levels that satisfy related regulations Detailed regulations (Category D in the Factory (Plant) Noise Control Criteria): 80 dB during the day; 70 dB during the evening; 65 dB during the night

Target value	Indicator presentation (calculation details)	
	2014	2015
• PM_{10} of the daily mean measurements satisfy the standard (<125μg / m^3): 100% • $PM_{2.5}$ of the daily mean measurements satisfy the standard (<35μg / m^3): 60% • SO_2 of the daily mean measurements satisfy the standard (<0.1 ppm): 100% • NO_2 of the daily mean measurements satisfy the standard (<0.25 ppm): 100%	• PM_{10} of the daily mean measurements satisfy the standard: 100% • $PM_{2.5}$ of the daily mean measurements satisfy the standard: 50% • SO_2 of the daily mean measurements satisfy the standard: 100% • NO_2 of the daily mean measurements satisfy the standard: 100%	• PM_{10} of the daily mean measurements satisfy the standard: 100% • $PM_{2.5}$ of the daily mean measurements satisfy the standard: 59.9% • SO_2 of the daily mean measurements satisfy the standard: 100% • NO_2 of the daily mean measurements satisfy the standard: 100%
The ratio of using low-pollution fuel or biodiesel reaches 100% among harbor crafts	52÷59×100%=88.1% Among the 59 harbor crafts, 52 use low-pollution fuel. Low-pollution fuel for work vessels: Marine gas oil consumption: 5 KL Marine diesel consumption: 255 KL	52 ÷ 59 × 100% = 88.1% Among the 59 harbor crafts, 52 use low-pollution fuel. Low-pollution fuel for work vessels: Marine gas oil consumption: 20 KL Marine diesel consumption: 236 KL
The ratio of using shore power reaches 100% among harbor crafts	59÷59×100%=100% All the 59 harbor crafts use shore power during berthing operations	59÷59×100%=100% All the 59 harbor crafts use shore power during berthing operations
The ratio of deceleration among all the incoming and outgoing ships reaches 40% in 2016 and 50% in 2017.	The disclosure of deceleration among incoming and outgoing ships was yet not implemented in 2014.	From July to December in 2015, a total of 3,822 incoming and outgoing ships (approximately 32%) decelerated to 12 knots when they were 20 sea miles from the port.
• All newly built gates of roadway are automated. • Number of passes	The ratio of incoming roadways installed with an automatic gate sentry post control system: 17 ÷ 32 × 100% = 53.1% The ratio of outgoing roadways installed with an automatic gate sentry post control system: 17 ÷ 30 × 100% = 56.7% Number of passes: 8,581,882	The ratio of incoming roadways installed with an automatic gate sentry post control system: 21÷33×100%=63.6% The ratio of outgoing roadways installed with an automatic gate sentry post control system: 20÷31×100%=64.5% Number of passes: 8,860,126
• Daytime equivalent energy sound levels: quarterly achievement rate of 100% • Evening Leq: quarterly achievement rate of 100% • Nighttime Leq: quarterly achievement rate of 100%	• Daytime Leq 100% • Evening Leq 100% • Night time Leq 100%	• Daytime Leq 100% • Evening Leq 100% • Night time Leq 100%

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State of the Environment

Environmental Performance Indicators of Kaohsiung Port

Significant environmental issues	Index item	Calculation method
Water Quality	Marine water quality pass rate (pH, DO, BOD_5, TP, cyanide, phenols, mineral oils)	The ratio of port water quality measurements (obtained at the water quality monitoring station in the port) satisfying the Marine Environment Classification and Quality Criteria
	Ratio of the regulated businesses or wastewater (sewage) treatment permits in the port obtained approval for their water pollution prevention plans	Number of regulated businesses or wastewater (sewage) treatment permits in the port that have obtained approval for their water pollution prevention plans ÷ Total number of businesses producing wastewater (sewage) in the port that should be regulated × 100%
Marine Sediment Quality	Sediment monitoring	Quarterly means and maximums of port sediment monitoring measurements
Relationship with Local Communities	Neighborhood and community welfare activities	Number of activities and events

Target value	Indicator presentation (calculation details)	
	2014	2015
Marine water quality: 100% of the quarterly pH, DO, cyanide, metal oils, and BOD_5 measurements satisfy the criteria.	Marine water quality criteria for Category C pH 100% DO 100% BOD5 96.43% Cyanide 98.21% Phenols 100% Metal oils 100%	Marine water quality criteria for Category C pH 100% DO 100% BOD_5 100% Cyanide 100% Phenols 100% Metal oils 100%
All the regulated businesses or wastewater (sewage) treatment permits (100%) in the port have obtained approval for their water pollution prevention plans.	(11+10)÷21×100%=100% Total number of businesses in the port that produce wastewater (sewage): 21 Number of regulated businesses in the port that have obtained approval for their water pollution prevention plans: 11 Number of businesses in the port that are not regulated by the Water Pollution Control Act to commission wastewater (sewage) treatment contractors or do not discharge wastewater: 10	(17+6)÷23×100%=100% Total number of businesses in the port that produce wastewater (sewage): 23 Number of regulated businesses in the port that have obtained approval for their water pollution prevention plans: 17 Number of businesses in the port that are not regulated by the Water Pollution Control Act to commission wastewater (sewage) treatment contractors or do not discharge wastewater: 6
Upper limits of heavy metal content in domestic sediments (mg/kg per unit): Arsenic 33 Mercury 0.87 Copper 157 Lead 161 Chromium 233 Zinc 384 Cadmium 2.49	Arsenic: mean = 10 Mercury: mean = 0.68 Copper: mean = 142 Lead: mean = 32.8 Chromium: mean = 77.5 Zinc: mean = 400 Cadmium: mean = 0.32	Arsenic: mean = 10.2 Mercury: mean = 0.56 Copper: mean = 116 Lead: mean = 44.4 Chromium: mean = 87.3 Zinc: mean = 380 Cadmium: mean = 0.4
12 activities held	16 activities held	19 activities held

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State of the Environment

Environmental Performance Indicators of Kaohsiung Port

Significant environmental issues	Index item	Calculation method
Port Development	Public waterside recreational space	The area of waterside recreational space
Contaminated Land	Control rate of soil contaminated sites	Number of regulated sites in the port ÷ Total number of sites with soil pollution in the port × 100%
Waste	Port recycling rate	Amount of recycled waste ÷ Waste generation×100%
Terrestrial Habitats / Ecosystems Loss	Ecological habitats	Area of ecological habitats
Energy Consumption	Outcomes of implementing the Four-Saving Project (saving energy, oil, water , and paper)	Power, oil, paper, and water conservation rates for offices and operation sites

Target value	Indicator presentation (calculation details)	
	2014	2015
Increasing and maintenance the area of waterside recreational space	Total waterside recreational area is 30.39 Ha, which includes: 1) The open space behind No. 2, 3 Berth (8 Ha) 2) The open space behind shallow water berth(3 Ha) 3) Gaozi Tower Park(4 Ha) 4) Port Terminal, Music Center (under construction, 13.89 Ha) 5) Exhibition and Convention Center green belt(0.4 Ha) 6) Yacht Industrial Park waterside(0.9 Ha) 7) Pier 3 parking space(0.2 Ha)	Total waterside recreational area is 31.07 Ha, majorly increased Pier2, 3 warehouse Art Center (0.68 Ha)
Control over all sites with soil pollution (100%)	• Number of regulated sites in the port: 12 • Control rate of soil contaminated sites: 100%	• Number of regulated sites in the port: 12 • Control rate of soil contaminated sites: 100%
Port recycling rate reaches 20%.	• Waste generation: 2,211.24 tons • Amount of recycled waste: 496.65 tons • Recycling rate: 22.46%	• Waste generation: 2,286.22 tons • Amount of recycled waste: 490.20 tons • Recycling rate: 21.44%
• Area of reserved wide bird habitat • Area of grassland • Area of woods (windbreak)	• Reserved wide bird habitat: 8 ha • Grassland: 2.1 ha • Woods (windbreak): 18.3 ha	• Reserved wide bird habitat: 10 ha • Grassland: 2.1 ha • Woods (windbreak): 18.3 ha
• Power consumption reduction: 1% • Oil consumption reduction: 3% • Water consumption reduction: 2% • Paper consumption reduction: 1% • (Index calculation: Resource consumption of the previous year – Resource consumption of the present year) / Resource consumption of the previous year × 100%	• Power consumption reduction: 0.58% • Oil consumption reduction: 6.91% • Water consumption reduction: -7.08% • Paper consumption reduction: 17.32% (Note: Negative value means not reached the index)	• Power consumption reduction: -1.23% • Oil consumption reduction: -12.37% • Water consumption reduction: 1.70% • Paper consumption reduction: 13.04% (Note: Negative value means not reached the index)


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Emergency Response

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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 regularly 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 penality.

During 2014 and 2015, within the Kaohsiung Port area, the 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

>>Environmental Inspection and Punishment in Port of Kaohsiung

Item\Year	2012	2013	2014	2015
Number of patrols (water area and land area)	463	508	461	496
Notification (water area and land area)	96	97	117	76
Exhaust emission	66	44	42	57
Environment and hygiene inspection in ship making plants	62	105	52	64
Oil fence (vessels)	114	133	120	122
Joint inspection	7(land)	11(land)	16(land & water)	24(land & water)
Admonishment for improvement	1296	1895	1895	1851
Admonishing ticket	12	49	49	36
Penalty (Maritime and Port Bureau)	3	2	9	12

Source: TIPC Kaohsiung Branch

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 2014 and 2015, the commercial port area of Kaohsiung held 6 joint exercises, and participants included the Kaohsiung Branch of TIPC, Kaohsiung Harbor Police Department, Kaohsiung Harbor Fire Brigade, National Fire Agency, MOI, Southern 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.

>>Number of Accidents in Kaohsiung Port

Accidents\Year	2012	2013	2014	2015
Ship collision, fire, explosion, fuel spill, chemical spill	28	31	28	19
Ship breakdown, tilt (no affecting safety)	19	32	10	12
Safety and health accident (cause injuries or deaths)	-	-	21	15
Fire and/or explosion of warehouse or fuel tank	2	0	0	0
(Small) fuel spill, garbage and fire in the port area	60	78	117	87
Others	170	123	206	211

Source: TIPC Kaohsiung Branch

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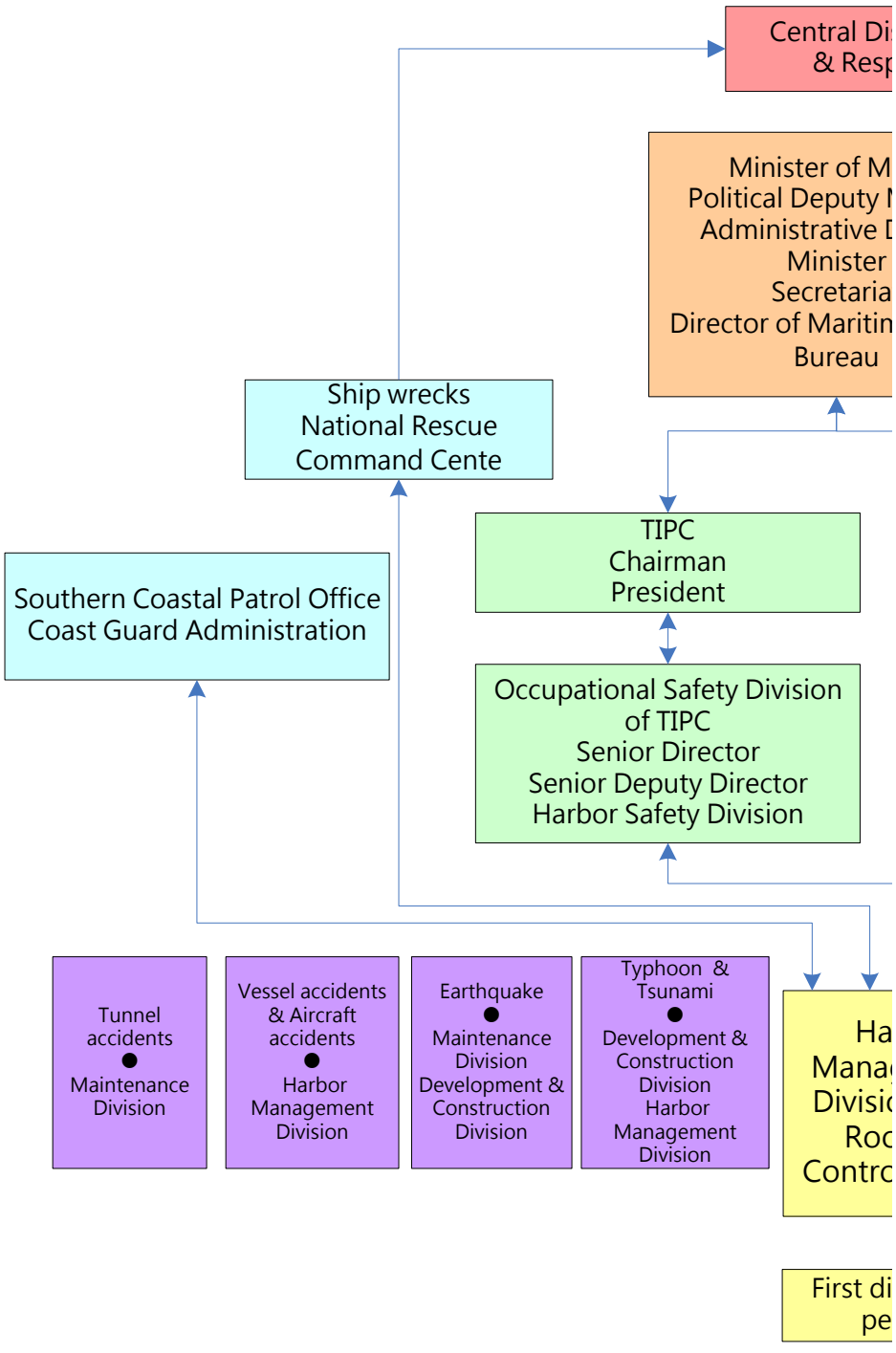
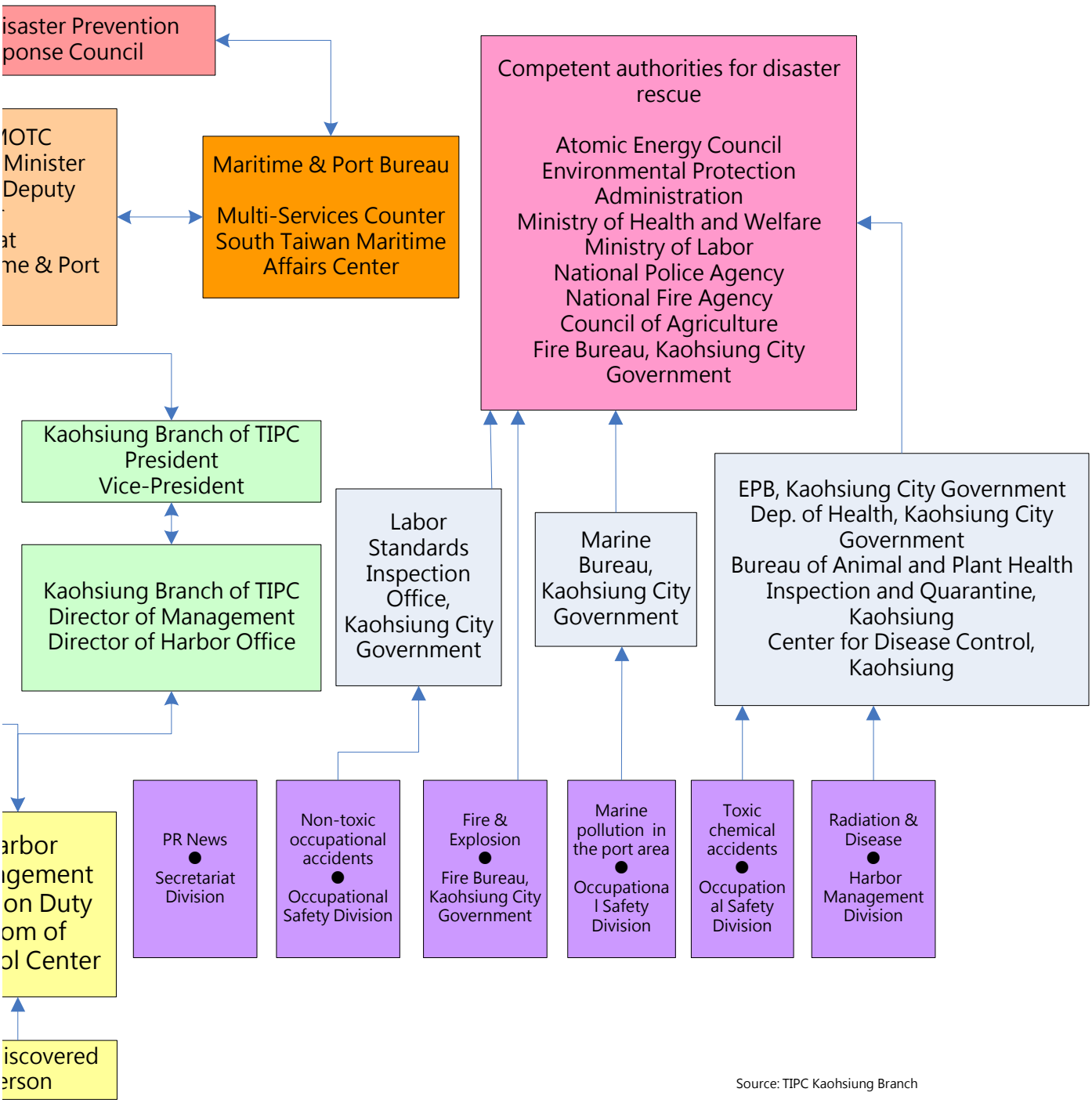
Emergency Response

Flow Chart for Disaster and Accident Notification in Port of Kaohsiung





Source: TIPC Kaohsiung Branch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Involvement and Cooperation

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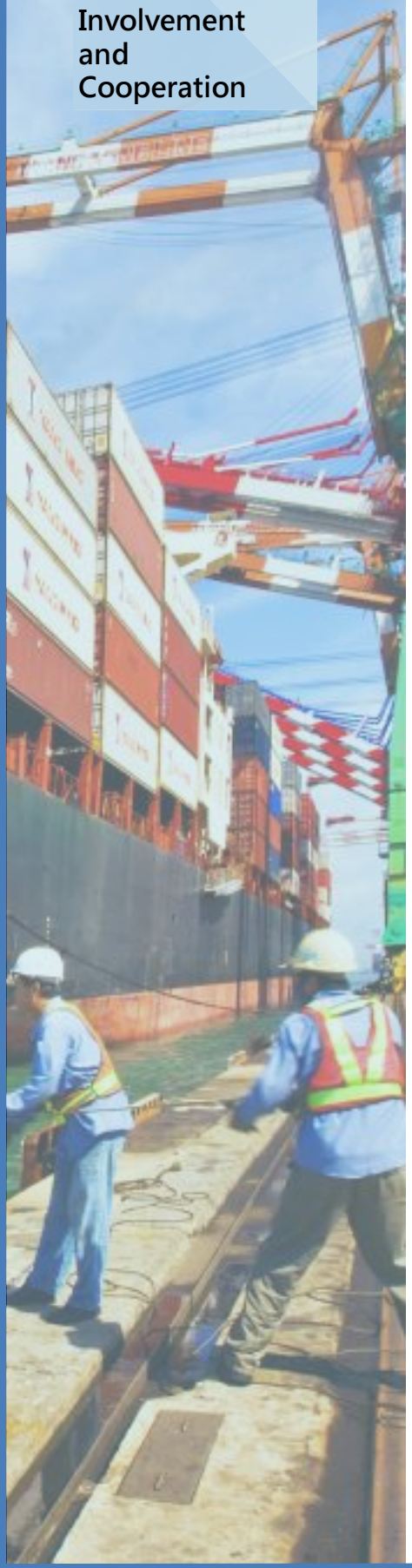
The best solutions proposed by the Kaohsiung Branch of TIPC indicate the organization' s ability to manage port environment. Kaohsiung Port' s best practice examples of 2015 and 2016 includes brownfield restoration, covered warehousing and storage facilities and vessel speed reduction.



6.1.1 Brownfield Restoration

Environmental issue: Contaminated land

Strategies: Exemplifying, Enforcing

Content

Attention/Motives

In the past, the high-pollution industries such as heavy industry, oil storage facilities, and shipbuilding surrounding the Port of Kaohsiung have contributed to the accumulation of heavy metals and toxic substances in port soil and water. The brownfields resulting from environmental remediation of chronical pollution become the greatest challenge to the port.

Solutions

The depth of contaminated soil is approximately 5.5 meters, the basement excavation of Kaohsiung Port Terminal is 11 meters, so all of the contaminated soil can be removed during construction. Therefore, the CPC Corporation (Taiwan) was contacted to remediate soil by excavating and removing oil-contaminated earth works in the base.

Implementation/Timeline

1947-1997	➢ Lingzhan oil delivery and storage operations
1997	➢ CPC Corporation handed the site back to the TIPC.
2005	➢ The Environmental Protection Bureau announced the original site as partially polluted.
2010-2013	➢ Decided to build the Kaohsiung Port Terminal on the original site during planning and design.
Sep. 2013	➢ Soil contamination was spotted during construction.
Mar. 2014	➢ The Kaohsiung Branch of TIPC conducted an additional survey on the site, and professionals from the Environmental Protection Bureau arrived at the site to verify the survey results.
June 2014	➢ Continued to execute the Plan of Necessary Response Measures, and the Environmental Protection Bureau announced this site to be a site under pollution control.
Jan. 2016	➢ Presented the Application for Land Use in the Kaohsiung Port Terminal.
April 2016	➢ R emoved all the contaminated soil at the site and completed self-verification.
May 2016	➢ Resumed the construction of the basement structure and the new building of the Kaohsiung Port Terminal.

Investment amount

Contaminated sites supplementary survey: 3.7million (NTD)
Kaohsiung Port Terminal construction project: 4.5billion (NTD)

Effect/Benefits

●The site has been clear of all contaminated soil, after which the construction of basement structure and the building can continue without repeating the same excavation procedure and wasting public funds. This practice has created a win-win situation by facilitating both the restoration of brownfields and the construction of the project.

●Expected benefits

- Improve the quality of passenger services, and increase the number of passengers that can be served during peak hours to 2,500.
- Attract international cruises to berth at the Kaohsiung Terminal Port. The building will provide services for passenger ships berthing at Wharves No. 18–21 (575m in length and 10.5m in depth). The target types of ships will be large cruises with a gross tonnage of over 225,000, length of 361 m, and breadth of 66 m that have a draft of 9.15 m when fully loaded (5,400 passengers and 2,400 crew members)
- Establish a single service counter to provide comprehensive port and passenger services.

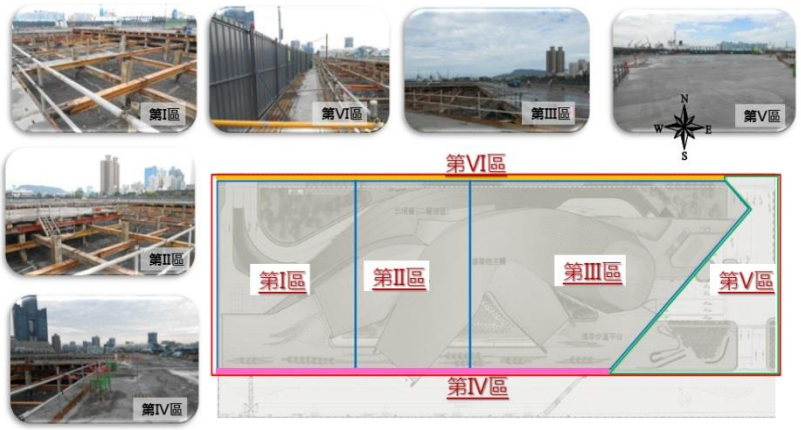
Participating Units

CPC Corporation (Taiwan), Kaohsiung Branch of TIPC, Kaohsiung EPB

Stakeholders

Kaohsiung Branch of TIPC, Kaohsiung EPB, Kaohsiung city citizens and residents and passengers of the Port of Kaohsiung

>>Divide the site into different zone for improvement works



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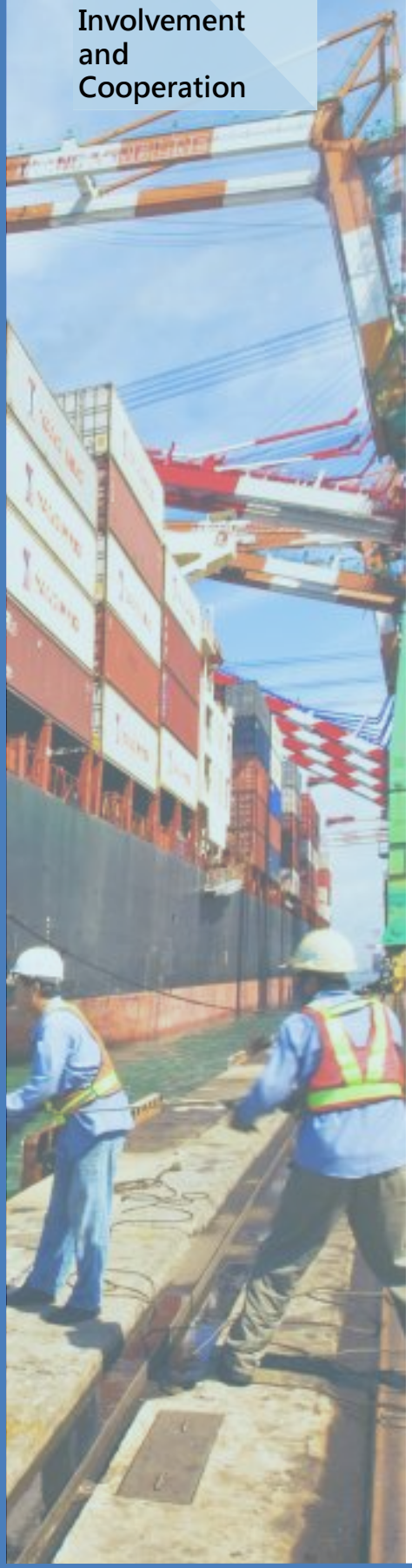


6.1.2 Covered warehousing facilities of cargo handling

Environmental issue: Air quality, dust

Strategies: Exemplifying, Encouraging, Enabling

Content

Attention/Motives

Wharves No. 48–56 in the Chungtao Commercial Port Area are mainly for bulk cargo stevedoring. The major types of cargo stevedored include coal, scrap iron, wood chips, gravel, bulk cement clinker, and other substances that tend to produce suspended particles. If the air control measures are not implemented, the fugitive particles and substances alike may affect and contaminate air in the port, export processing zones, and nearby communities.

Solutions

To improve fugitive dust pollution induced by stevedoring in the port and to comply with the "Guidelines for Controlling Air Pollution Caused by Stationary Pollution Sources and Fugitive Particulate Pollutants" issued by the EPA, the Kaohsiung Branch of TIPC established covered coal-unloading equipment, dust nets, and mobile spray towers that are qualified by related laws and regulations in the bulk cargo stevedoring area in the Chungtao Commercial Port District. For Wharf No.49, its operational specifications describe as follow:

- Equipment capacity: Speed of conveyor: 250 ton/hr, 4 lines: 1,000 ton/hr
- Outcome of test (Continuous supply of source material): Speed of conveyor: >200 ton/hr, 4 lines: >800 ton/hr
- If the grab operation is fast enough and continuously supply the material, the speed of conveyor equipment of Wharf No.49 can reach to more than 800 ton/hr.

Implementation/Timeline

Apr. 2011	➢	Planned and constructed the covered warehousing facilities at Wharf No. 49
Oct. 2014	➢	Finished the construction
Jan. 2015	➢	Officially opened

Investment amount

The cost for the covered warehousing facilities at Wharf No. 49 was approximately NT$ 78 million.

Effect/Benefits

- Environmental benefits: Effectively reducing air pollution generated by cargos' loading and unloading and improving air quality in Kaohsiung area.
- Operational benefits: In 2015, there were 27 collier coal ship unloading the coal, approximately 0.7 billion ton of coal. During 2016 January to April, there were 11collier coal ships unloading the coal, approximately0.22 billion ton of coal.

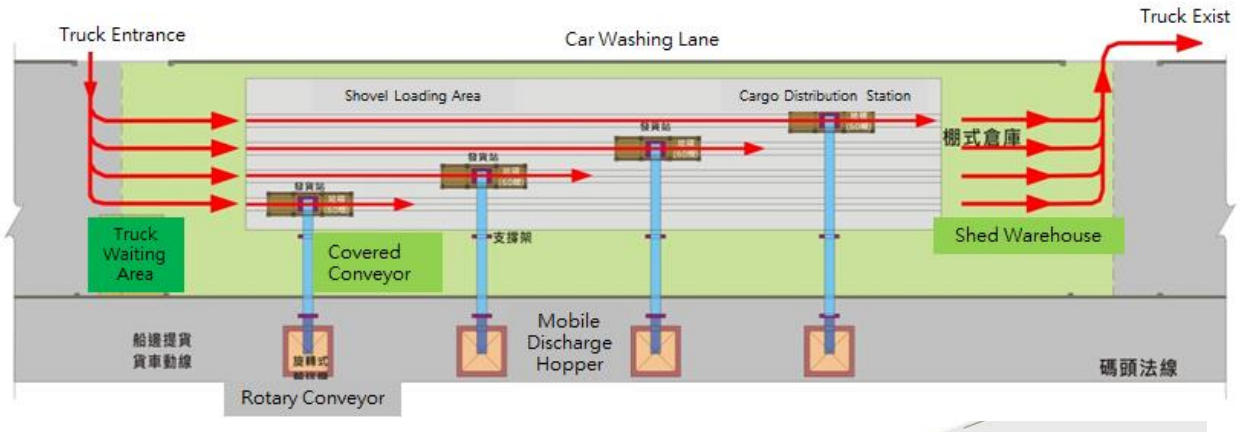
Participating Units

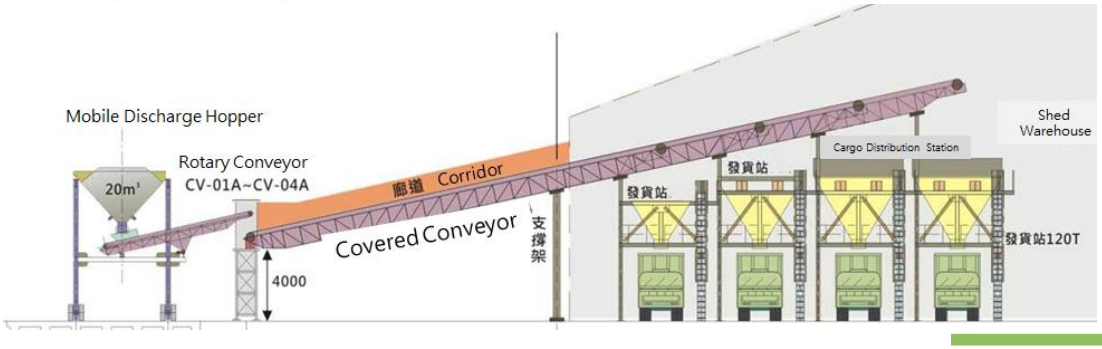
Kaohsiung Branch of TIPC

Stakeholders

Transport operators, stevedore, Ministry of Economic Affairs Export Processing Zone, Tenants, Kaohsiung EPB, EPA

>> Illustration of wharf No. 49 operation (no temporarily stores)





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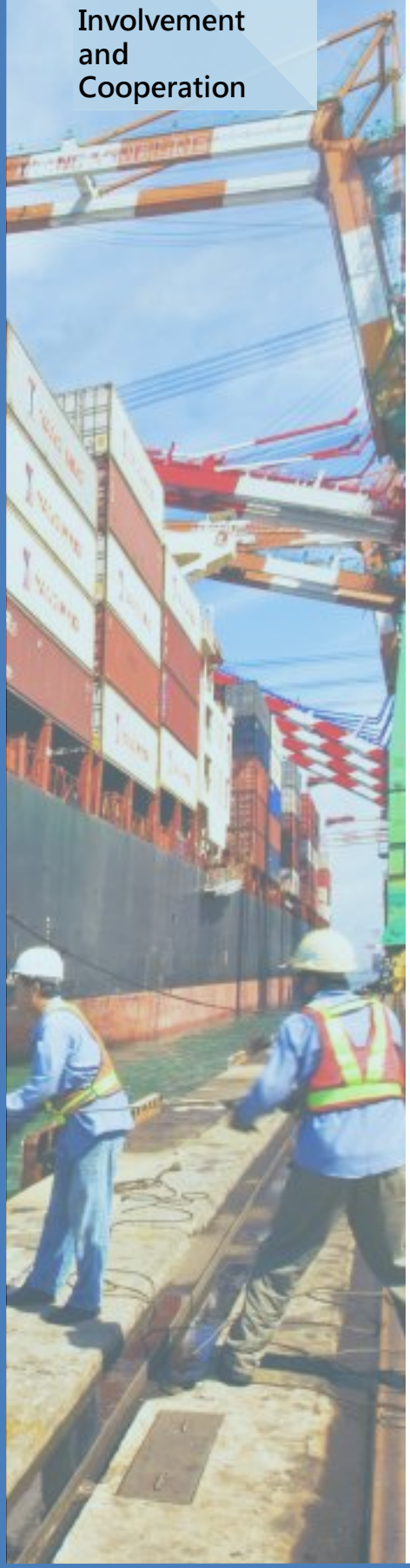

6.1.3 Vessel Speed Reduction Information Disclosure

Environmental issue: Air Quality

Strategies: Exemplifying, Encouraging, Enabling

Content

Attention/Motives

The Kaohsiung Branch realized that emissions from ships in the port have impact on Kaohsiung City citizens' daily life, so we request ships to reduce the speed to below 12 knots after getting to within 20 nautical miles from the port, and through the establishment of an automatic identification system (AIS) to understand ship deceleration achievement situation. This practice has less expense but can bring the pollution reduction benefits.

Solutions

The Kaohsiung Branch of TIPC has devised a plan for vessel speed reduction for ships entering and leaving the port in correspondence with the action plan for reducing nationwide air pollution launched by the Executive Yuan and the plan for controlling the total amount of air pollution in Kaohsiung and Pingtung initiated by the EPA on June 30, 2015. In compliance with the TIPC' s policies and plans, the branch has advocated speed reduction and encouraged incoming ships to decelerate within 20 nm from the port. In addition, among the ports and harbors in Taiwan, the Port of Kaohsiung was the first port to demonstrate and implement the plan of disclosing vessel speed reduction information for ships entering and leaving the port. In addition to completing the automatic identification system for vessel speed reduction inspection at 2014, the branch has started to implement information disclosure and public recognition since July in 2015 to encourage shipping lines to volunteer for developing an eco-friendly port in the Port of Kaohsiung with the branch.

Implementation/Timeline

Oct. 2013 to Dec. 2014	➢ Established and tested an automatic identification system for vessel speed reduction inspection.
June 2015	➢ Proposed "The Action Plan of Disclosing Vessel Speed Reduction for Ships Entering and Leaving the Port of Kaohsiung"
Mar. 2016	➢ The Golden Ship Prize of Vessel Speed Reduction was publicly awarded to shipping lines with satisfactory speed reduction performance.

Investment amount

The cost for establishing the automatic identification system for vessel speed reduction inspection in the Port of Kaohsiung was approximately NT$500,000. The amount of prize for shipping lines with excellent vessel speed reduction performance in 2016 was included in TIPC' s operational costs for anniversary celebration.

Effect/Benefits

- In terms of environmental benefits, the speed reduction program was promoted among the shipping lines in the Port of Kaohsiung, the information of vessel speed reduction was disclosed on a website, and a prize was conferred on shipping lines with excellent eco-friendly performance. By doing so, we expect to enhance incoming and outgoing ships' intention to reduce speed and increase the ratio of vessel speed reduction gradually every year. The EPA estimated that the Port of Kaohsiung can reduce approximately 20,000 tons of greenhouse gas and 500 tons of nitrogen oxides.
- In terms of social benefits, this project not only assists the Ministry of Transportation and Communications to demonstrate its effectiveness in reducing mobile sources of pollution, but realizes the EPA' s action plan for reducing nationwide air pollution. In addition, the Kaohsiung Branch of TIPC can promote its ideals and achievements to the international shipping industry.

Participating Units

Kaohsiung shipping industry, TIPC, Kaohsiung Branch of TIPC

Stakeholders

MOTC, EPA, TIPC, Kaohsiung Branch of TIPC, Kaohsiung shipping industry, Kaohsiung city citizens and residents and passengers of the Port of Kaohsiung

Port of Kaohsiung
Safety and hygiene Section of the Occupational Safety Division
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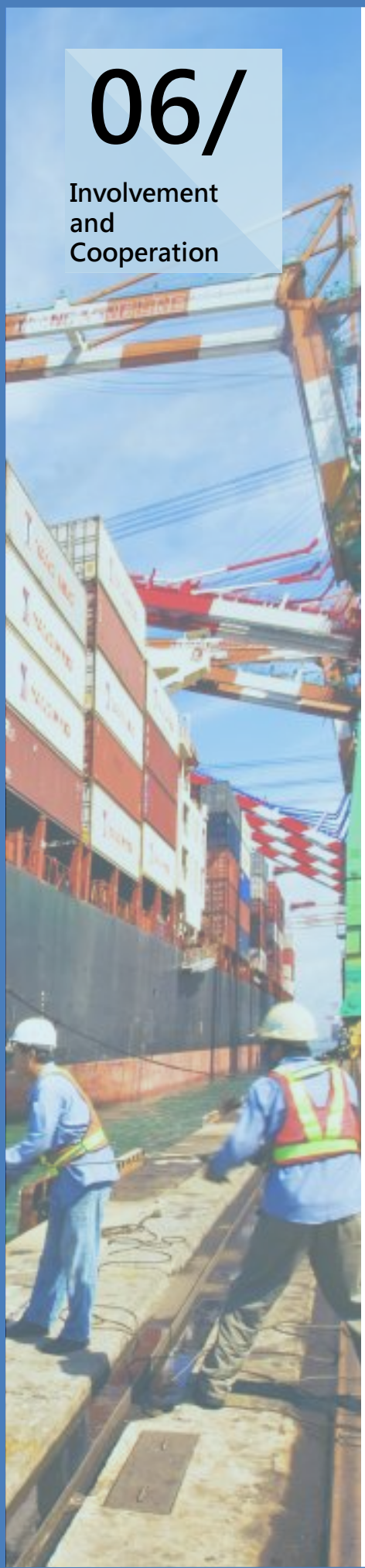


06/

Involvement and Cooperation

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 organizations

Association

Association of Pacific Ports(APP)

The APP is aimed to gather the authorities of ports along the Pacific coast to discuss the development of Pacific marine transportation, seek solutions for problems. The Kaohsiung Branch regularly attends APP conferences and served as the organizer in 2015, adopting the theme of "Ecology, LOHAS, and Greening in the Port of Kaohsiung" to exchange innovative technology, knowledge, and professional management experiences with other members.

The International Association of Ports and Harbors(IAPH)

The IAPH is a NGO with a tremendous influence on global port authorities, IAPH also provide the advisory to the main bodies of UN (eg. ECOSOC, IMO , UNCTAD , UNEP , ILO, WCO). The IAPH holds biennial conferences alternately in America, Asian Pacific, and European and African regions. The Port of Kaohsiung regularly attends the conference to keep abreast of the development and latest topics of ports worldwide.

Terminal operators

Kao Ming Container Terminal Corp. (KMCT)

Kaohsiung Branch of TIPC and KMCT collaborated through BOT to invest in the first world class green terminal in Terminal No. 6 of Kaohsiung Port, to offering high-quality and highly efficient service with the principle of safety, efficiency, 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.

Cooperation

South Star Free Trade Port Zone (SSFT)

South Star 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.

Kaohsiung Port Land Development Company

The branch facilitates the cooperation between the Port of Kaohsiung and Kaohsiung City Government, adaptively reuses old land and buildings, and integrates the resources and strengths of the port and the city to improve local economic development.

Academic institution

National Sun Yat-sen University

NSYU signs a memorandum of cooperation with the TIPC to cooperate in terms of personnel training, student internships, and the management of seminars and lectures.

Ports

APEC-Antwerp/ Flanders Port Training Center

The Port of Kaohsiung signed a letter of intent with the Antwerp/Flanders Port Training Center to provide various port operation-related courses on engineering, wharf management, logistics, and docker training.

Port of Gdansk Authority

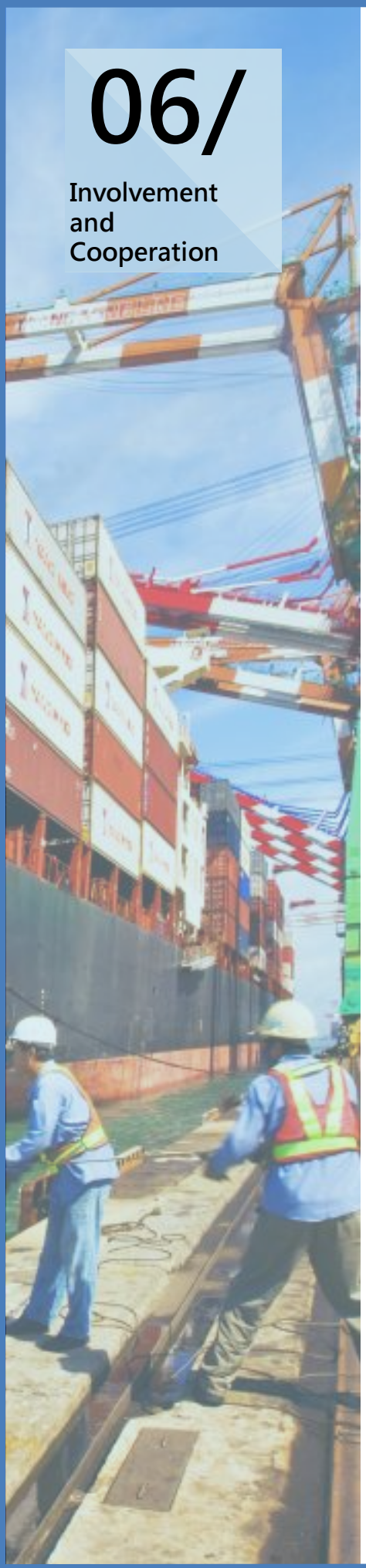
The Port of Kaohsiung signed a sister port agreement with the Port of Gdansk to facilitate mutual operational developme-nt and exchanges in port management and technologies.

Shanghai International Port (Group) Co. Ltd.

With an aim to improve the level of port engineering technology, the Port of Gdansk and the Port of Kaohsiung actively engage in exchanges regarding equipment maintenance, energy conservati-on and environmental protection, and the application of new technologies.

06/

Involvement and Cooperation



Public sector

Institute of Transportation (IOT), MOTC

The Institute of Transportation at the MOTC has served as a think tank that assists the ministry with formulating policies, integrating and coordinating transportation-related decisions, and establishing a communication network for industrial, governmental, and academic transportation organizations. The Kaohsiung Branch of TIPC has collaborated with the Harbor and Marine Technology Center of the institute in multiple projects regarding topics such as the establishment of green ports, innovative container management, and port operation strategies.

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 30 entities from private sector, public sector, academia and the military to cooperate in controlling port pollution and sharing marine environmental monitoring data and information to achieve the goal of marine pollution control.

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, South Taiwan Maritime Affairs Center, and Kaohsiung EPB monthly to conduct joint inspections of the public bulk cargo dock of Zhongdao Commercial Port to prevent pollution in the Port area.

Southern Taiwan Service Center of MPB, MOTC

The South Taiwan Maritime Affairs Center of the MPB under the MOTC is in charge of the affairs related to port security, disaster relief, and pollution control in the Port of Kaohsiung, as well as the implementation of laws and regulations, gathering of evidence, and penalty consideration. The Kaohsiung Branch of TIPC cooperates with the South Taiwan Maritime Affairs Center to conduct land–water inspection in the port.

Environmental Protection Administration, Executive Yuan

The EPA of the Executive Yuan and the USEPA 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").

Environmental groups

Environmental Protection Bureau, Kaohsiung City Government

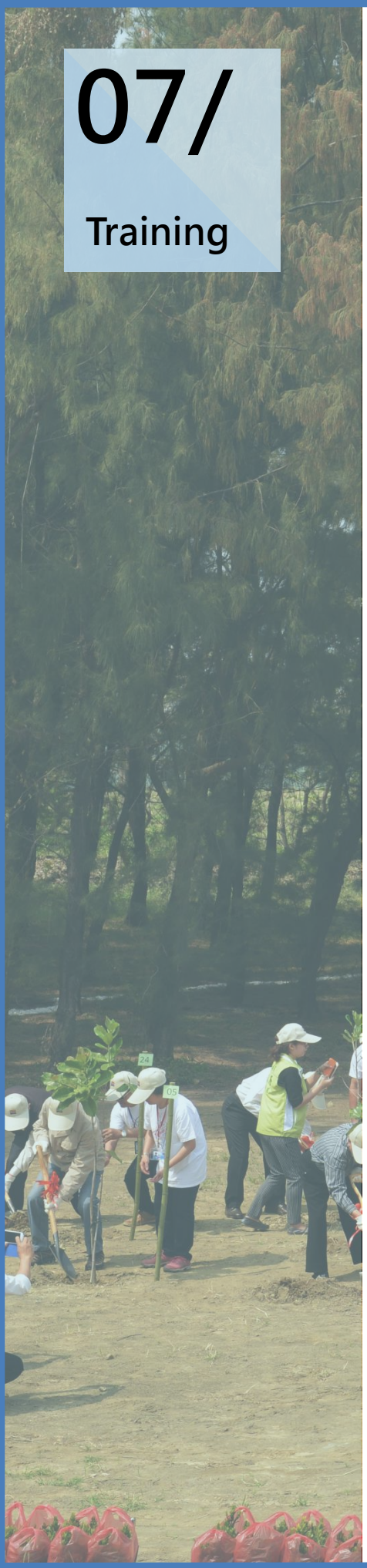
The Kaohsiung Branch of TIPC works with EPB of the Kaohsiung City Government to encourage diesel vehicles entering the Port area to join Kaohsiung City's autonomous management project to set up a vehicle license plate recognition system at Checkpoint No. 55 for joint inspection.

Kaohsiung Wild Bird Society

The Kaohsiung Branch of TIPC consulted ecological protection in SSFT 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 lecture our staff about ecology in the SSFT Port Zone.

Training

07/



07/ Training

7. Training

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

In 2014 and 2015, the Kaohsiung Branch of TIPC organized 64 environmental education courses for internal staff members, with approximately 2,000 participants. The courses included: pollution prevention, natural disaster, environmental impact assessment and ecological education.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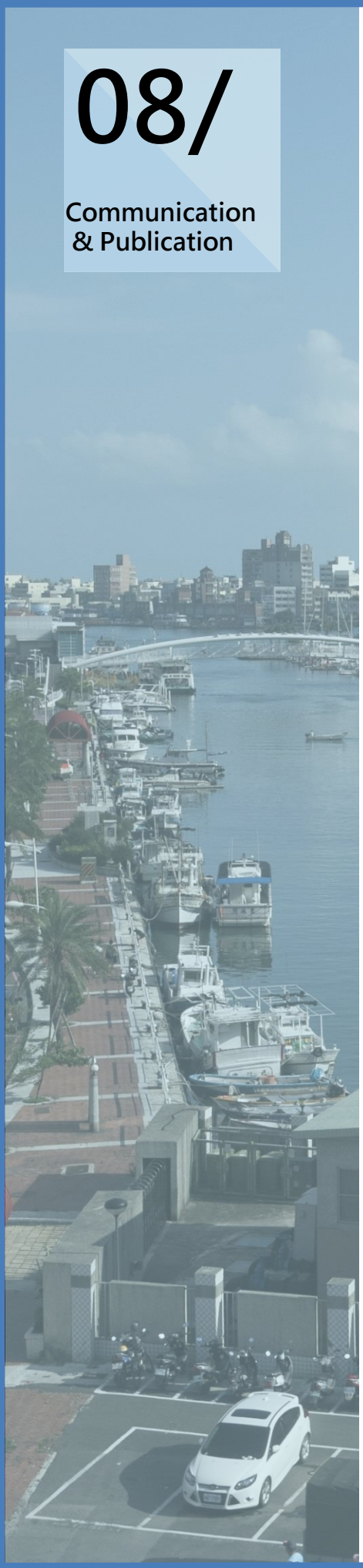
Communication and Publication

08/



08/

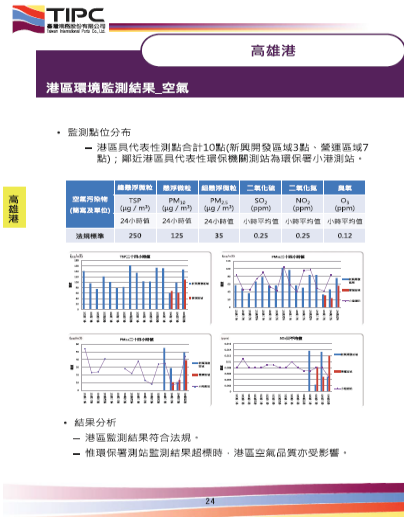
Communication & Publication

8. Communication & Publication

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.

Publication

Port of Kaohsiung Introduction Booklet



TIPC Environmental Monitoring Report

Website

Chinese and English web pages for TIPC Green Policy

"Contact us" on the Kaohsiung Branch of TIPC website

Kaohsiung Branch of TIPC FB Pages

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.

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

By promoting daily life and activities of Kaohsiung Port through FB pages would allow the Kaohsiung Branch to have a more intimate interaction with public.

Seminars/ Workshops

The Association of Pacific Ports Annual Conference

2015 was first held in Kaohsiung, through the theme of " Ecology, LOHAS, Green Dynamism" to discuss future trends of pacific ports.

3th port–city coordination and development forum

TIPC Kaohsiung Branch and local government, shipping companies, logistics and the cruise industry, discussed the innovative mutual benefit approach for port–city harmonious development.

Eco-Port Certification Presentation

Following the certification of the Port of Kaohsiung as Asia' s first EcoPort in 2014, the TIPC successfully certified its subsidiary ports of Keelung and Taichung as EcoPorts in 2015.

Activities

Occupational health and safety promotion month

By promotion of occupational health and safety to enhance the awareness of staff and related industry, such as engineering contract manufacturers, petrochemical industry and container handling industry

Port field trip for students

Assist university educators to arrange a port visit for students, to understand port operations, pollution prevention technique.

61&62th Maritime Festival celebrated in Kaohsiung

TIPC appreciated meritorious staff and shipping companies with professional performance at work

Tree Planting Day

South Area Port Business Forum

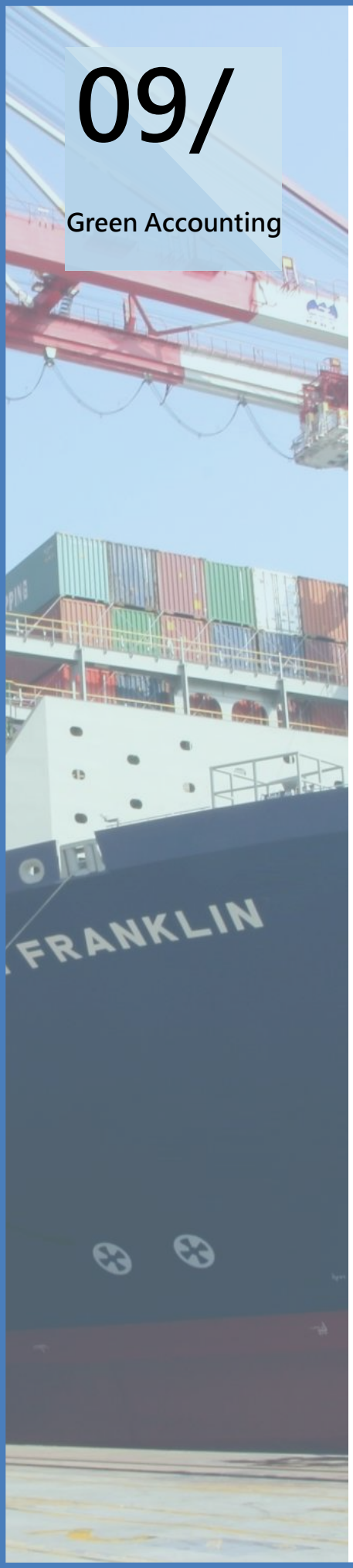
World Oceans Day

Kaohsiung Branch of TIPC exhibited our Green Port achievement


SWL
Under Spreader 80T
Under hook 100T
GC - 11
ZPMC
GC - 11
GC - 12
ZPMC
CMA CGM BENJAM

Green Accounting

09/



09/

Green Accounting

9.1 Environmental costs

Regarding the environmental issues, the Kaohsiung Branch of TIPC has spent funds on their employees, environmental maintenance, 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 total amounts that Kaohsiung Branch of TIPC invested in the environmental issues are NT$307,094,000 (approximately €8,530,000 in 2014) and NT$199,974,000 (approximately €5,555,000 in 2015).

Environmental investments in the Kaohsiung Branch

- Employees: Personnel costs of environmental control, and environmental educationand 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

>>Costs related to Environmental Issues, Kaohsiung Branch of TIPC (Unit: NTD thousands)

Items of Expenses	2012	2013	2014	2015
Employees	49,306	67,710	74,878	41,227
Environmental Maintenance & Management	74,524	67,907	179,211	116,311
Environmental Monitoring	27,609	27,774	37,035	26,502
Emergency Response	1,494	3,853	14,740	13,720
Communication & Publication	3,704	5,519	1,230	2,214
Total	158,143	172,763	307,094	199,974

9.2 Environmental Assets

In order to develop Kaohsiung Port into a transshipment hub in the Asia-Pacific Region, the Kaohsiung Branch of TIPC has promoted a series of port development projects, 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 to increase the effectiveness and reduce pollutant emissions. The total amounts that the Kaohsiung Branch of TIPC invested in the fixed assets regarding environmental issues are NT$1,449,606,000 (approximately €40,267,000) in 2014 and NT$1,414,332,000 (approximately €39,287,000) in 2015.

>>Assets invested in Environmental Issues in 2014 (Unit: NTD thousands)

Item / Fixed assets		Land Improvement	Buildings	Machinery and Equipment	Transportation Facilities	Miscellaneous Equipment	Investment property	Total
Development Plan	Follow-up Projects	1,161,943	43,621	74,927	0	0	0	1,280,491
	New Projects							
General Building and Equipment Plan		1,447	0	79,250	3,986	17,031	67,401	169,115
Total		1,163,390	43,621	154,177	3,986	17,031	67,401	1,449,606

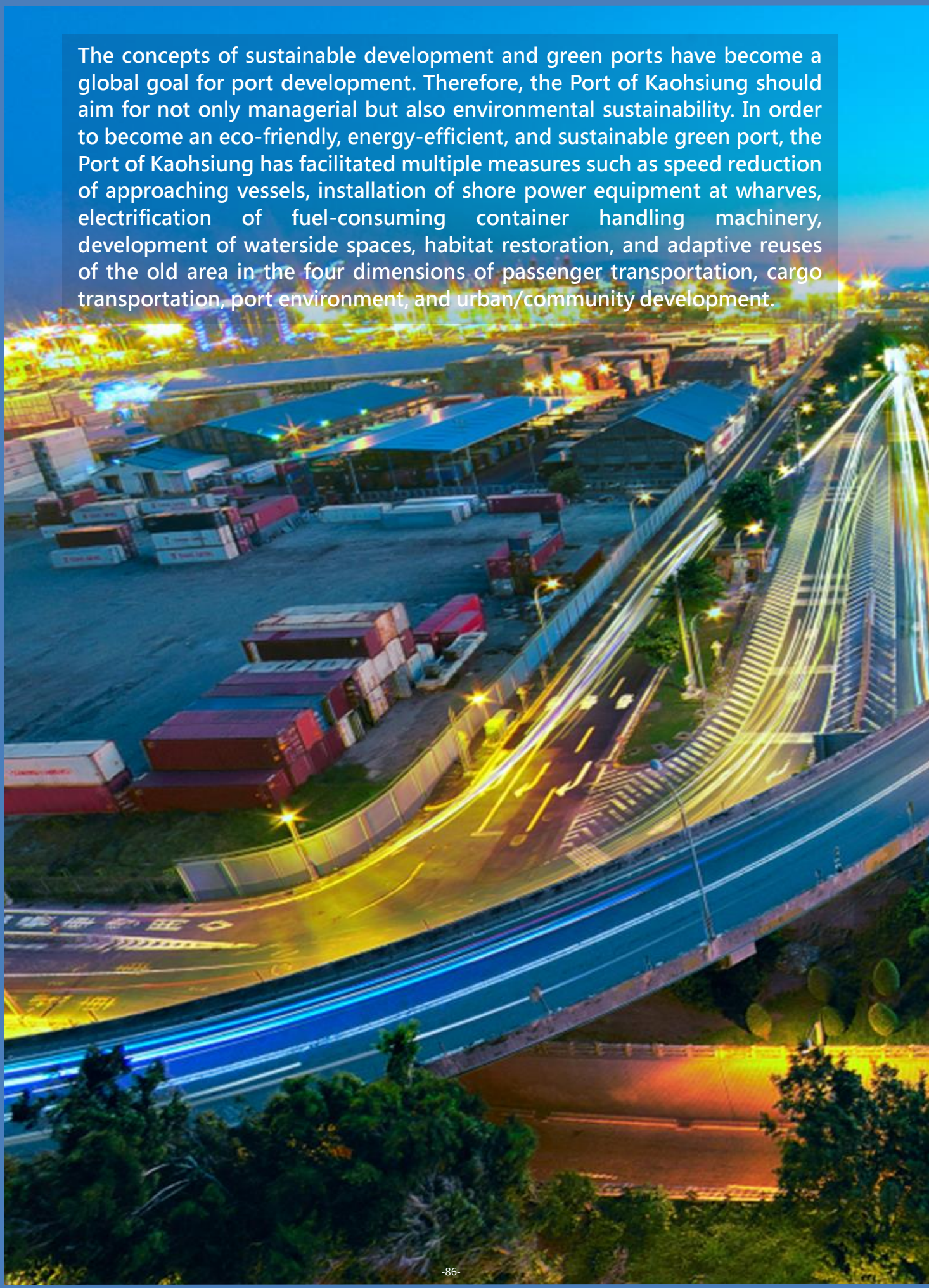
>>Assets invested in Environmental Issues in 2015 (Unit: NTD thousands)

Item / Fixed assets		Land Improvement	Buildings	Machinery and Equipment	Transportation Facilities	Miscellaneous Equipment	Investment property	Total
Development Plan	Follow-up Projects	906,673	196,075	7,802	0	0	0	1,110,550
	New Projects							
General Building and Equipment Plan		0	0	179,740	4,977	25,206	138	303,782
Total		906,673	196,075	187,542	4,977	25,206	93,859	1,414,332

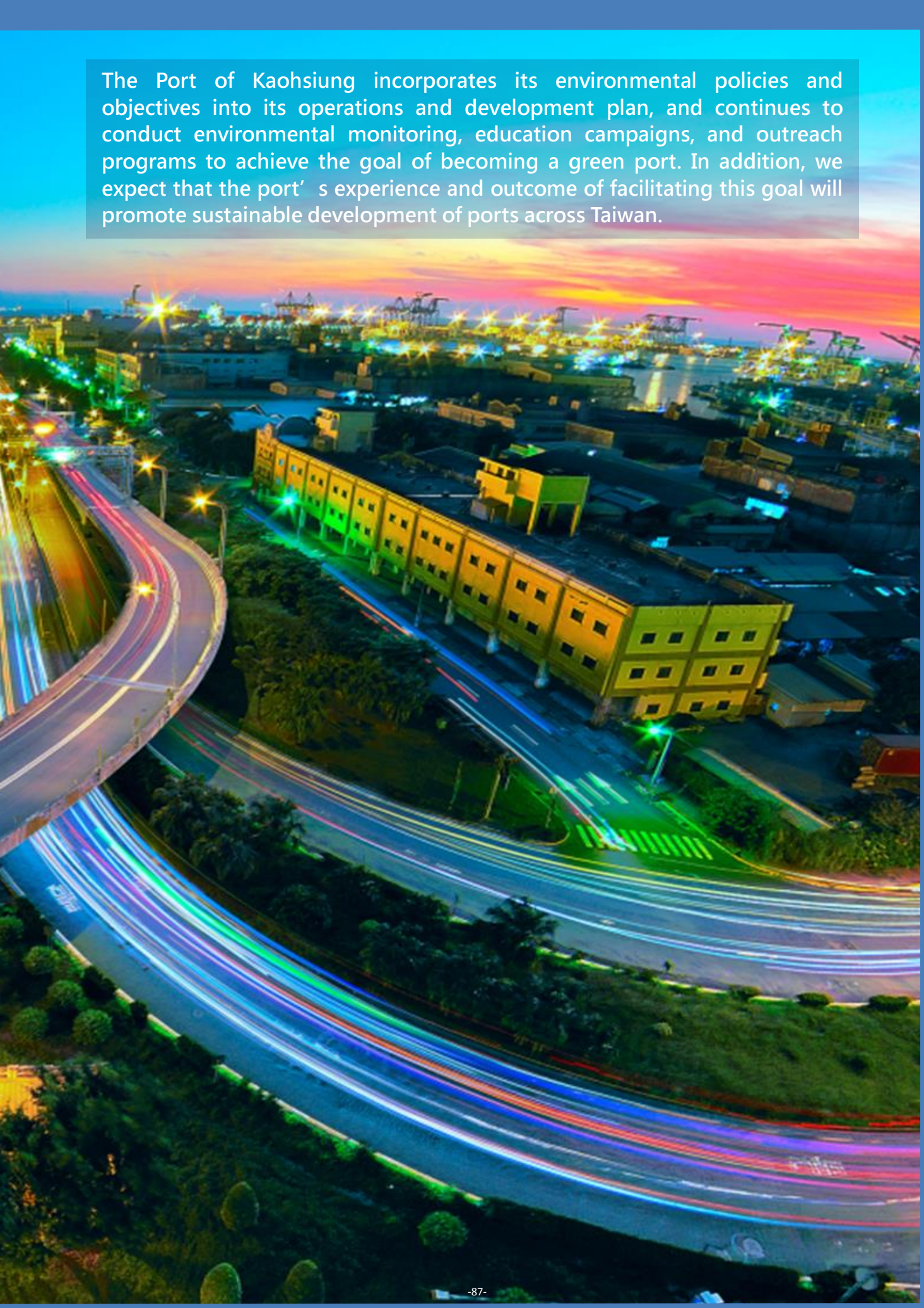
Improvement Recommendations

10/

The concepts of sustainable development and green ports have become a global goal for port development. Therefore, the Port of Kaohsiung should aim for not only managerial but also environmental sustainability. In order to become an eco-friendly, energy-efficient, and sustainable green port, the Port of Kaohsiung has facilitated multiple measures such as speed reduction of approaching vessels, installation of shore power equipment at wharves, electrification of fuel-consuming container handling machinery, development of waterside spaces, habitat restoration, and adaptive reuses of the old area in the four dimensions of passenger transportation, cargo transportation, port environment, and urban/community development.



The Port of Kaohsiung incorporates its environmental policies and objectives into its operations and development plan, and continues to conduct environmental monitoring, education campaigns, and outreach programs to achieve the goal of becoming a green port. In addition, we expect that the port’ s experience and outcome of facilitating this goal will promote sustainable development of ports across Taiwan.



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Environmental Science Technology Consultants corporation