Port of Kaohsiung Environmental Report

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This environmental report presents Kaohsiung Port's achievements in environmental protection from 2016 to 2017 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.

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Environmental Policy

Ports are the core of international trades and essential for Taiwan's economic development. The Port of Kaohsiung recognizes the importance of ensuring sustainable development while keeping the balance between port prosperity and local ecology. In order to sustain the beauty and prosperity of the bay area, Port of Kaohsiung thereby established the following environmental policy to ensure consistent environmental performance.

- 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



PORT OF KAOHSIUNG, TAIWAN INTERATIONAL PORTS CORPORATION





Environmental Objectives

Improve port air quality:

To encourage speed reductions for vessels in proximity to the port, reduce air pollution emissions from cargo handling operations, and continuously monitor air quality at the port

Abate vessel emissions:

port water quality monitoring. **Reduce waste:**

To fully implement waste recycling at the port, and manage river debris efficaciously.

Manage hazardous cargo: To value disaster prevention and prevent accidents at all cost.

Practice good port development strategies: To minimize impacts of port development by coordinating with city development and monitoring marine environment.

Monitor marine sediment:

To protect port ecology by monitoring the dredged-sediment disposal area. Continue brownfield remediation:

To continuously monitor and remedy the contaminated sites in the port and revitalize the brown fields. Strengthen relationships with local communities:

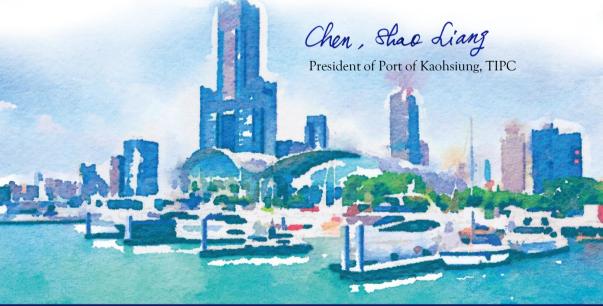
To enhance port friendliness by making port information transparent, encouraging public participation, and increasing opportunities to interact with the local communities.

Restore habitats:

To restore local ecology by reducing impacts from port development and implementing compensation measures

Tighten resource usage:

To reduce port impact by managing resource consumption and greenhouse gas emissions.



PORT OF KAOHSIUNG, TAIWAN INTERATIONAL PORTS CORPORATION

To manage vessel pollution effectively by promoting environmental friendly practices and conducting long-term

Message from the President

01/

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

To achieve sustainable development, the Port of Kaohsiung (hereinafter the Port) has employed environmentally friendly practices in its operational development. Since 2010, the Taiwan International Port Corporation's "Greening the Ports Action Plan" has been gradually implemented among ports in Taiwan. In 2014, the Port became the first in the Asia-Pacific region to obtain European EcoPort certification. Since then, it has continued to strive toward sustainable development and has set the following objectives: to increase its business competitiveness, to enhance its social image, to improve its visibility and reputation, and to obtain the experience of international ports.

The Port has continually improved its infrastructure under the joint efforts of various shipping sectors and agencies, promoting the port as the center for Asia-Pacific transshipment and global logistics. With the business goals of "breakthrough, innovation, and variation" and "safety, efficiency, and sustainability," the Port aspires to develop its logistics and transshipment and to become a free port, cultivating a safe, economical, and highly efficient operating environment.

Considering the compatibility of port-city development, the Port will expand southward and adhere to the principles of sustainable development in production, life, and ecology by adjusting the function of the old port area. As a green port, the Port is transitioning into the role of a hub port, LOHAS port (i.e., a port that features lifestyles of health and sustainability), and eco-port (i.e., a port that is environmentally friendly). The Port will be built to function as a modern commercial harbor that is informative, automated, and complies with green transportation, while meeting shipping and urban development demands. Combining the business culture of "integrity, sincere service, and business innovation," the Port provides clients with attentive and thoughtful services, creating a win-win business outcome for the Port, shipping sectors, and clients.

Chen, Shao Liang

President of Port of Kaohsiung Taiwan International Ports Corporation, Ltd.





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 km² of land, and the water area of the Port reaches 158.65km². 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 (Ciiin Seashore). In addition, the Love River, Qianzhen River, Canal No. 5 and Yanshui Stream all flow into the ocean through the Port.

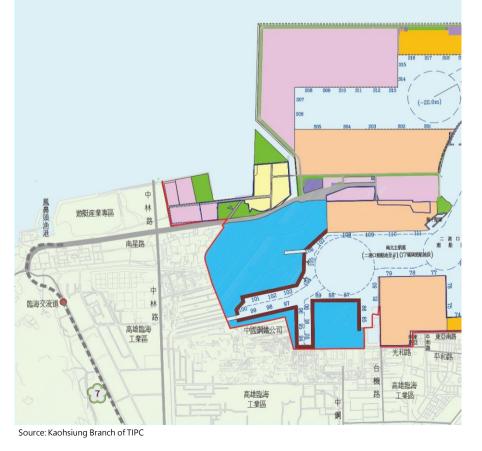
2.2 Legal Status and Port Operators

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

public authority.



Master Plan of Port of Kaohsiung



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



2.3 Commercial Activities 2.4 Main Cargoes

At present, the commercial section In 2016 and 2017, the inbound cargo of the port include 124 operating of the Port of Kaohsiung mainly docks, whose full length is 28,853 m, including: bulk and sundry goods base metals and articles therefore dock, container dock and industrial (13.22%), vegetable products dock. Commercial activities within (7.58%), and products of chemical or the port include: ship building and repair, petroleum processing, marinas / leisure, chemical industry, general manufacturing, storage and packaging and refrigerated cargo.

includes mineral products (60.28%), allied industries (6.12%). The product outbound cargo primarily includes base metals and their products (35.67%), plastics, rubber, and articles thereof (20.84%), mineral products (10.42%), and products of chemical or allied industries (10.26%).

Main Commercial Activities and Cargo Handling of Port of Kaohsiung

Petroleum	Pyrites minerals
Crude oil Refined products LNG (liquefied natural gas)	Aluminum Cement Phosphates Sulphur
Dry bulk	Liquid bulk (non-oil)
Animal feed Chemicals Grains Scrap Timber Wood products	Liquid chemicals Liquefied gases
Ores	Other
Coal Iron ore	Vehicles Fish Fruit

Source: Kaohsiung Branch of TIPC

2.5 Port Business

2016-2017 Business of Port of Kaohsiung

Item		2016	2017	Difference	%
Incoming &	V.	36,525	37,546	1,021	2.8
Outgoing Ships	G.T.	900,275,872	915,594,148	15,318,276	1.7
Volume of	Cargo (Revenue ton)	374,785,560	367,561,080	-7,224,480	-1.9
	Dry bulk and Groceries (Revenue ton)	51,789,568	50,937,814	-851,754	-1.6
Cargo Handled	Pipeline cargo (Revenue ton)	29,801,464	31,544,006	1,742,542	5.8
	Total (Revenue ton)	456,376,592	450,042,900	-6,333,692	-1.4
	Incoming Cargo(TEU)	5,229,312	5,126,820	-102,492	-2.0
Number of Cargo Handle	Outgoing Cargo(TEU)	5,235,548	5,144,198	-91,350	-1.7
	Total (TEU)	10,464,860.00	10,271,018.00	-193,842	-1.9
	Incoming Cargo(TEU)	78,172,862	79,438,675	1,265,813	1.6
Volume of Imports &	Outgoing Cargo(TEU)	32,297,031	32,116,744	-180,287	-0.6
Exports	Total (TEU)	6,150,923	4,515,553	-1,635,370	-26.6
	Imports (ton)	116,620,816	116,070,972	-549,844	-0.5
	Domestic	76,523	79,057	2,534	3.3
Incoming & Outgoing Passenger	International	42,998	117,559	74,561	173.4
	Total	119,521	196,616	77,095	64.5

Source: TIPC, 2016-2017 Statistical Report





3.1 Organizational Structure

Kaohsiung TIPC is The responsible for addressing environmental concerns involved in port operation and management, as indicated by attribution the of responsibilities specified in the Commercial Port Law and the Marine Pollution Prevention Act. Hygiene and Pollution Control The South Maritime Affairs Center is in charge of coping with environmental issues related to public authority. The 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 Management Section, Hygiene and Pollution **Control Section and Environmental** Management Section. The Safety and Hygiene Management Section is in charge of management of occupational safety and hygiene; the Section deals with pollution control, environmental laws, environmental impact assessment, environmental monitoring, oil pollution, chemical accidents, emergency management and environmental education in the the Environmental port; Management Section manages conservation, plant conservation, waste treatment and recycling. Among the staff members, 50 are involved in environmental protection issues.

Figure of Organization involved in environmental issues of Port of Kaohsiung

Management

- Kaohsiung Branch of TIPC
- Environmental Protection Bureau, Kaohsiung City Government South Taiwan Maritime Affairs Center, Maritime and Port Bureau, MOTC

Supervise

Kaohsiung

of

Port

- Kaohsiung Branch of TIPC Marine Bureau, Kaohsiung City Government
- **Environmental Protection Administration** Ocean Affairs Council
- ronmental Protection Bureau, Kaohsiung City Government
- South Taiwan Maritime Affairs Center Maritime and Port Bureau MOT

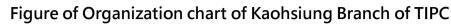
Perform Interdiction, Collection of evidence or **Enforcement Referral**

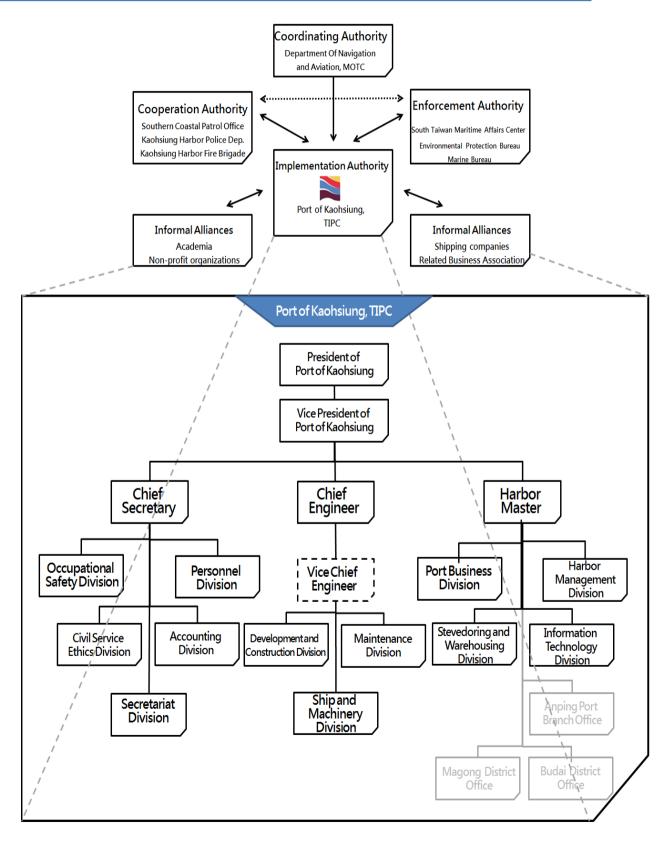
Kaohsiung Branch of TIPC

- Kaohsiung Harbor Police Dep. , National Police Agency, Ministry of the interior
- Southern Coastal Patrol Office, Coast Guard Administratio
- South Taiwan Maritime Affairs Center, Maritime and Port Bureau, MOTC
- Environmental Protection Bureau, Kaohsiung City Government

Sanction

- South Taiwan Maritime Affairs Center, Maritime and Port Bureau, MOTC
- Kaohsiung Harbor Police Dep., National Police Agency, Ministry of the interior
- Environmental Protection Administration Ocean Affairs Council
- Environmental Protection Bureau, Kaohsiung City Government







3.2.1 Relevant international regulations

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

Relevant Environmental Laws and Regulations Related to Ports in Taiwan

3.2.2 Relevant Environmental Laws and Regulations in Taiwan

In addition to the international environmental specifications and conventions, The Kaohsiung in Taiwan. The follow table lists the relevant Branch of TIPC collaborates with local authorities to environmental laws and regulations related to ports manage the environment in the Port in compliance in Taiwan.

Competent Authorities	Laws Title		Central Competent Authority	Loca
	The Commercial Port Law	2011/12/28		
Contains in the Minister of	The Law Of Ships	2010/12/08		
Sectors in the Ministry of transportation and	The Shipping Act	2014/01/22	Ministry of Transportation	South Mariti
communications	Act for the Establishment and Management of Free Trade Zones	2012/12/28	and Communications	
Sectors in the Ministry of the Interior	Fire Services Act	2011/12/21	Ministry of the Interior	Fire Bure
Sectors related to agricultural	Wildlife Conservation Act	2013/01/23	Council of Agriculture	Marine Burea
	Marine Pollution Control Act	2014/06/04	Ocean Affair Council	Marine Bu
	Basic Environment Act	2002/12/11		
	Air Pollution Control Act	2018/08/01		
	Water Pollution Control Act	2018/06/13		
	Waste Disposal Act	2017/06/14		
	Environmental Impact Assessment Act	2003/01/08		
	Environmental Education Act	2017/11/29		
Sectors related to	Noise Control Act	2008/12/03		Environment
environmental protection	Indoor Air Quality Act	2011/11/23	Environmental Protection	
	Toxic Chemical Substances Control Act	2013/12/11	Administration	
	Soil and Groundwater Pollution Remediation Act	2010/02/03		
	Environmental Agents Control Act	2016/12/07		
	Greenhouse Gas Reduction and Management Act	2015/07/01		
	Public Nuisance Dispute Mediation Act	2009/06/17		Public Nuisa Ka
Intersectoral	Disaster Prevention and Protection Act	2017/11/22	Ministry of the Interior	Ka

Source: Kaohsiung Branch of TIPC

with relevant environmental laws and regulations

cal Law Enforcement Agencies

ritime Affairs Center, Maritime and Port Bureau, MOTC

ureau, Kaohsiung City Government

eau/ Agriculture Bureau, Kaohsiung City Government

Bureau, Kaohsiung City Government

ental Protection Bureau, Kaohsiung City Government

isance Disputes Mediation Committee, Kaohsiung City Government

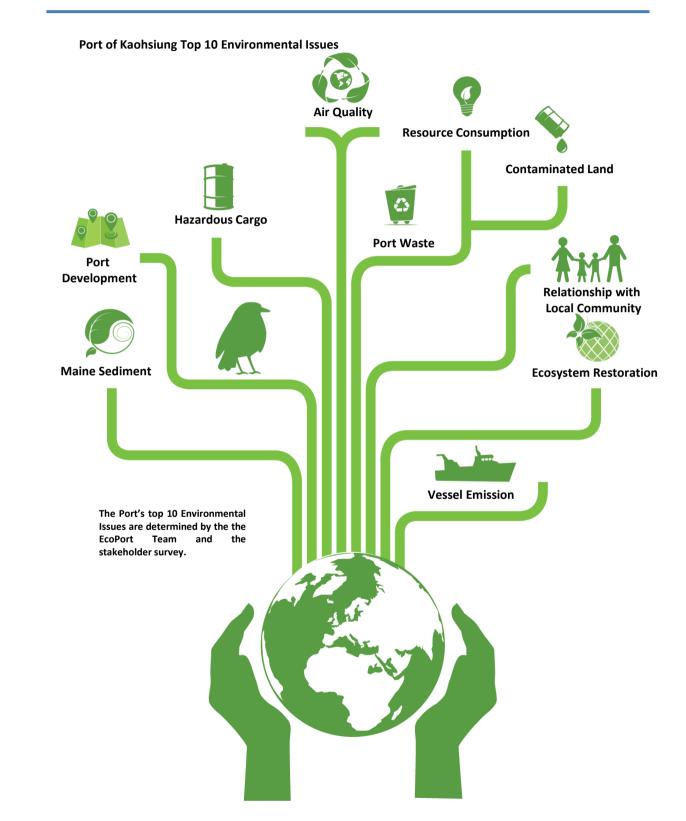
Kaohsiung City Government



3.3 Stakeholder Analysis

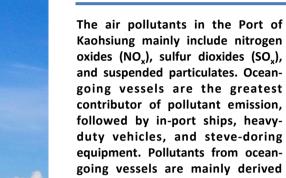
As an important enterprise in the Kaohsiung City bay area, the Kaohsiung Branch of TIPC uses a variety of methods to communicate with stakeholders. Their needs and expectations are gathered and incorporated into the company's policy. The Port of Kaohsiung believes that good communications with the stakeholders help identify key environmental issues and create value. Therefore, it collected surveys to help formulate the Port's Environmental Objectives.

Sector	Environmental Concerns	Relevant Environmental Objectives
Government	Dust, Emissions from Heavy Duty Vehicles and Vessels, Emissions from Port Industry, Hazardous Cargo	I. Air Quality II. Vessel Emissions III. Port Waste IV. Hazardous Cargo
Employee	Living Quality near the Ports, Port Ecology, Resource Usages	V. Port Development VIII. Relationship with Local Community IX. Ecosystem Restoration X. Resource Consumption
Clients	Air Quality, Emissions from Port industry, Cargo Leakage, Port Safety, Soil Pollution	I. Air Quality II. Vessel Emissions IV. Hazardous Cargo VII. Contaminated Land
Community	Dust, Emissions from Heavy Duty Vehicles and Vessels, Pollution from Riverain, Dredge Disposal, Marine Sediment, Port Development, Port Safety	I. Air Quality II. Vessel Emissions III. Port Waste IV. Hazardous Cargo V. Port Development Vi. Marine Sediment





04/ State of the Environment



4.1 Air Quality

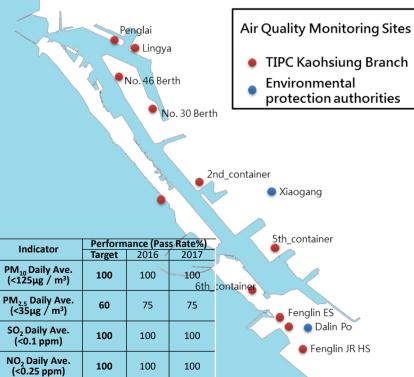
and suspended particulates. Oceangoing vessels are the greatest handling. Therefore, to reduce contributor of pollutant emission, followed by in-port ships, heavyduty vehicles, and steve-doring equipment. Pollutants from oceangoing vessels are mainly derived from emissions caused by the fuel combustion of auxiliary boilers and engines when such ships approach and berth in a port, thereby

generating SO, as the primary pollutant. Pollution released from heavy-duty trucks is mainly caused by engine idling during freight pollution and green-house gas (GHG) emissions, the Kaohsiung Branch of TIPC has focused on promoting ecofriendly 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

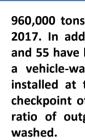
Currently, 10 air quality monitoring stations are set up in the Port of Kaohsiung, among which 3 are located in the construction development district and 7 in the of Kaohsiung, namely the Xiaogang operation district. The monitoring items include total suspended particles (TSP), particulate matters (PM₁₀), fine suspended particles (PM_{25}) , SO₂, NOx, and ozone (O_3) .

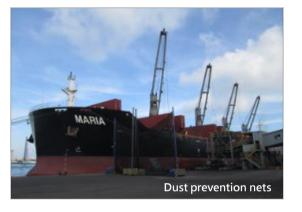
These indicators are monitored quarterly. In addition. two monitoring stations are established in the neighboring areas of the Port Monitoring Station and the Dalin Po Monitoring Station, respectively set up by the EPA and EPB.



4.1.2 Preventing Emissions from Cargo Handling Operations

Port of Kaohsiung effectively manages dust generated from bulk cargo handling operations at Bulk and General Cargo Terminals No. 48–56 by implementing dust net, swiping and cleaning the streets, and deploying mist cannon vehicles. At Wharf No. 49, a covered warehouse is installed to control stevedoringinduced suspended coal particles. The amount of coal handled at Wharf No. 49 was about







	r	lumber
		Year
		2016
		2017
Automatic spraying system		he amoui 60,000 to

Figure of the covered warehouse facility

Effectively reducing air pollution generated by cargos' loading and unloading and improving air quality in Kaohsiung area. Mobile Discharge Hopper Rotary Conveyor CV-01A~CV-04A Covered Conveyor 4000

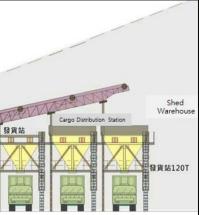


960.000 tons in 2016 and 1.000.000 tons in 2017. In addition, Wharves No. 50, 52, 54, and 55 have been individually equipped with a vehicle-washing pond, and a camera is installed at the inspection and registration checkpoint of Wharf No. 55 to calculate the ratio of outgoing vehicles that have been

Imber of Vehicles washed and inspected

/ehicles	Inspections	Pass rate
107,408	25,345	99%
96,299	30,331	99%

amount of coal handled at Wharf No. 49 was about 0,000 tons in 2016 and 1,000,000 tons in 2017.







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

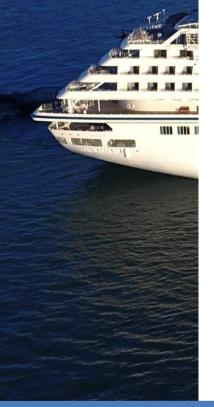
electric or hybrid machinery. Currently, 63 of the 69 roadways in and out of the Port of Kaohsiung are installed with an automatic gate sentry post. The automatic gate sentry post control system is not comprehensively installed because ordinary roadways are required for the passage of goods with particular specifications. However, all newly built roadways are installed with the 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 Fuel Reduction (L)	Total Carbon Reduction(Kg)	
2013	7,858,423	24.6 g/ per passing (1)		227,432	1,194,480	
2014	8,581,882		per passing		248,370	1,304,446
2015	8,860,126			0.152Kg/per passing (2)	256,422	1,346,739
2016	8,588,795			248,570	1,305,497	
2017	8,698,290			251,739	1,322,140	

1. Automotive Research & Testing Center

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

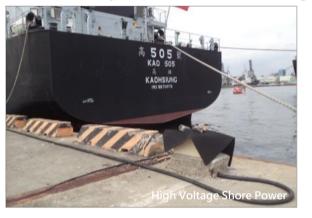




4.2 Vessel (Water) Mobile Pollution Source Control

Regarding the management of ships emissions, there are mainly two types of pollutions: air and wastewater. The Kaohsiung Branch of TIPC has endeavored to promote the use of low-pollution practices. Currently, there are 17 dwarfs installed with low-voltage shore power and 7 dwarfs installed with high-voltage shore power. To lead by example, all the harbor crafts in the Port of Kaohsiung have started to use shore power to reduce air pollution at berth. And the accumulated usages of low-voltage shore power were 321,932 kWh in 2016 and 269,318 kWh in 2017.

Shore Power Systems at Port of Kaohsiung



Locati Base W

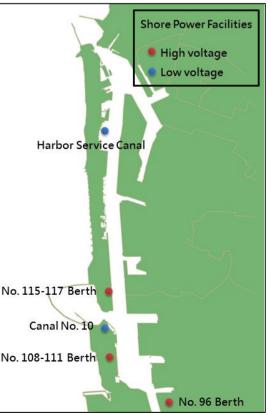
Wharf No Wharf No Wharf N Wharf No Wharf No Wharf No Wharf No Security Ship Char





No. 115-117 Berth

ion	Voltage	#
/harf	220V · 110V	15
o. 115	6.6kV	1
o. 116	6.6kV	3
lo. 96	11.4kV	1
o. 108	6.6kV	1
o. 109	6.6kV	1
o. 110	6.6kV	2
o. 111	6.6kV	2
Check	220V	1
nnel 10	220V	3





4.2.1 Promote Vessel Speed Reduction

In addition, the port encourages Vessel Speed Reduction (VSR), which is to ask incoming and outgoing ships to decelerate to less than 12 knots within 20 nm from the port. The speed reduction attainment rate target was set to be 40% in 2016 and 50% in 2017. Although the actual attainment rate was only 36.46% in 2016 and 35.30%. To improve the VSR, the Kaohsiung Branch of TIPC has sent an official letter to major shipping lines, providing speed reduction information specific to their ship types and promoting the compliance with the branch's speed reduction program.



Furthermore, beginning Jan 1st of 2018, the Port gives bonus to lower the costs for clients who are willing to help improve the air quality by joining the VSR program.

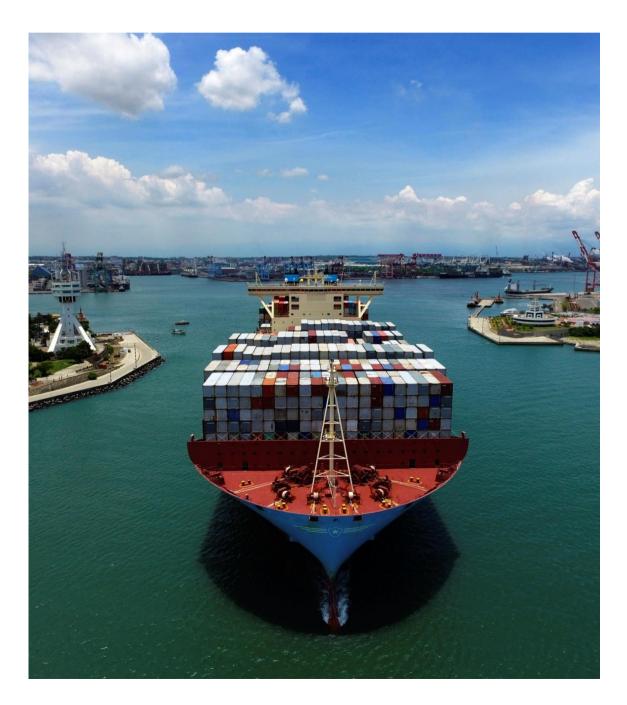
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Nevertheless, the Port respects the schedule of each ship liner, does not wish to see any client penalized for late shipping, and only asks those who are not in a hurry to help promote VSR.

Month	(A)Vessels meeting the criteria	(B)Vessels with measured average speed	(C)Total number of vessel count	(D)VSR achievement rate (D=A/B)(%)
1	935	2185	2900	42.8
2	693	1599	2324	43.3
3	999	2279	2908	43.8
4	926	2231	2786	41.5
5	953	2322	2754	41.0
6	1017	2206	2706	46.1
7	831	1,793	2,780	46.3
Total	6,354	14,615	19,158	43.5

4.2.2 Low Pollution Fuel

All harbor vessels in the Port uses clean fuel in 2016 and 2017. Request ships to switch to fuel C from A upon receiving the notification from VTC tower after getting to within 5 nautical miles from the port.



In order to meet the new national fuel sulfur content standard, the Port has reached an agreement with CPC reduce the sulfur content of all MGO and MDO supplies to less than 0.5wt% from March 2018.





4.3 Port Waste

Because the Port of Kaohsiung is located close to the city of Kaohsiung, it pays special attention to maintaining the cleanliness of the port environment and the quality of life of Kaohsiung citizens. It follows the Waste General Recycling Management Procedure to reduce port resource consumption and waste generation. Furthermore, it requires that international ocean liners separate garbage properly to increase the efficiency of onshore waste disposal.

To diminish the environmental impact of ships berthing at the port, the Port of Kaohsiung,

Waste recycling statistics

Item	2015	2016	2017
Total (Ton)	2,286.22	195.23	133.57
Recycled (Ton)	490.20	51.16	43.29
Rate (%)	21.44	26.2	32.4

Taiwan

such

International

entrust

Corporation (TIPC) also requires that

environmental protection vendors

to collect and transport waste (oil)

water. Ship waste treatment is

handled by vendors commissioned

by the Port of Kaohsiung, TIPC. In

addition to fully managing ship

waste, the Port of Kaohsiung

entrusts vendors to clear drift waste

brought into the port area by rainfall

and rivers daily and record the

amount of marine waste cleared.

The total amount of waste collected

from vessels and from the water

surface was about 879.12 tons in

2016 and 636.4 in 2017.

ships

Ports

legal



As of ship waste and wastewater, the Kaohsiung Branch of TIPC has properly managed the disposal of ship oily wastewater, waste oil, and waste currently. 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).

Considering that ship emissions and upstream debris are the mainly sources of port water pollution, the Kaohsiung Branch of TIPC has committed to facilitating the establishment of

Collected vessel waste and waste oil

Year	2015	2016	2017
# vessel	3,952	3,892	4,049
Waste (ton)	922.95	879.12	636.40
Waste oil (ton)	47,540	12,174	5,376





rainwater treatment facilities and ship emission control measures. For example, domestic sewage is discharged to sewage systems, and wastewater (sewage) treatment plants are built to effectively treat port wastewater (sewage) and prevent pollution 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 Environmental Protection Bureau of Kaohsiung City Government), as well as coordinated continuously with local governments and actively requested them to reduce the upstream pollution sources.







4.4 Manage Hazardous Cargo

Promoting disaster prevention awareness and implementing disaster management guidelines are essential for hazardous cargo management. To ensure port safety, Port of Kaohsiung set conducting a minimum of 2 disaster drill together with port tenants as its cargo management target. The number of drills was 3 times in 2016 and 2 times in 2017. On top of setting response plans in case of disaster, Port of Kaohsiung also set inspection targets, which it will perform at least 6 joint inspections with the competent authority and conduct at least 12 joint patrols with other port units and the port fire brigade. Serious violators will be reported to competent authorities. There were 0 cases reported to the competent authority in 2016 and 3 in 2017. The 3 cases were all reported for keeping hazardous cargo longer than the permitted time period.







Hazaro	lous Cargo Management Related Activities
Year	Name of Event (Training Conference)
	Laws and Regulations on Tugboat and Sea Disaster Rescue
	2016 Marine Bureau Rescue Alliance Meeting
	CPC 2016 3D Compounded Disaster Drill
	2016 Toxic Chemical Disaster Prevention Seminar
	National Key Infrastructure Protection Plan Conference
2016	Marine Oil Pollution Emergency Response Seminar
	Dredging Disposal Training
	CPC 2016 3D Compounded Disaster Drill at Dalin Refinery
	Lecture on Marine Dispute Litigation Experience Sharing and Compensation
	National Key Infrastructure Protection Evaluation
	Chemical CloudCross Department "Chemical Substance Infor Training"
	2017 Marine Pollution Prevention Expert Training
	2017 Marine Pollution Inspection Sampling Training
	2017 Lifetime Learning Program Training Report
	Marine Pollution Prevention System Operation Meeting
2017	IMO Level 2 Marine Oil Pollution Cleanup Training
-	2017 Toxic Chemical Emergency Response Team Seminars
	Using Drone with Aerial Photography for Emergency Response
	Marine Chemical Substance Leakage Emergency Response Sen
	2017 Marine 3D Compounded Oil Pollution Emergency Respor
	Marine Oil Pollution Emergency Response Drill at Wharf No. 8
	Marine Oil Pollution Emergency Response Drill at CPC Dalin Re

	Date
	2-23
	3-03
	3-25
	4-26
	6-17
	7-11~12
	9-09 ` 12-15
	11-02
d Storm Damage	11-08
	11-21
ormation Platform	6-15
	8-16~17
	9-08
	9-01
	12-08
	12-13~15
	5-08 \ 10-18
e	7-17
eminar	8-24~25
onse Drill	9-28~29
8	10-20
efinery	11-04





4.5 Practice good port development strategies

The port development policies of Considering that ship emissions and the Kaohsiung Branch of TIPC are aimed at creating a sustainable compatibility with the environment and the urban area of Kaohsiung City is considered during development.

Port of Kaohsiung has two first is to cultivate a pedestrian to bring good living quality and front requires proper spatial planning and clean water bodies. Currently, the accumulated area is as high as 31.5 hectares, and Port of Kaohsiung strives to maintain and waterfront area.

upstream debris are the mainly sources of port water pollution, the Kaohsiung green port. Therefore, the Branch of TIPC has committed to facilitating the establishment of rainwater treatment facilities and ship emission control measures. For example, domestic sewage is discharged to sewage systems, and wastewater (sewage) treatment plants are built to emphases on port development: effectively treat port wastewater (sewage) and prevent pollution caused friendly waterfront, and second is by direct discharge. To improve upstream pollution that affects the port, images to the public. Good water the Kaohsiung Branch of TIPC has communicated effectively with other responsible authorities (e.g., Water **Resources Bureau and Environmental** waterfront space such as fishing Protection Bureau of Kaohsiung City Government), as well as coordinated continuously with local governments increase the and actively requested them to reduce the upstream pollution sources.



On top of pollution prevention measures, the Port of Kaohsiung also monitors water quality to understand the effectiveness of water quality control in the port area. At present, the Port of Kaohsiung has 14 water quality monitoring stations in the port area; the monitoring stations conduct surveys every quarter. Moreover, pursuant to the Marine Pollution Control Act, the Marine Bureau, Kaohsiung City Government has set up sea area monitoring stations to monitor water quality since 2004; seven of these stations are located in the commercial port area of the Port of Kaohsiung. The monitoring results of 2016 and 2017 show that the Port of Kaohsiung met the water quality standards of a Class C sea area.

In the past, the Port of Kaohsiung and the Kaohsiung City were developed to meet different goals. Consequently, the distinct modes of management and operation have resulted in a huge gap both in the relationship and spaces between the port and the city.

Moreover, the locations of the industrial districts and container terminals imperceptibly separate the port from the city. To reshape port views and the urban image of Kaohsiung City, the Kaohsiung

improving city image. impacts.



Branch of TIPC collaborates with Kaohsiung City Government in releasing the Penglai, Yancheng, and Lingya Commercial Port Districts and the nearby warehouse district of Taiwan Sugar Corporation for the renovation of old port areas and the repurposing of idle spaces, providing public access to the port and

In response to the growing demand for container traffic, the first phase of the Intercontinental Container Center Project of the Port of Kaohsiung has been completed. and the land reclamation efforts will be continued to increase port hinterland in the second phase of the project. During land reclamation, the Port of Kaohsiung has actively sought alternative material sources, including the remaining earth works from major public works in Southern Taiwan and mud dredged from the port. By doing so, the port has effectively reduced the amount of gravel extracted from offshore waters, controlled pollution caused by dredging and filling, and protected bare land created after land reclamation to mitigate environmental





4.6 Monitor and Reduce Sediment Pollution

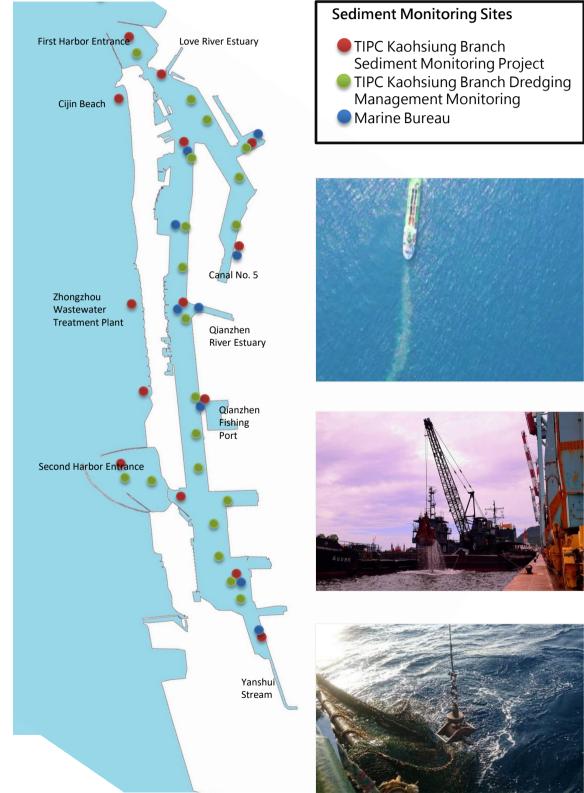
To ensure effective management, the Kaohsiung Branch of TIPC conducts sediment monitoring every quarter. In addition to monitoring port sediments, ocean disposal of dredging, and determining sediment monitoring sites for environmental assessment, the branch monitors measures the 32 pollutants that include total nitrogen, total phosphorus, total oils, cyanide, and heavy metals. Particularly, heavy metal pollution is more serious than other types of solution; however, such pollution

Is majorly found in rivers and canal conjunctions, indicating that it is mainly caused by upstream industrial wastewater discharge by factories. In the ocean disposal area for port dredging, the Kaohsiung Branch of TIPC also conducts longterm monitoring on the environmental impacts on the area's marine ecology according to the "Application and Permission for Ocean Disposal of Port Dredging." Monitoring reports are presented to the Environmental Protection Administration every quarter.

Amount of Sedimentation Disposing at Port of Kaohsiung Unit: Ten Thousand M³

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	66.0	68.3
2011	88.0	16.0	72.0	81.8
2012	70.9	18.9	52.2	73.3
2013	51.7	25.7	26.0	50.3
2014	60.0	11.4	48.6	81.0
2015	97.4	9.3	88.1	90.5
2016	51.7	0.2	51.5	99.6
2017	31.4	8.6	22.8	72.6









4.7 Brownfield Remediation

In the past, the heavy industry, oil storage facilities, and shipbuilding surrounding the Port of Kaohsiung may have contributed to the accumulation of heavy metals and toxic substances in port soil and water. The brownfields left after environmental remediation 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

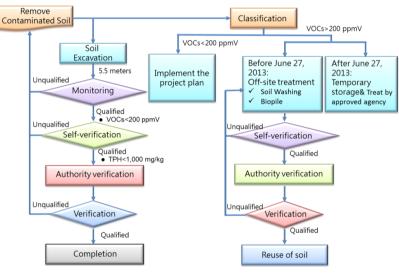
Oil Contaminated Site

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. Since the site was classified by the EPA in 2013, the CPC Corporation (Taiwan) remediated and removed oil-contaminated soil from the base. The site was eventually declassified on April 12th, 2018.

Corporation (Taiwan) was located.

Pier 121 of the Port of Kaohsiung was once monitored by the Environmental Protection Administration because of soil pollution. The pier contains a fuel adding and storage facility that provides fuel for container hauling vehicles and equipment operation within the pier; the facility is for internal use only and is not open to the public. In Nov. 2015, the Environmental Protection Administration performed an onsite investigation and found that the total petroleum hydrocarbons (TPH) exceeded soil control standards stipulated by the latest relevant environmental protection laws and regulations. Port of Kaohsiung began the improvement process since 2016 and completed in March 2018. The site was declassified on June 15th, 2018.

Contaminated Soil Treatment Processes



Timeline of oil pollution at Wharf No. 121

1990	Planning and design of Wharf No. 121
1994	Contracted to NYK
2014	NYK terminated the contract
July 2015	The Port operates the wharf for container handling and publ
Nov. 2015	EPA discovered one sample with TPH level above the soil sta
2016	The Port outsourced the "Emergency Response Plan"
2017	The "Emergency Response Plan" approved by the EPB and the
Jan. 2018	Oil storage removed
Feb. 2018	Conducted the soil and storage tank sampling and testing au
Mar. 2018	Site Improvement Completion Report sent to the EPB for ver
June 2018	EPB approved and declassified the site



Timeline of the oil pollution at the Old Lingvaliao Storage Station

	p
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	Removed 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.
April 2018	Declassified

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the Port proceeded the remediation

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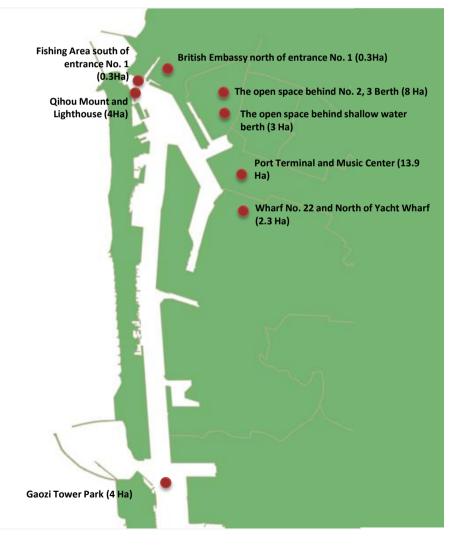


4.8 Enhance Community Relations

The neighboring communities of the Port improve the biodiversity of environments of Kaohsiung bear the brunt of possible environmental impacts from the port Branch of TIPC will gradually open the and face high environmental risks. Therefore, the branch maintains recreational spaces such as parks, 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 public identification with the port, and pollution on them. In addition, the green belts can increase habitats and thus nearby communities.

surrounding the port. The Kaohsiung old port areas to the public, providing activity venues, and bicycle routes. In addition, the branch will occasion-ally organize ocean carnivals and volunteer visits and seminars with local governments, inviting citizens to participate in the activities, maintaining engaging in favorable interaction with

Waterside recreational areas at Port of Kaohsiung







Visiting Traditional Tribes

Giving New Years Gifts





Accessible Space Walkthrough

Anti-drug Campaign



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Participating Local School Graduations

Beach Cleanup



4.9 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.

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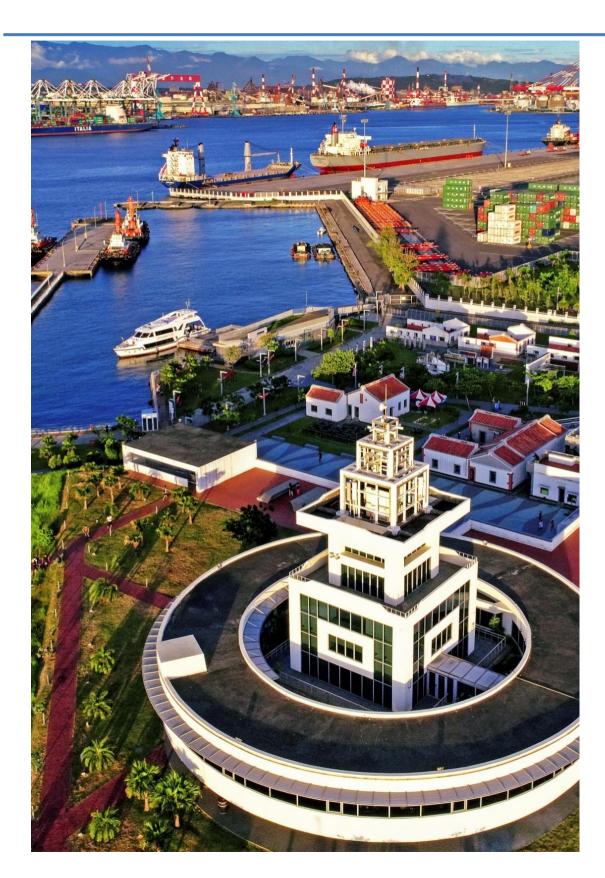
In addition, the society found 5 species endemic to Taiwan, 19



rare and protected species, and 3 other species that should be protected.

Therefore, during construction and operation processes, the SSFT District plans to preserve the windbreaks, existing 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.





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4.10 Port Resource

То practice environmental reduce the protection and environmental impact of port operations, the Port of Kaohsiung sets increasing energy use efficiency as one of its top ten environment objectives. The port continues to promote resource usage reduction control in the port area by reducing resource consumption and greenhouse gas generation. In addition, the office building is the first wharf the receives building green certification.

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, electric vehicles are used throughout the area, and all containers are operated using one electronic system to enhance operational efficiency and reduce energy consumption in the area.



Resource Managements

Four-Saving The Program, promulgated by the Executive Yuan, entails a negative growth in annual electricity, fuel, water, and paper consumption to lower port resource consumption and waste generation.

Even though the gas reduction target was not met in 2017, overall trend is decreasing. The savings in 2016 and 2017 were 14.8% and 3.5% for electricity, 3.5% and 1.8% for gas, 27.5% and 9.1% for water, and 12.9% and 30.1% for paper.

Port of Kaohsiung 2014-2017 Four Savings

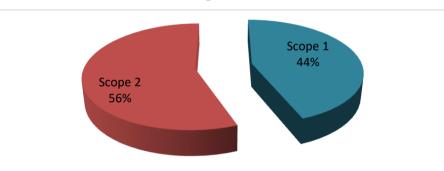
Item	Target	2014	2015	2016	2017	
Electricity	1	0.6	-1.2	14.8	3.5	
Gas	3	6.9	-12.4	3.5	1.8	
Water	2	-7.1	1.7	27.5	9.1	
Paper	1	17.3	13.0	12.9	30.1	
Unit: Percentage						

Greenhouse Gas Management

In 2016, the Port of Kaohsiung complied with ISO14064 and inspected its 2013-2015 greenhouse gas emissions, where it found that the main causes of its greenhouse gas emissions were port area management operations and office administration operations. Concerning the methods for setting organizational boundaries for greenhouse all emission sources within gases, organizational boundaries are identified in accordance to Operational Control Laws.

tons CO₂e respectively.

Port of Kaohsiung Emission Source 2015



Note: Scope 1 includes direct emission sources such as emissions from TIPC vehicles and vessels; scope 2 includes indirect emissions from purchased energy usage

Electricity used by the Port of Kaohsiung, TIPC is mainly for providing transportation for portrelated operations, public area operations, and office administration operations. Between 2013 and the first half of 2014, the main sources of emissions were TIPC Marine ships. Since the addition of the TIPC Marine in October 2014, tugboating-related operations of the Port of Kaohsiung, TIPC are no longer included in inspection checks. Therefore, the main GHG emission was from electricity usages (more than 50%). The GHG inventory for 2016 and 2017 is scheduled to be complete by the end of this year (2018).

According to the environmental impact assessment of the South Star Free Trade Zone in the Port of Kaohsiung, the competent agency promises to provide guidance for individual companies to conduct annual greenhouse gas inventorying and verification starting from the March of the year following their entry into and official launch in the zone, and register the resultant greenhouse gas inventories 6 months after completing the inventorying procedure. Therefore, guidance will be provided this year (2016) to determine the companies' carbon emissions during operation.



The organizational boundary of Port of Kaohsiung, TIPC is the areas that it owns and controls. Thus, greenhouse gas emissions of the Port of Anping, the TIPC Marine Corporation, Ltd. (TIPC Marine), and tenants are not included in the calculation. The total Greenhouse Gases Emissions of Kaohsiung Port from 2013 to 2015 are 18,710.497 tons CO₂e, 16,791.840 tons CO₂e and 12,512.032

State of the Environment

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Environmental Performance Indicators of Kaohsiung Port

	Index item	Calculation method		Target value	Indicator presentation (calculation details)		
				Taiget value	2016	2017	
	Air quality pass rate ($PM_{10} \times PM_{2.5} \times SO_2 \times NO_2$)	The ratio of the measurements in the air quality monitoring station of the port that meet the "Air Quality Standards"		 PM10 daily mean <125µg /m3: 100% PM2.5 daily mean <35µg/m3: 60% SO2 daily mean <0.1 ppm: 100% NO2 daily mean <0.25 ppm: 100% 	 PM10 daily mean <125µg /m3: 100% PM2.5 daily mean <35µg/m3: 75% SO2 daily mean <0.1 ppm: 100% NO2 daily mean <0.25 ppm: 100% 	 PM₁₀ daily mean <125μg /m³: 100% PM_{2.5} daily mean <35μg/m³: 75% SO₂ daily mean <0.1 ppm: 100% NO₂ daily mean <0.25 ppm: 100% 	
Air Quality	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 low-pollution fuel or biodiesel reaches 100% among harbor crafts	Consumption of marine gas oil: 5 KL	52 ÷ 59 × 100% = 88.1% Among the 59 harbor crafts, 52 use low pollution fuel. Low-pollution fuel for work vessels: Consumption of marine gas oil: 20 KL Consumption of marine diesel oil: 236 KL 52÷59×100%=88.1%	
	Promotion of a comprehensive use of the Automatic Gate Sentry Post Control System among shipping lines	utomatic Gate Sentry Post Control System an automatic gate sentry post		 All newly built gates of roadway are automatic. an automatic gate sentry post control sy 18 ÷ 35 × 100% = 51.4% The ratio of outgoing roadways installe 		The ratio of incoming roadways installed with an automatic gate sentry post control system $18 \div 35 \times 100\% = 51.4\%$ The ratio of outgoing roadways installed with an automatic gate sentry post control system $18 \div 34 \times 100\% = 52.9\%$ Number of passes: 8,698,290	
	Car wash	 Percent washed Vehicle washed Promotion 		 90% Total number washed Number of times promoted 	 99.0% washed Total of 107,408 vehicles Promoted 25,345 times 	 99.0% washed Total of 96,299 vehicles Promoted 30,331 times 	
	Air pollution inspection	Number of land area inspections		 300 inspections annually 	• 462 times	• 320 times	
	Vessel waste oil management	 Processed by qualified collectors÷ Total number of vessels collected×100% Amount of waste oil collected 		• 100%	 100%; total of 475 vessels Vessel waste oil collected: 12,174.26 tons 	 100%, total of 441 vessels Vessel waste oil collected: 5376.38 tons 	
	Vessel exhaust • Usage of clean fuel by harbor vessels	 Number of harbor vessel using clean fuel÷Total number of harbor vessel×100% Total amount of clean fuel used 		• 100%	13÷13×100%=100% • Clean fuel: 45 KL Marine Gas Oil: 49 KL Marine Diesel Oil: 88.3 KL	13÷13×100%=100% • Clean fuel: 30 KL Marine Gas Oil: 45 KL Marine Diesel Oil: 52.8 KL	
Vessel emission	The ratio of using shore power among harbor crafts	Number of harbor crafts using shore power ÷ Total number of harbor crafts × 100%			13 ÷ 13 × 100% = 100% All the 13 harbor crafts use shore power during berthing operations. 59÷59×100%=100%	59 ÷ 59 × 100% = 100% All the 59 harbor crafts use shore powe during berthing operations. 59÷59×100%=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		• 2016: 40% • 2017: 50%	36.46%	35.30%	
	Vessel pollution inspection and notifications	Water area inspections Smoke emission notifications		 Inspect 150 times annually Number of some emission notifications 	164 times52 notifications made	159 times16 notifications made	
Garbage/	Port waste recycle rate	Amount of recycled waste÷Waste generation×100%		Port recycling rate reaches 20%.	51.16÷195.23=26.2%	43.29÷133.57=32.4%	
port waste	Port water area garbage	 Cleaning frequency Amount of waste collected 		Clean daily	 Cleaned daily 879.12 tons (including garbage from 3,892 vessels) 	 Cleaned daily 636.4 tons (including garbage from 4,049 vessels) 	
	Drill	Number of drills		2 drills each year	3 drills	2 drills	
Hazardous cargo	Hazardous cargo inspection	Number of inspections		6 inspections	12 inspections	12 inspections	
	Number of patrols, vessels inspected, and number of cases sent to the authorities	 Number of patrols Number of cases sent to the authorities 		 12 patrols each year, 12 vessels Number of cases decrease over year 	 12 patrols, 24 vessels 0 case 	 12 patrols, 23 vessels 3 cases 	





Environmental Performance Indicators of Kaohsiung Port

Port DescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescriptionDescription		Index item	Calculation method	Target value		Indicator presentation	on (calculation details)		
Perton Perton The area of wateride recreational space The area of wateride recreational space State of wateride recreation recreational space State of wateride recreation recrecreation recrecreation recreatin recrecreation recreatin recrecr						16	2017		
Means exter quality pass rate mineral lolg mineral control mineral contro mineral control mi		Public waterside recreational space		of waterside recreational space	which includes: (1)The open space behind No. 2, 3 Berth (3.7 Ha) (2)The open space behind shallow water berth(3 Ha) (3)Gaozi Tower Park(4 Ha) (4)Port Terminal, Music Center (under construction, 13.9 Ha) (5)Wharf No. 22 and North Shore Yacht Area (1.3 Ha) (6)Fishing area at North Shore Exit 1 (0.3 Ha)		7 7 Total waterside recreational area is 31.2 Ha, 1 Ha increase at Wharf No. 22 and North Shore r Yacht Area		
Marine sediment Sediment monitoring Quarterly means and maximums of port sediment monitoring Image: monitoring port sediment monitoring Marine sediment monitoring Marine sediment monitoring Marine measurements Measurements Marine measurements Marine m			measurements (obtained at the water quality monitoring station in the port) satisfying the Marine Environment Classification and	Marine water quality: 100% of the pl quarterly pH, DO, cyanide, metal oils, and BOD_5 measurements satisfy the criteria.		pH 100% DO 100% BOD ₅ 96.43% Cyanide 98.21% Phenols 100%		iteria for Category C	
Control rate of soil contaminated sites Number of sites in the port is best in t		Sediment monitoring	port sediment monitoring	in domestic sediments (mg/kg per unit): Arsenic 33 Mercury 0.87 Copper 157 Lead 161 Chromium 233 Zinc 384	Arsenic: mean = 1.75 Mercury: mean = 0.24 Copper: mean = 131 Lead: mean = 34.4 Chromium: mean =138 Zinc: mean = 322		Arsenic: mean ND Mercury: mean ND Copper: mean =1.3 Lead: mean ND Chromium: mean ND Zinc: mean =5.65		
Relationship with Local communities Neighborhood and community welfare communities Number of activities and events Image: Figure of activity Events Types of activity Events Types of activity Relationship with Local activities Number of activities and events Image: Figure of activity Environmental 18 Environmental Environmental Environmental 11 Cultural Image: Figure of activity Environmental Image: Figure of activity Environmental Image: Figure of activity Environmental 18 Environmental Image: Figure of activity Environmental Image: Figure of activity Image: Figure of ac		Control rate of soil contaminated sites	+ Total number of sites with soil	Control over all sites with soil	Control rate of soil contaminated sites: 100%		Number of regulated sites in the port: 12 Control rate of soil contaminated sites: 100%		
Relationship with Local Communities Neighborhood and community welfare activities Number of activities and events 12 activities held Environmental 18 Environmental 18 Image: Communities Number of activities and events 12 activities held Image: Communities					The 12 sites that were regulated since July 2 ⁻² 2013 had been delisted on April 12 ⁻² 2018.				
with Local Communities neighborhood and community were at activities Number of activities and events Number of activities			Number of activities and events		Types of activity	Events	Types of activity	Events	
Communities Energy saving 6 Energy saving 6 Energy saving Cultural 11 Cultural 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12		Neighborhood and community welfare		12 activities held	Environmental	18	Environmental	9	
Resource consumption Outcomes of implementing the Four- saving project (saving energy, oil, water consumption rates for offices and operation sites Power, oil, paper, and water consumption rates for offices and operation sites Power consumption reduction: 2% operation	Communities	activities			Energy saving	6	Energy saving	10	
Terrestrial habitats ecosystems lossArea of ecological habitatsArea of ecological habitats• Area of reserved wide bird habitat • Area of grassland • Area of grassland • Area of woods• Reserved wide bird habitat: • Grassland: 3.6 ha • Woods: 18.3 ha• Reserved wide bird habitat: • Grassland: 4.2 ha • Woods: 18.3 haBesource consumptionOutcomes of implementing the Four- Saving Project (saving energy, oil, water and paper)Power, oil, paper, and water operation sites• Power consumption reduction: 1% • Oil consumption reduction: 2% • Paper consumption reduction: 1% • Oil consumption reduction: 2% • Paper consumpti					Cultural	11	Cultural	15	
habitats ecosystems loss / Ecological habitats Area of ecological habitats Area of ecological habitats * Reserved wide bird habitat: 8 ha • Area of grassland: 4.2 ha • Woods: 18.3 ha * Reserved wide bird habitat: 8 ha • Grassland: 4.2 ha • Woods: 18.3 ha * Reserved wide bird habitat: 8 ha • Grassland: 4.2 ha • Woods: 18.3 ha Resource consumption Outcomes of implementing the Four- Saving Project (saving energy, oil, water, and paper) Power, oil, paper, and water consumption reduction: 27.5% • Power consumption reduction: 27.5% • Power consumption reduction: 27.5% Resource consumption Outcomes of implementing the Four- Saving Project (saving energy, oil, water, and paper) Power, oil, paper, and water consumption raduction: 1.4% • Power consumption reduction: 27.5% • Power consumption reduction: 27.5%					Total	35	Total	34	
 Resource consumption Consumption <li< th=""><td>habitats / ecosystems</td><td>, Ecological habitats</td><td>Area of ecological habitats</td><td> Area of grassland </td><td colspan="2"> Grassland: 3.6 ha </td><td colspan="2"></td></li<>	habitats / ecosystems	, Ecological habitats	Area of ecological habitats	 Area of grassland 	 Grassland: 3.6 ha 				
× 100%		Saving Project (saving energy, oil, water ,	conservation rates for offices and	 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 	 Power consumption reduction: 1.4% Oil consumption reduction: 3.5% Oil consumption reduction: 27.5% Water consumption reduction: 12.9% Paper consumption reduction: 12.9% Note: Negative value means not reached the isource index) 				
Greenhouse Gas Management GHG Inventory GHG Inventory Complete by the end party verification.			GHG Inventory	GHG emissions			ected to complete by th	e end of 2018 with 3 rd	

calculation	details)	





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 penalty.

During 2016 and 2017, 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 accidents, spill of announced controlled toxic chemicals, disease and natural disasters.

Environmental Inspection and Punishment in Port of Kaohsiung

Item\Year	2012	2013	2014	2015	2016	2017
Number of patrols	463	508	461	496	545	407
Notification	96	97	117	76	159	164
Exhaust emission	66	44	42	57	47	16
Environment and hygiene inspection in ship making plants	62	105	52	64	55	39
Oil fence (vessels)	114	133	120	122	147	126
Joint inspection	7	11	16	24	24	23
Admonishment for improvement	1296	1895	1895	1851	2110	1510
Admonishing ticket	12	49	49	36	30	36
Penalty (MPB)	3	2	9	12	9	2

Source: TIPC Kaohsiung Branch



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 marine oil pollution, civilian protests, connected pathway flooding, typhoons, International Ship and Port Facility Security (ISPS). The main collaborators of these exercises includes 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	2016	2017
Ship collision, fire, explosion, fuel spill, chemical spill	28	31	28	19	24	26
Ship breakdown, tilt (no affecting safety)	19	32	10	12	28	16
Safety and health accident (cause injuries or deaths)	-	-	21	15	11	12
Fire and/or explosion of warehouse or fuel tank	2	0	0	0	0	1
(Small) fuel spill, garbage and fire in the port area	60	78	117	87	96	110
Others	170	123	206	211	119	84







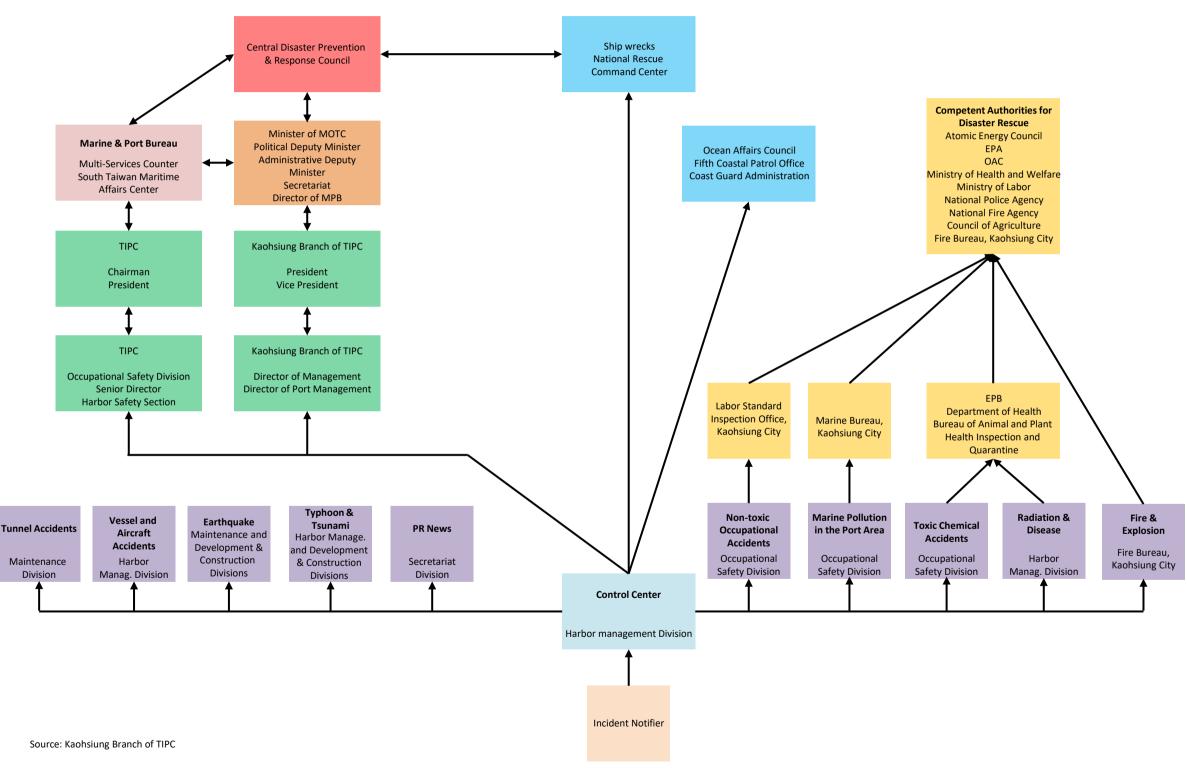


Source: TIPC Kaohsiung Branch





Disaster and Accident Notification in Port of Kaohsiung









6.1 Solar Power System

Environmental issue: Climate Change, Energy Consumption



Strategies: Exemplifying, Encouraging, Enforcing

Attention/Motives

With the completion of the environmental management system at the Port of Kaohsiung, promotion of the development of renewable energy has matured. However, despite the sufficient sunlight in southern Taiwan that

Solutions

To solve problems regarding money management and spatial resources, the Port of Kaohsiung recruits investment from the solar industry by leasing building roof spaces, which solve the problem of insufficient space. Additionally, the rent from roofs is used to replace self-investment costs, and a proportion of electricity sales revenue is collected for the Port of Kaohsiung.

Investment amount

Direct investment is unavailable because the Port of Kaohsiung only provides building roofs for leasing.

makes the region suitable for solar photovoltaic development, the high installation and maintenance costs and the large area of land required for the solar equipment mean careful consideration and evaluation are required for such investment.

The Port of Kaohsiung allows solar photovoltaic equipment companies to assess suitable roof spaces in the port area and negotiates with building tenants to install relevant equipment. The solar panels are installed through noninvasive methods to avoid destroying the original roof structure, which could result in problems such as leakage.

The electricity sales rate is NT\$4.7 per kWh of electricity, and the Port of Kaohsiung receives part of the revenue.

Effect/Benefits

- Roof spaces in the port area are leased to collect rent and increase the revenue of the Port of Kaohsiung.
- Installing 6.4 m2 of solar panels can yield a power generation capacity of 1000 W, producing a total of 1320 kWh per year.
- produced in 2018.

Solar Power Systems at the Port of Kaohsiung

		Date of	Area	Capacity	Power Generated (kWh)		
Location	Building	Completion	(M²)	(kW)	2016	2017	
Penglai Commercial	Office No.1	2016/03/24	91	14	15,657	19,752	
	Transit Shed (TS) 34-1		3,706	580	215,440	698,189	
	TS 35-1	2016/00/22	3,485	546	216,056	694,627	
Zhongdao Commercial	TS 37-1	2016/08/22	2,613	410	183,299	583,867	
Commercial	TS 38-1		2,613	410	184,950	593,765	
	TS 39-1	2016/11/09	2,613	410	63,099	534,221	
	Warehouse No. 118		2,330	365	-		
Container Terminal No.4	Warehouse No. 119	2017/12/26	1,425	223	-		
NO.4	Warehouse No. 120		1,650	259	-		
Qienzhen Commercial	МСС	2017/12/29	3,037	476	-		
	23,562	3,693	878,501	3,124,421			

Participating Units and Stakeholders

Kaohsiung Branch of TIPC, Port Tenant, Solar Power Companies/Developers

> Port of Kaohsiung Port Business Division **Contact: David Chen**

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■ Through promotion of the development of solar photovoltaic industry in Taiwan, photovoltaic energy companies produced 880,000 kWh and 3,120,000 kWh of electricity in 2016 and 2017, respectively, amounting to NT\$4.16 million and NT\$14.7 million. Approximately 4,870,000 kWh of electricity is anticipated to be



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6.2 Land Reclamation at the Intercontinental Terminal #2

Environmental issue: Dredging: Operation and Disposal, Hazardous Cargo: Handling/storage



Strategies: Exemplifying, Encouraging, Enforcing

Attention/Motives

More than 300 petrochemical fuel storage tanks and operating facilities are scattered in Zhongdao and other neighboring areas in old harbor areas at the Port of Kaohsiung, which is close to the crucial zones in Kaohsiung City. In consideration of the citizens'

Solutions

In conjunction with the developments of the government such as the Asia-Pacific Regional Operations Center and Multifunctional Commerce and Trade Park, the Port of Kaohsiung has used land reclamation technology together with more than 41.09 million m3 of sand to expand the port, producing approximately 232 ha of land area. Sensitive goods such as refinery storage tanks from the Chinese Petroleum Corporation in Kaohsiung are then moved to the new harbor area.

Additionally, chemical pipelines that originally passed through Kaohsiung

safety, petrochemical and other operating facilities should be relocated to the outer section of the Port of Kaohsiung, and the functions of the port should be readjusted to manage the facilities in a professional and centralized manner.

City will be abolished, with the transferred chemicals being directed on other routes. The port area adjacent to the urban area will be transformed into a sightseeing dock with less environmental effect. In addition to adjusting dock positions. the land reclamation area at the Intercontinental Container Center Phase 2 Project at the Port of Kaohsiung also provides a deep water pier more than 16 m in depth in which large container ships of 8,000 to 10,000 TEU and above (please confirm with the Design Section) can anchor, thereby stabilizing the international shipping status of the Port of Kaohsiung.

Effect/Benefits

Through the Shoreline, Filling, and Harbor Craft Basin of the Intercontinental Container Terminal Phase 2 Project at Port of Kaohsiung and New Land Fill Construction Project of the Intercontinental Container Terminal Phase 2 Project at Port of Kaohsiung, the Port of Kaohsiung receives the following additions: ten petrochemical liquid storage terminals, four bulk cargo terminals, and five 15,000 TEU. In addition to improving the safety of cargo storage at the port area and expanding its future development,

Environmental Protection Construction Method

- Natural ecology construction method:
- Constructing fish ladders can help fish avoid the construction area.
- Using dynamic self-propelling and selfloading features, the dredger actively circumvents ecologically sensitive areas and avoids pumping sand at a fixed spot that results in potholes in the seabed.
- Sand monitoring: monitor the direction of ocean current to avoid sand loss and reduce the ecological effect on the sea area

Construction Difficulties:

Proximity to fishing rights areas: maintain favorable relations with the neighboring fishermen's associations, and reach agreement through six coordination meetings with the fishermen's associations.

Implementation/Timeline

Began Nov 23rd 2015 Completed Nov 22nd 2017

Participating Units and Stakeholders

Shipliners, Cargo handling operators,

Port tenants, EPA, EPB

Port of Kaohsiung New Construction Section, **Development & Construction Division** Contact: Ching-Hung Lin

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- Formulate

Investment amount

these construction projects adopt several environmental protection methods to overcome a number of engineering problems. The Shoreline, Filling, and Harbor Craft Basin project won the outstanding 16th Public **Construction Golden Quality Award, whereas** the New Land Fill Construction Project won honorable mention for the 17th Public **Construction Golden Quality Award.**

Dredge-based backfilling: oceandumped soil from the channel dredging is used as the source of sand for the Intercontinental Container Terminal Phase 2 Project to save the costs of ocean dumping and offshore sand pumping and reduce the ecological effect on the ocean.

• Unexploded sea mines: relevant SOP and Management mechanisms Proactive detection to avoid risk

Approximately 115.6 million Euro



6.3 Cooperation

The Kaohsiung Branch of TIPC has development trends in the 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

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 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, professional management and experiences with other members.

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 highquality and highly efficient service with the principle of safety, efficiency, and energy saving.



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.



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 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.

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.



Kaohsiung Port

The

development.

Port of Gdansk Authority

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

Academic institution



National Sun Yat-sen University

Land Development Company

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

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.



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 conservation and environmental protection, and the application of new technologies.





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.



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.



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 port 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



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.



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.



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.

Environmental Protection Administration, Executive Yuan



Kaohsiung Wild Bird Society





7. Training

In compliance with its environ- Each year, the Kaohsiung Branch of mental policies, the Kaohsiung TIPC organized dozens of Branch of TIPC provides suitable environmental education courses for environmental education and internal staff members, with training programs to improve staff's approximately 2,000 participants. environmental awareness, enhance The courses included: pollution their environmental protection prevention, natural disaster, knowledge and improve the environmental impact assessment competitiveness of the Port of and ecological education. Kaohsiung.

Posture training

Health Seminar







Civil Defense Training





Employee Consultation Training



Leaders Consensus Building



AED and CPR Training









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

institutions and

Publication



Seasonal Magazines



TIPC Environmental Monitoring Report



TIPC Green Policy Website



Kaohsiung Port Facebook





Exhibition on Green Port







Visitors from Universities



Visitors from Overseas







Green Port Awards Ceremony



Marine Environmental Workshop

Occupation Safety Week Event



Visitors from the Marine Academy





09/ Green

Accounting

9.1 Environmental costs

Regarding the environmental issues, the Kaohsiung Branch of TIPC has spent funds on their employees, environmental maintenance, The total amounts that Kaohsiung management, environment-al monitoring, publications, emergency response and communication, with the aim of enhancing employees' environmental awareness and thousand (€4,283 thousand) in 2017. environmental maintenance, to improve environmental quality and

ability of emergency response, and to increase the public's understanding of the port.

Branch of TIPC invested in the environmental issues are NT\$287,357 thousand (€8,027 thousand) in 2016 and NT\$153,369

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)

Expenses/ Year	2013	2014	2015	2016	2017
Employees	67,710	74,878	41,227	59,666	53,363
Environmental Maintenance & Management	67,907	179,211	116,311	179,842	64,222
Environmental Monitoring	27,774	37,035	26,502	26,583	28,360
Emergency Response	3,853	14,740	13,720	17,073	7,201
Communication & Publication	5,519	1,230	2,214	4,193	223
Total	172,763	307,094	199,974	287,357	153,369

9.2 Environmental Assets

In order to develop Kaohsiung Port into a trans- reconstructed with shore power systems; old shipment hub in the Asia-Pacific Region, the vessels and vehicles are removed or replaced to Kaohsiung Branch of TIPC has promoted a series of increase the effectiveness and reduce pollutant port development projects, some of them involve emissions. The total amounts that the Kaohsiung environmental issues. For example, new buildings Branch of TIPC invested in the fixed assets regarding are designed and constructed as green buildings, environmental issues are NT\$1,371,617 thousand and also in a way to increase opportunities for the (€38,111 thousand) in 2016 and NT\$1,353,470 public to get close to the Port; the wharfs are thousand (€37,804 thousand) in 2017.

Assets invested in Environmental Issues in 2016 (Unit: NTD thousands)

Item Fixed assets		Land Improvement	Buildings	Machinery and Equipment	Transportation Facilities	Miscellaneous Equipment	Investment property	Total
Development Plan	Follow-up Projects	1,142,665	208,721	843	0	0	0	1,352,229
	New Projects							
General Building and Equipment Plan		1,652	0	0	15,479	2,257	0	19,388
Total		1,144,317	208,721	843	15,479	2,257	0	1,371,617

Assets invested in Environmental Issues in 2016 (Unit: NTD thousands)

Item Fixed assets		Land Improvement	Buildings	Machinery and Equipment	Transportation Facilities	Miscellaneous Equipment	Investment property	Total
Development Plan	Follow-up Projects	1,127,766	0	0	0	0	0	1,127,766
	New Projects							
General Building and Equipment Plan		13,400	177,333	24,131	9,840	1,000	0	225,704
Total		1,141,166	177,333	24,131	9,840	1,000	0	1,353,470