Port of Keelung

Environmental Report 2019

TIPC
臺灣港務股份有限公司
TAIWAN INTERNATIONAL PORTS CORP., LTD

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Port of Keelung **Environmental Report**

To become a "Green Port," the port of Keelung has acquired certification of Ecoport since 2015, and is applying for second recertification (2019.) This environmental report presents achievements and goals of Keelung Port in environment from 2017 to 2018.

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

Occupational Safety and Health Department, Port of Keelung, TIPC
No. 1 Chung-Cheng Road, Chung-Cheng District, Keelung City 202

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Policy Statement

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.

Chung-Rung Wu
Chung-Rung Wu
Chairman of TIPC

Chen Shao Liang
Shao-Liang Chen
President of TIPC

臺灣港務股份有限公司
基隆港務分公司
TIPC Port of Keelung, Taiwan International Ports Corporation, Ltd.

Port of Keelung, Taiwan International Ports Corporation Environmental Policy

In charge of port operation and developments, Port of Keelung, Taiwan International Ports Corporation (hereinafter referred to as Port of Keelung) recognizes its obligations towards protecting the environment as its corporate social responsibility. Aiming at being an eco-friendly and sustainable port with continuous advancement, we consider environmental protection as a part of port operation and work proactively to prevent the pollution of the environmental impacts.

In order to minimize the potential and actual environmental impacts from port operations, Port of Keelung has identified the scope of its environment protection. With autonomous management, periodic inspection and evaluation, we will keep continuously improving our environmental performance.

We commit to:

- Regularly evaluate port environmental impacts and any pollution generated from port operation.
- Set environmental objectives to continuously lower environmental impacts.
- Comply with all relevant environmental regulations and aim at pollution prevention.
- Provide environmental education to build environmental awareness in all staff to completely implement our environmental policy.

The full understanding and mutual consent to this environmental policy have been reached by all the relevant parties, including employees, suppliers and tenants of Port of Keelung. This policy is open to the public on our website.

Shy-tzong Liou

President of Port of Keelung, TIPC

Date: Feb. 13, 2017

No.1, Chung-Cheng Road, Keelung 20202, Taiwan, R.O.C.
Tel:(02)24206100 Website: http://kl.twport.com.tw/

Port of Keelung,
Taiwan International Ports Corporation, Ltd

Port of Keelung Environmental Objectives

To implement the commitments of Keelung Port environmental policy, the following environmental objectives are set based on the ten major environmental issues from the port.

- Improve Port Air Quality: replace old equipment with energy saving equipment and disclose instant air quality data
- Reduce River Pollution: advise the municipal government to construct waste water interception facilities to conserve water recreation areas in port district
- Reduce Vessel Sewage Discharge: forbid discharging waste oil/ sewage and force appropriate waste oil/ sewage disposal by vessels
- Reduce Cargo Spillage: improve cargo handling management, prevent overloading or leakage, and strengthen the emergency response mechanism
- Reduce Port-generated Waste: promote waste reduction in port district continually and implement recycling/ reusing of resources
- Strengthen Hazardous Cargo Management: reinforce stacking yard self-management and implement harbor inspections as well as joint safety supervision
- Abate Ship Exhaust: promote vessel speed reduction and usage of low sulfur fuel oil/ onshore power supply by vessels
- Reduce Noise: maintain the port access system and continue to operate the automated and continuous port environment monitoring system
- Reduce Vessel-generated Waste: promote waste reducing on vessels and recycling/ reusing of resources
- Reduce Port Dust: install new dust control facilities for bulk cargo handling and require companies to comply with regulations

The President, Port of Keelung, TIPC is responsible for the implementation, maintenance and communication of the environmental objectives. To fulfil commitments, the objectives and corresponding action plans are reviewed and adjusted to the condition of the Port.

President of Port of Keelung, TIPC : Shy-tzong Liou

Date : 27/04/2017

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No.1, Chung-Cheng Road, Keelung 20202, Taiwan, R.O.C.
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Message from Port of Keelung, TIPC

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

As growing influence of climate change, eco-friendly and sustainable concept have been valued by international port authorities. The Taiwan International Ports Corporation, Ltd. (TIPC) is committed to advancing port infrastructure, improving facility and service, optimizing land use and preventing pollution. In recent years, we have not only pursuing the goal of becoming a Green Port, but been networking with global ports and active in international certification schemes of port environment management. The environmental performance of ports in Taiwan is thus recognized by the world. With our global presence, we are well positioned to achieve our goal as building Ecoport and Green Port.

Port of Keelung functions as a container terminal for ships that operate in near-sea shipping lines, hosts passenger and cargo vessels that travel between Taiwan and China, and foreign cruise liners. The port boasts its position as the Asia-Pacific hub of logistics distribution. The administration of the port continues to maintain stable growth in terms of profitability, and also strives to becoming a Green Port, control pollution within the port, and strengthen its relationship with the local community in a manner that contributes to the sustainability of the port.

Port of Keelung endeavors to reduce the environmental impact of operations within the port, cement its relationship with the residents of Keelung City, maintain its EcoPort status, engage with partners across the world, and rejuvenate the port city of Keelung through benchmarking strategies.

Shy-tzong Lou

President of Port of Keelung, TIPC

Port Profile

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Port Profile

Location and Area of the Port

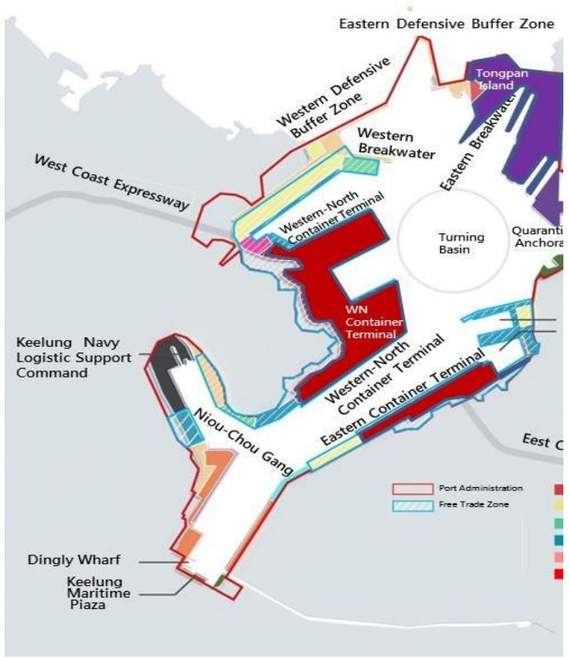
Port of Keelung is the top maritime gateway of Northern Taiwan. Located on the northeastern tip of Taiwan (25°09'42.5''N 121°44'57.5''E), the single-opening port covers 196 hectares of land territory and 376 hectares of waterway. The water depth varies between -12 and -16 meters with the tide contributing to a maximum 0.73 m of difference.

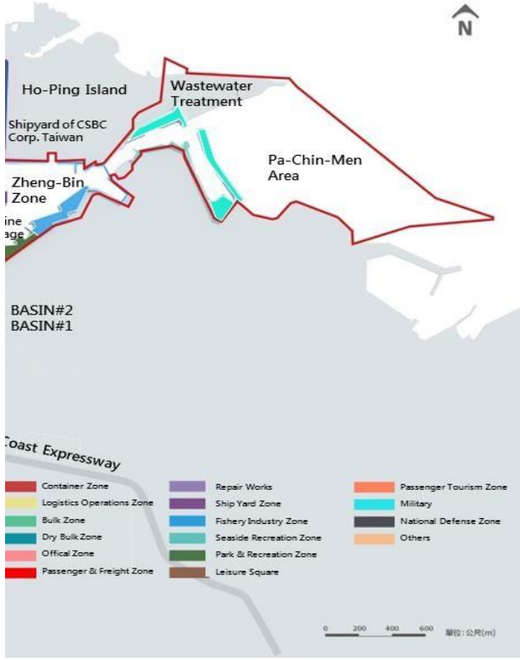
A natural, landform harbor with a shoreline characterized by pebble beaches, rocky shores and artificial seawalls, Port of Keelung benefits significantly from its sheltered water and strategic locale and the presence of critical industries (e.g. CSBC Keelung Shipyard, TPC Hsieh-ho Power Station). The proximity to the city of Keelung and recreational facilities is also noted as an advantage, as a readily available labor force is essential to the operation of the port.

Legal Status and Port Operators

To promote modernized commercial port management system reforms, in March 2012, the national maritime system was divided into two parts, government and corporation, the latter named Taiwan International Ports Corporation.

Since established, TIPC has dedicated itself to fostering core businesses, promoting free trade, and developing into a metropolitan port. Moreover, to boost its operational performance and efforts toward corporate social responsibility, Port of Keelung has gradually implemented an environmental-friendly program called "Greening the Ports Action Plan," which includes obtaining the EcoPort certification, promoting environmental well-being, and striving for environmental sustainability.





District of Keelung Port

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Port Profile

Main Commercial Activities

There are 56 docks in Keelung Port commercial harbor area with 20 on the east shore and 36 on the west shore. Dock types include 15 container docks, 19 bulk cargo docks, and 6 passenger docks. In recent years, development of Keelung Port focuses on containers and tourism. Near-sea shipping lines is the main service of outer harbor which also includes near-sea container lines, shipping between Taiwan and People's Republic of China, logistics/marketing center in Asia-Pacific and container storage. Bulk goods include aggregates, oil, cement, metal and cars.

Keelung Port business statistics from 2017 to 2018

Business item		2017	2018	Comparison between 2017 and 2018	
				Difference	%
Incoming and outgoing ships	Total number of ships (vessel)	5,606	5,678	72	1.28
	Total tonnage (ton)	95,474,985	95,584,764	109,779	0.11
Cargo stevedoring quantity	Container cargo (shipping ton)	51,056,055	52,984,530	1,928,475	3.78
	Bulk cargo (shipping ton)	5,606,249	4,954,275	-651,974	-11.63
	Channel cargo (shipping ton)	3,529,239	3,955,863	426,624	12.09
	Total (shipping ton)	60,191,543	61,894,668	1,703,125	2.83
Container stevedoring quantity	Inbound container (TEU)	770,000	790,000	20,000	3.17
	Outbound container (TEU)	650000	680,000	30,000	4.49
	Total (TEU)	1,420,000	1,470,000	50,000	3.77
Cargo throughput	Imported/ Exported cargo (metric ton)	139,600,000	131,800,000	-7,800,000	-5.60
	Domestic cargo (metric ton)	35,000,000	41,000,000	6,000,000	17.10
	Total (metric ton)	174,600,000	172,800,000	-1800000	-1.05
Number of travelers	Number of domestic line travelers (number of people)	95,157	86,209	-8,948	-9.40
	Number of international line travelers (number of people)	941,663	829,903	111,760	13.47
	Total number of travelers (number of people)	1,036,820	916,112	120,708	13.18

Main Cargoes

The main import cargo at Keelung Port in 2017 and 2018 was mineral products, followed by base metal products and chemical or industrial products. Yet, in 2017 and 2018, top three export cargo are plastic and rubber products/chemical and industrial products/base metals and articles of base metal and plastic and rubber products/ chemical and industrial products/textile products, respectively.

2017-2018 Main Import/Export Cargoes of Port of Keelung (unit: MT)

Type	Main Import Cargoes			Main Export Cargoes			
	Mineral Products	Base Metals and Articles of Base Metal	Products of the Chemical or Allied Industries	Plastic and Rubber Products	Chemical and Industrial Products	Base Metals and Articles of Base Metal	Textile Products
2017	4,617,309	1,318,928	1,245,875	890,112	515,596	414,616	-
2018	3,584,209	1,394,821	1,157,060	965,920	564,321	-	407,592

Main Commercial Activities and Cargoes in Keelung Port

Commercial activities	
Aggregates (sand and gravel)	Building and Repair
Cruise industry/ Ferry services	General Manufacturing
Cargo stevedoring	
Dry bulk cargo	Perishable Goods
Trade Cars/ Vehicles	General Cargo
Petroleum/ Oil Products	Ro-Ro

Environmental Management

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Environmental Management

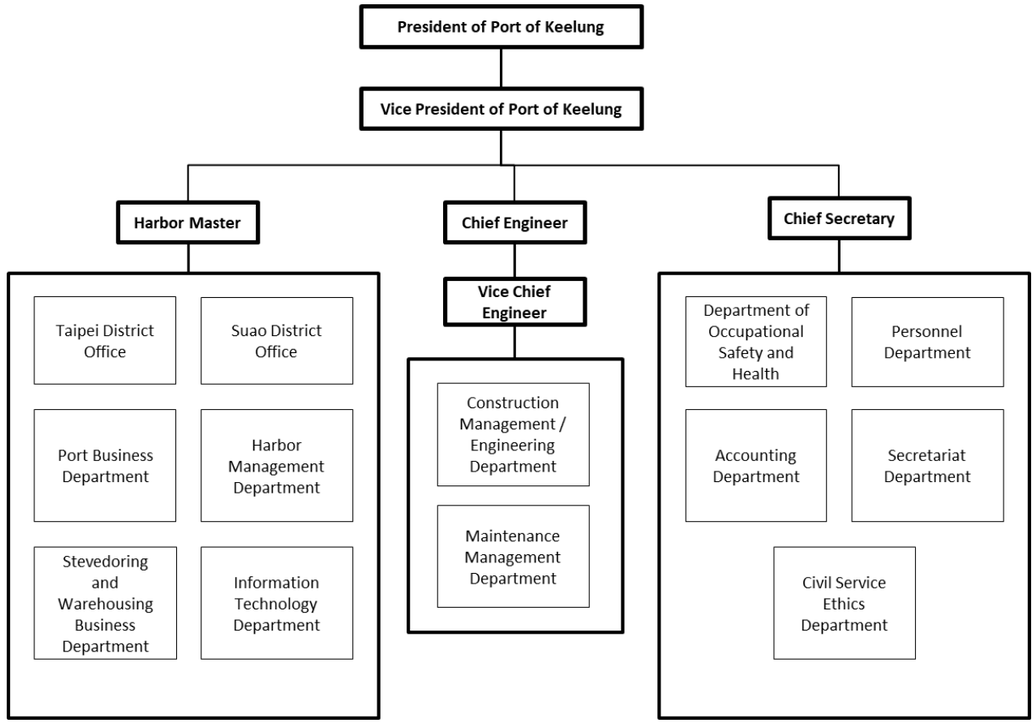
Environmental Management Organization Structure

According to Commercial Port Law regulations, the Port of Keelung, TIPC and the North Taiwan Maritime Affairs Center is responsible for environmental management in the Keelung commercial port area. Port of Keelung, TIPC is responsible for environmental issues in management and operations while the North Taiwan Maritime Affairs Center shall handle environmental issues that involve public authority.

Environmental Protection Administration and the Bureau of Environmental Protection shall manage stevedoring and neighboring municipal areas, and monitor and supervise the environment. The Port of Keelung, TIPC has 13 internal departments, functions of the divisions of the Port of Keelung as follow:

Department	Description
Secretariat Department	Property, cashier, public relationship affairs and document management of the branch
Construction Management / Engineering Department	Port planning, design, construction, supervision and contracting out
Harbor Management Department	Port safety management and port affairs management
Stevedoring and Warehousing Business Department	Tourist services and private store operation
Port Business Department	Attraction of local investments, implementation of port functions, and creation of benefit
Accounting Department	Budget review and management of income and expenditures
Information Technology Department	Development and maintenance of IT systems and equipment
Personnel Department	Company human resource management
Maintenance Management Department	Civil/electrical engineering, harbor construction and electrical maintenance/management
Occupational Safety and Health Department	Port environmental protection, pollution prevention and management of occupational health and safety
Civil Service Ethics Department	Enforcement of ethics and investigation
Taipei Port Branch Office of Keelung Port, TIPC	Taipei port operation and management
Suao Port Branch Office of Keelung Port, TIPC	Suao port operation and management

Organization Chart of the Port of Keelung, TIPC



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Environmental Management

Environmental Regulations

The Keelung Port follows relevant international specifications, such as International Convention for the Prevention of Pollution from Ships (MARPOL73/78), London Dumping Convention, International Convention for the Control and Management of Ships' Ballast Water and Sediments, International Convention on the Control of Harmful Anti-fouling Systems on Ships etc. In addition to the international environmental specifications and conventions, the Keelung Port collaborates with local authorities in compliance with relevant environmental laws and regulations in Taiwan.

International Conventions

Conventions	Objective	Corresponding to the Domestic Legislation
International Convention for the Prevention of Pollution From Ships (MARPOL73/78)	Prevent pollution from ships	• The Law of Ships (article 101) • The Commercial Port Law (article 75) • No. 10150137211, 10150138211, 10150138451, and 10250048611, Administrative Law of the Ministry of Transportation and Communications
London Dumping Convention	Regulate marine dumping	• Marine Pollution Control Act (article 20, 25) • Marine Dumping and Marine Incineration Management Regulations
International Convention on the Control of Harmful Anti-fouling Systems on Ships	Terminate the use of toxic hull paint	Prohibition of the use of tributyltin oxide in manufacturing marine antifouling paint, specified in the "List of Prohibited Toxic Chemical Substances" of Toxic and Concerned Chemical Substances Control Act
International Convention for the Control and Management of Ships'Ballast Water and Sediments	Prevent the invasion of alien species along with ballast water, and protect marine ecology and biodiversity	• Regulations on Equipment of Ships (article 174, 215, 216) • "International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004" issued by the Ministry of Transportation and Communications • "Prohibition of Ballast Water Exchange in the Territorial Waters of R.O.C. and Related Pollution Control Measures" announced by the Environmental Protection Administration

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Environmental Management

Environmental Regulations

Relevant Environmental Laws and Regulations Related to Ports in Taiwan

Laws Title			Central Competent Authority	Local Law Enforcement Agencies
Sectors in the Ministry of transportation and communications	The Commercial Port Law	2011/12/28	Ministry of Transportation and Communications	North Maritime Affairs Center, Maritime and Port Bureau, MOTC
	The Law of Ships	2018/11/28		
	Shipping Act	2014/01/22		
	Act for the Establishment and Management of Free trade zones	2019/01/16		
Sectors related to agricultural	Wildlife Conservation Act	2013/01/23	Council of Agriculture	Department of Economic Affairs (Keelung City)
Sectors in the Ministry of the Interior	Fire Services Act	2019/01/07	Ministry of the Interior	Keelung City Fire Department
				Keelung Harbor Fire Brigade
Sectors related to environmental protection	Basic Environment Act	2002/12/11	Environmental Protection Administration	Environmental Protection Bureau (Keelung City)
	Marine Pollution Control Act	2014/06/04		
	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		

Laws Title			Central Competent Authority	Local Law Enforcement Agencies
Sectors related to environmental protection	Waste Disposal Act	2017/06/14	Environmental Protection Administration	Environmental Protection Bureau (Keelung City)
	Environmental Impact Assessment Act	2003/01/08		
	Environmental Education Act	2017/11/29		
	Noise Control Act	2008/12/03		
	Indoor Air Quality	2011/11/23		
	Toxic and Concerned Chemical Substances Control Act	2019/01/16		
	Soil and Groundwater Pollution Remediation Act	2010/02/03		
	Resource Recycling Act	2009/01/21		
	Greenhouse Gas Reduction and Management Act	2015/07/01		
	Public Nuisance Dispute Mediation Act	2009/06/17		Public Nuisance Disputes Mediation Committee (Keelung City)
Intersectoral protection	Disaster Prevention and Protection Act	2019/05/22	Ministry of the Interior	Keelung City Government

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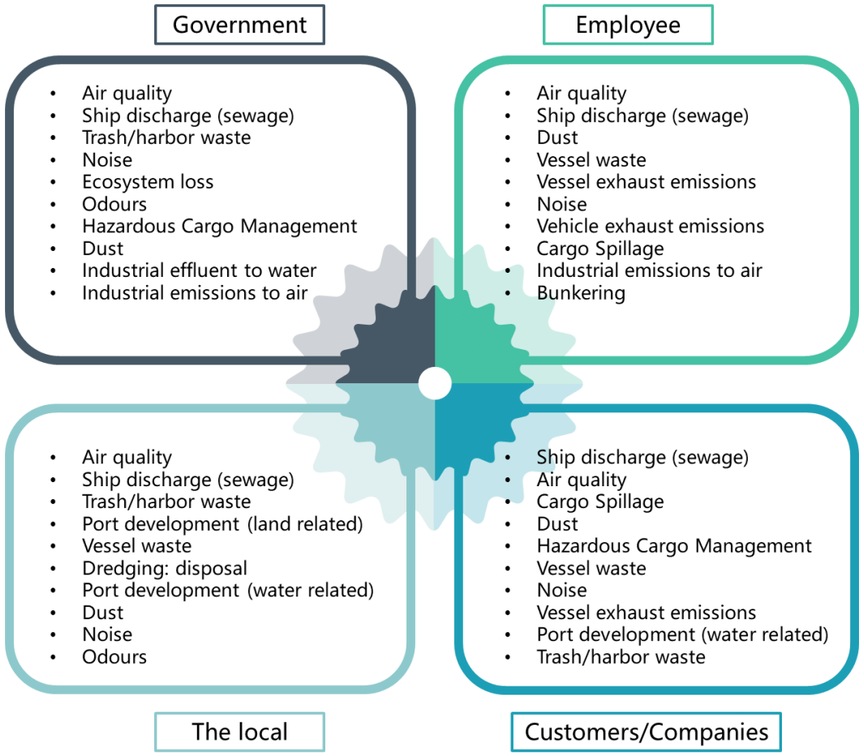
Environmental Management

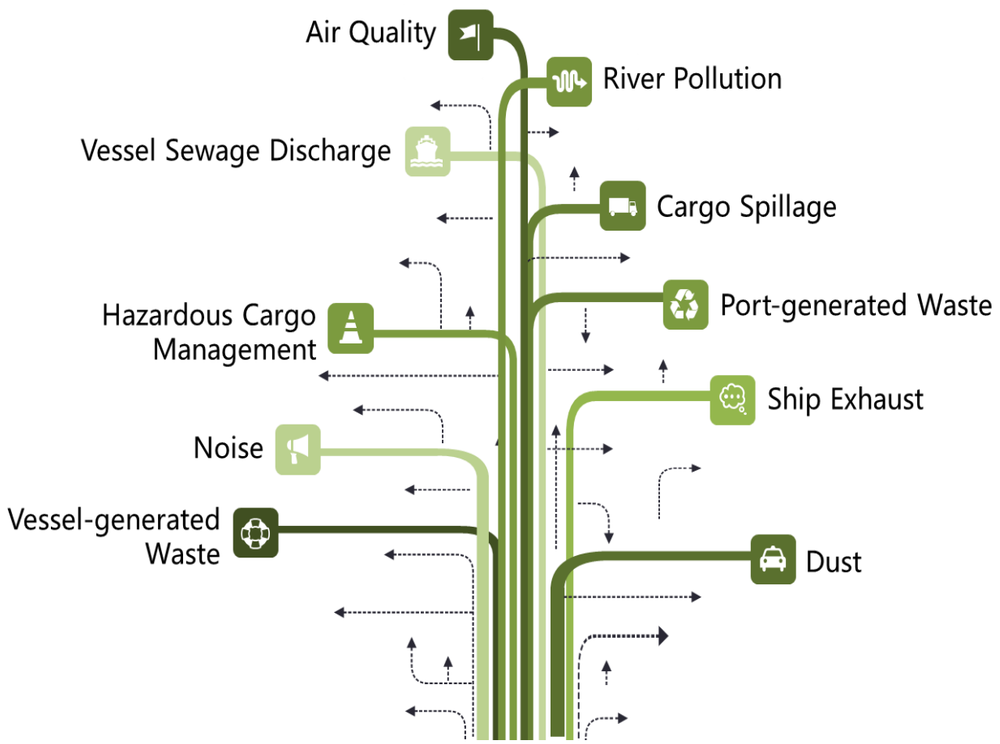
Stakeholder

The Keelung Branch of TIPC believes that good communications with stakeholder help identify key environmental issues and create value. Therefore, the Keelung Branch of TIPC uses a variety of methods to communicate with stakeholder, including surveys and interviews. Their needs and expectations are gathered and incorporated into operation and environmental management.



Top 10 Environmental Significant Issues

Procedure for selecting the top 10 environmental significant issues for the Port of Keelung: Top-level managers from each department of the Port of Keelung, TIPC select the top 10 environmental significant issues to the Port of Keelung, and inquire to relevant stakeholders. After organized and discussed with all departments of the branch, top 10 environmental significant issues for the Port of Keelung are decided.



State of the Environment

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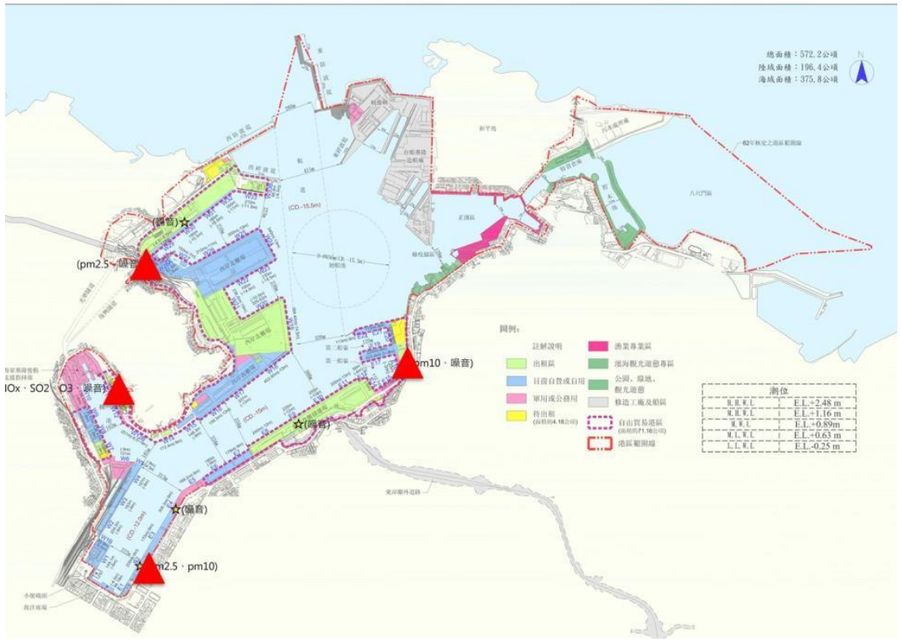
State of the Environment

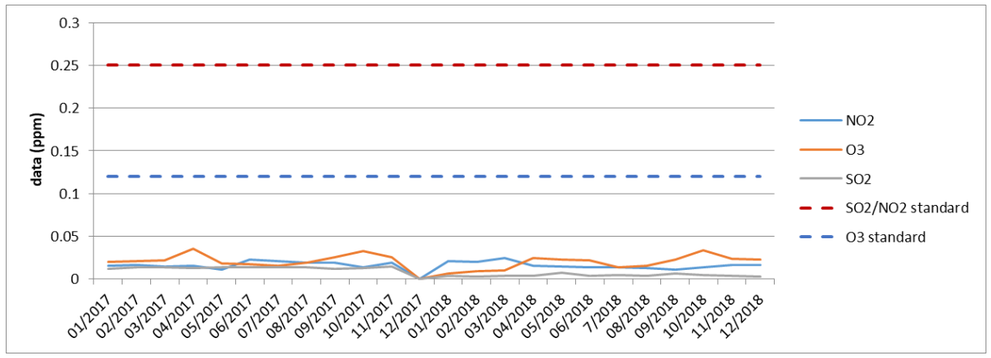
Air quality

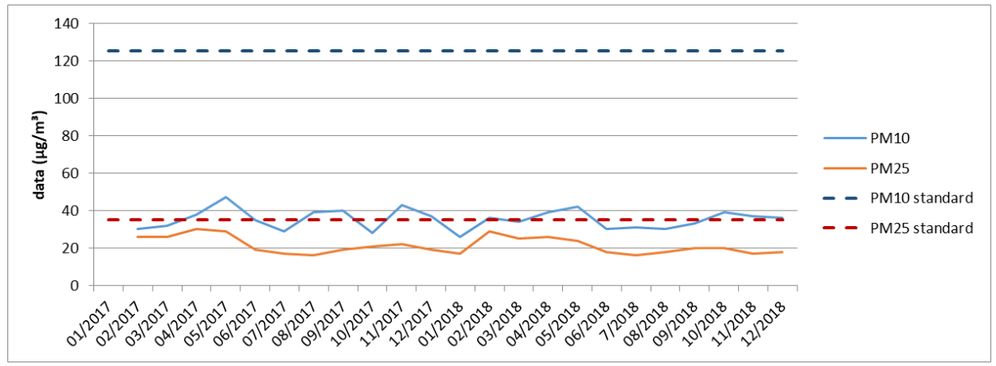
The major sources of air pollution at the Keelung Port comprise vessel emissions, vehicle exhausts, dust emissions, and smokestack emissions from the nearby Hsieh-ho Power Plant. To improve the air quality in the port and harbor areas, the Port of Keelung, TIPC, is assisting the EPA in restricting the use of aging trucks and promoting the use of alternative fuels to reduce exhaust emissions.

The monitoring items include particulate matters ($PM_{2.5}$、PM_{10}), sulfur dioxides (SO_2), ozone (O_3), nitrogen oxide (NO), nitrogen dioxide (NO_2), and wind speed etc.The air quality measurements are all meeting the Air Quality Standards in 2017 and 2018.

Air Quality Monitoring Stations and Sites
(Red triangle represent monitoring station)







Real-time monitoring equipment for air quality

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State of the Environment

Greenhouse Gas Emissions

Keelung Port uses the Taiwan Air Pollution Emission Line Source Manual to calculate port GHG emissions from vehicles, and resources consumption.

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

Container truck carbon emissions ($kgCO_2e$) =

Total number of vehicles per year × Average fuel consumption(L) in the port area× Emissions factor ($kgCO_2e$/L)

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 Keelung port is 1.03 km, and the round-trip distance is 2.06 km. Thus, fuel consumption of Keelung Port was estimated to be 1 L.

Year	Inward / Outward Container Throughput (TEU)	Heavy Goods Vehicle Carrying Limit (TEU)	Unit	Total Number of Passes per Year	Fuel Consumption (L)	Emission Factor ($kgCO_2e$/L)	Carbon Emissions (tonne)
2017	1,420,000	2	No. of vehicles	710,000	1	2.60	1,846.0
2018	1,470,000			735,000			1,911.0

Carbon Emissions from Resource Consumption

The total carbon emissions of Keelung Port from resource consumption is decreasing. In spite of increasing power usage, significant decline in fuel consumption causes a reduction of GHG emissions.

Resource	Emission Factor $kgCO_2e$	2017		2018	
		Amount of Resource Consumed	Carbon Emission (tonne)	Amount of Resource Consumed	Carbon Emission (tonne)
Water	0.154	189,651	29.2	214,353	33.0
Electricity	0.533	12,003,354	6,397	12,774,944	6,809
Fuel	2.60	1,532,409	3,984.2	118,229	307.3
Paper	2.8	4,262	11.9	3,944	11.0
Total			10,422.3		7,160.3

Power usage might increase with numbers of tourists and soaring usage of air condition.

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State of the Environment

Air Quality Improvement Strategies

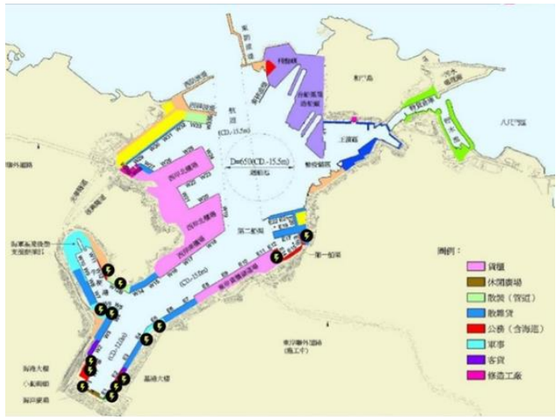
Shore Power and premium diesel

Services vessels of Keelung Port have totally adopted premium diesel, which contains a sulfur content lower than 10 ppm, as the fuel for half of its harbor vessels. Moreover, the port has promoted the electrification of port service facilities, including the installation of shore power systems at official-purpose docks to supply electricity to ported vessels. A total of 14 shore power systems to reduce exhaust gas emissions from ported vessels were installed.

In addition, the Port of Keelung encourages vessel speed reduction (VSR), which is to reduce average speed of vessels within 20 nautical miles to the port to under 12 knots per hour to abate air pollution.

Shore power services at Keelung Port

Operating enterprise	Cleaning boat/ Sightseeing boat	Service vessel	Custom	Coast guard	Navy	Cement ship/ Small business wheel
Dock	#W1, #E2B	#W5, #W6, #W12B	#W1	#E4, #E16	#W1B, #E5, #W12	#W12, #E1



Shore Power System

Shore Power Services at Keelung Port

Dust Emission Control

To reduce dust emission, air pollution and maintaining an adequate working environment and quality of life standards at the harbor and in urban areas. The Department of Occupational Safety and Health inspected docks 1,001 and 773 times in 2017 and 2018, respectively, and found that carriers, shippers, freight forwarders, loading and unloading contractors, and other handlers involved handled cargo in accordance with existing environmental regulations and the Commercial Port Law.

The Port of Keelung has implemented control measures for dust emissions. The control measures have two aspects, cargo handling and vehicle control. In addition, the Keelung Port also requests stevedoring companies to abide by the related regulations.

Dust control measures for Keelung Port

Aspect	Control Measures
Vehicle Control	●Implemented diesel vehicle self-management program promoted by the Keelung City Government ●Inspect incoming and outgoing diesel vehicles ●Install water sprinklers at sand and gravel stacking sties
Equipment	●Water sprayers：64 units ●Carwash facilities：3 units

Operation on docks

Street washer

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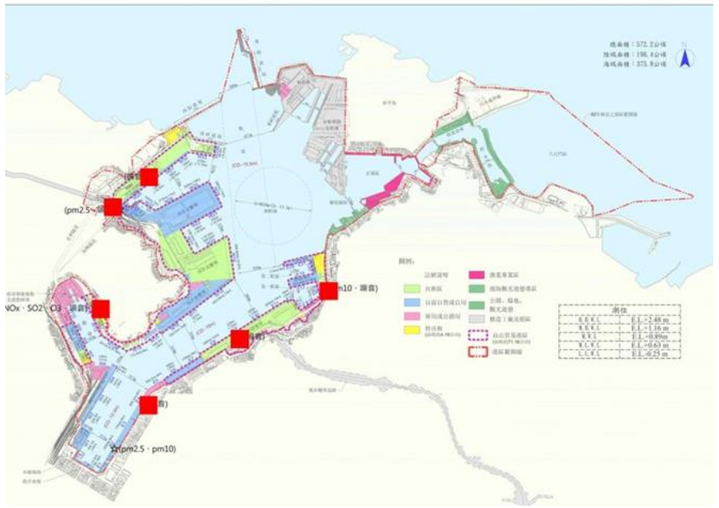
State of the Environment

Noise

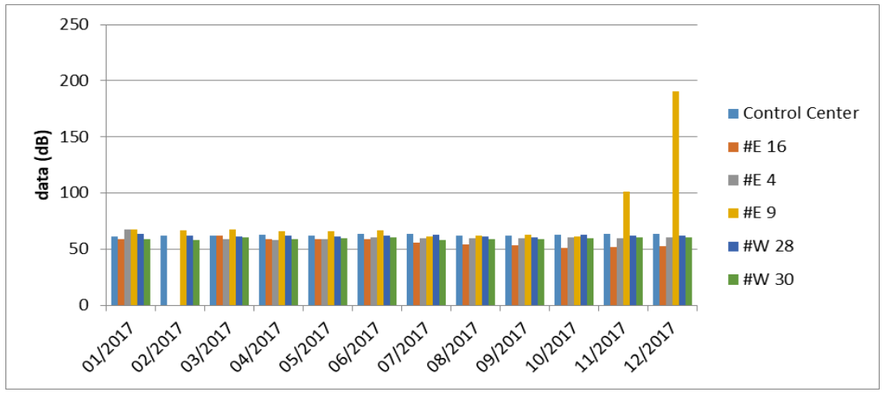
The Port of Keelung neighbors the Keelung City area. Because of noise from cargo handling, transportation, and traffic at the harbor travels to surrounding residential areas, affecting their livability. To ensure the quality of life of residents in the neighborhood of Port of Keelung, all lessees and ship operators in Port of Keelung shall restrict the noise of their operations to the statutory limits. To reduce harbor noise from vehicle, the Port of Keelung, TIPC, has maintained access traffic systems on the eastern and western harbor fronts and separate port traffic from the commuting routes of nearby residents and avoid disturbing community life.

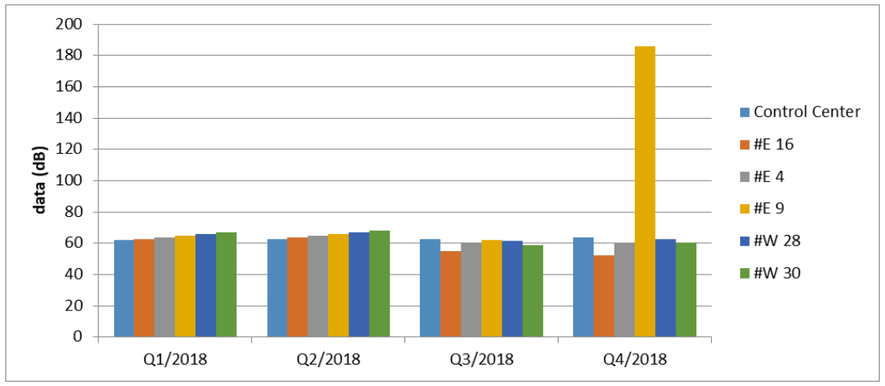
In 2017 and 2018, volume monitoring results for the day, evening, and night have demonstrated that readings exceeded at some of the test stations. This is probably due to neighboring traffic and the docking of ships at the port.

Noise Monitoring Stations and Sites



Noise Monitoring Stations





The view of Keelung Port and container terminals at night

Roads on the east bank of Keelung Port

Water Quality Improvement Strategies

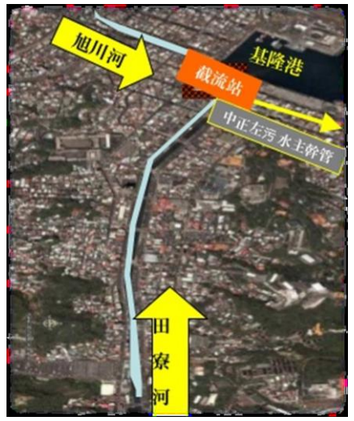
Reduce river pollution

Currently, Keelung Port basin collects the effluent of four major drainage channels, comprising the Xiangfeng Street channel, Niouchougang River, Hsuchuan River, and Tienliao River. These channels transport upstream sewage, which deteriorates water quality in the harbor basin.

Current investigations (2017 and 2018) have shown that interception stations are installed only on the Hsuchuan River (25% total installation rate). The Port of Keelung, TIPC, is planning to negotiate with relevant authorities to increase the number of interception station installations to improve the installation rate to 50%. Besides, the port dispatches cleaning vessels to remove trash (brought by streams in urban areas) from the waters of the port irregularly. In the future, according to performances on interception stations the branch will assess methods of cleaning up trash on the water in harbor and thereby make waters in harbor better.

Cleaning vessels on Tienliao River

Interception stations in Hsuchuan River

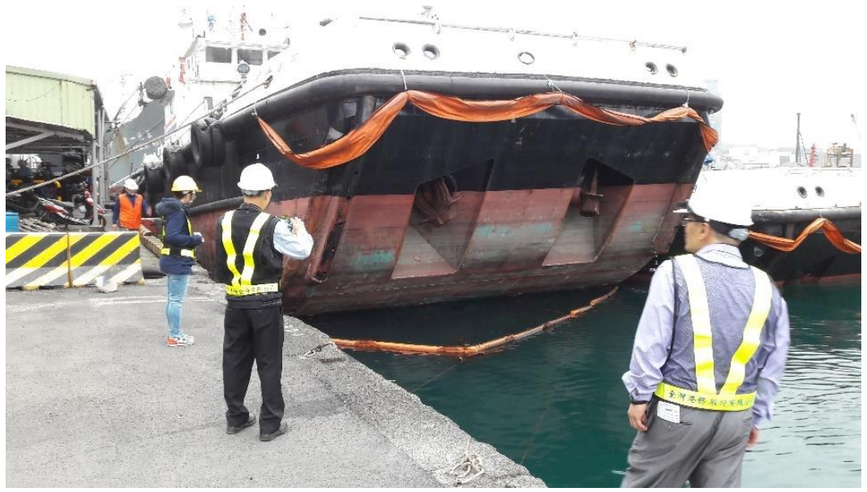


Reduce Vessel Sewage Discharge

To prevent unauthorized oily bilge discharge from entering the harbor, the Port of Keelung, TIPC, conducts to ensure that inbound ships treat their oily bilge water in accordance with regulations. Oily bilge water is primarily discharged by ships and vessels. According to relevant regulations, vessel wastewater (sewage), waste oil, solid waste, or other contaminants must be stored onboard or discharged to onshore collection facilities unless otherwise permitted for ocean discharge.

The oily bilge and sewage water collection process was fully implemented in Keelung Port. In 2017, 1358.46 tons of wastewater (including oily wastewater) was removed from 122 ships, and in 2018, 1678.37 tons was removed from 167 ships, and is expected to be continually maintained through periodically inspecting vessel docking environments in coordination with relevant authorities, thereby eliminating unauthorized discharge and harbor pollution.

Inspection of vessels docking



04/

State of the Environment

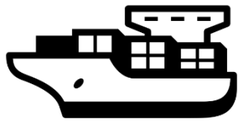
Reduce harbor waste

The Port of Keelung, TIPC, is promoting waste reduction and recycling plans to reduce harbor and vessels waste. Recycling and waste reduction plans are implemented in accordance with the Four-in-One Recycling Program that has been promoted by the EPA since 1997. Additionally, the EPA initiated the Mandatory Garbage Sorting requirement in 2005, requiring waste to be separated into recyclable, kitchen refuse, and general garbage, in which the major recycled items include waste paper.

Reducing land area waste at Keelung Port

Temporary waste bins are placed at fixed locations to store waste within the Keelung Port land area, and they are periodically emptied by commissioned operators. Additionally, dock leasing businesses and cargo handling companies must independently commission qualified waste-cleaning professionals to remove industrial waste (including bilge and sewage water).

In 2017, general waste amounting to 1,512 tons and the recycling amounting to 7 tons were removed from the Keelung Port land area. In 2018, the general waste removed amounted to 1,968 tons and the recycling amounted to 11 tons.

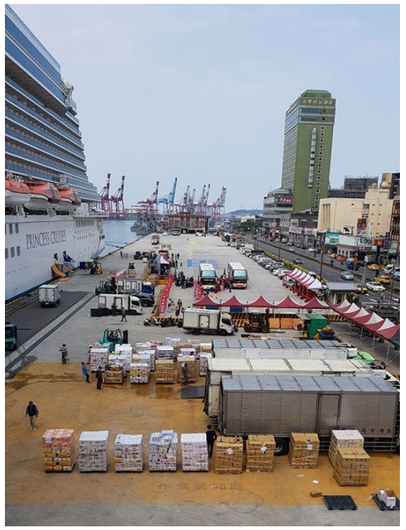


Reducing vessels waste

Waste produced from vessels is partially delivered to waste treatment site by the contractors, hired by The Port of Keelung, TIPC, partially removal by shipping companies themselves. Waste removed from vessels amounting to 504.35 ton and the removal rate of vessels waste was 100% in 2018; yet, in 2017, due to problems of the contract, only the data in December were recorded (22.6 ton) despite monthly routine waste removal.

Requiring companies in harbor (e.g. CPC) should remove industrial waste

Requiring shipping companies/ cruise liners should clean up their waste

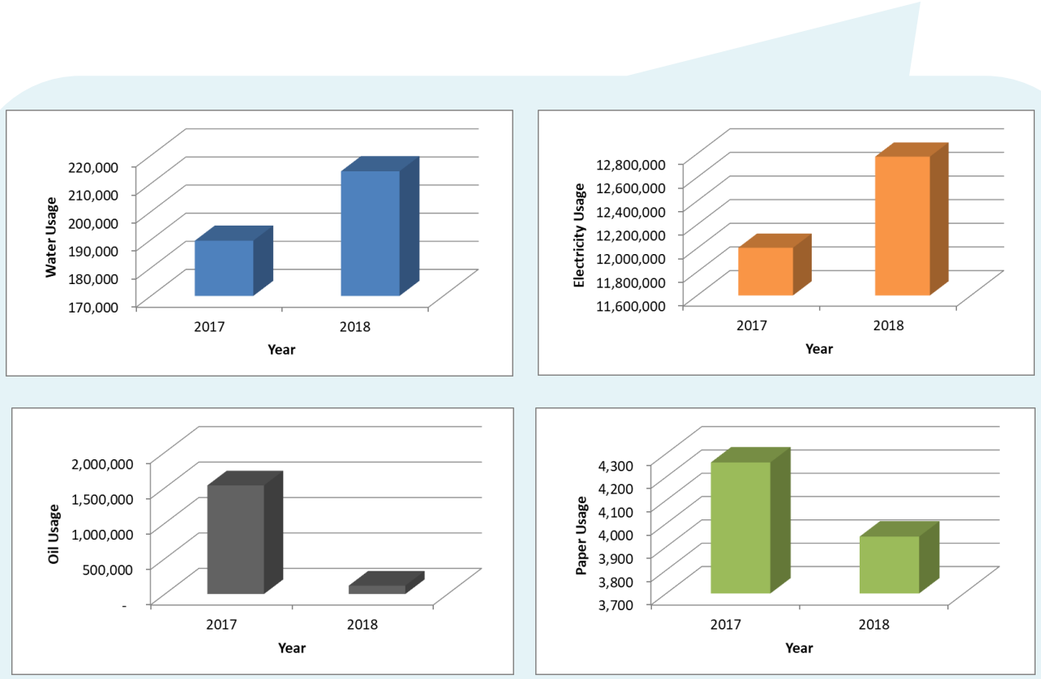


04/

State of the Environment

Keelung Port Resource Usage

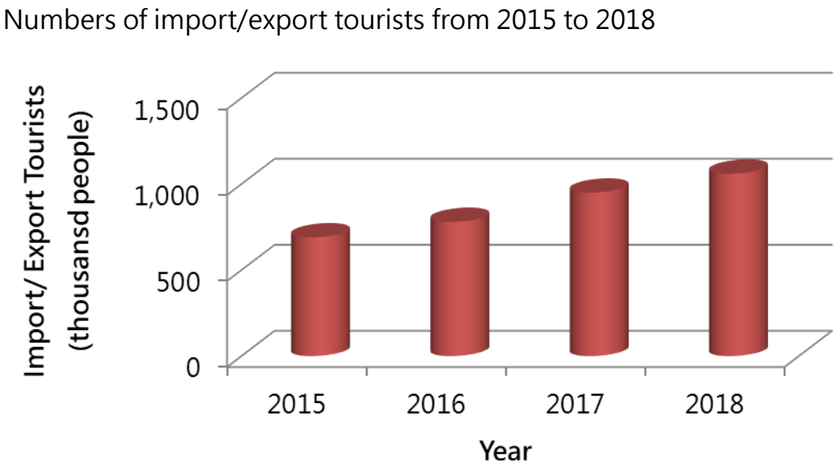
Port of Keelung, TIPC, is highly concerned about water and electricity use and frequently encourages all colleagues to cherish resources, establishing a consensus on conservation. Water and electricity use in the harbor are jointly monitored; upon discovery of any abnormal circumstances, the maintenance unit of the port is immediately notified, keeping resource waste to a minimum. In 2017 and 2018, an increase in international tourists results in an increase the usage for air conditioning units in the tourist center. This effected is coupled with an increase in the usage of shore-based electric equipment, which collectively result in an increase in power consumption. Owing to the elimination of diesel usage in Suao Port, fuel consumption significantly decreases in 2018.



Resource Savings Strategies of Keelung Port

Category	Strategies
Water	• Conduct leak inspections to control monthly water usage
Electricity	• Turn off unnecessary lights in hall ways • Gradually replace traditional lightings to energy saving once • Do not use AC under 28℃, and keep office above 26℃ • Turn off office lightings during lunch break
Fuel	• Promote ride sharing • Limited idle speed duration to less than 3 min • Regularly recorded the fuel consumption of official vehicles
paper	• Encouraging online administrative service and online document signing • Print documents on both sides and reuse used paper

Numbers of import/export tourists from 2015 to 2018



04/

State of the Environment

Strengthen Hazardous Cargo Management

The hazardous cargo storage, and transportation service companies in the port may cause potential environmental hazards because cargo leakage accidents can cause harm to neighboring ecology and residents. Therefore, improving cargo management and port security has become a crucial task for Keelung Port. Companies operating in the port shall devise corresponding emergency response plans and organize joint disaster drills to increase their capability of addressing emergency events.

The Keelung Branch of TIPC inspects stevedoring in the port from time to time and manages dangerous cargo in the port. In addition, the Branch contacts each port unit on a regular basis to develop emergency response plans for cargo leakage and improve the response capacity for responding to such events. The Branch stipulated that emergency response drills shall be organized once per year and a joint safety promotion twice per year. According to statistics, 1,001 harbor inspections and 11 jointly supervised harbor safety drills were conducted in 2017, whereas 773 harbor inspections 13 harbor safety drill were conducted in 2018.

The drill in precaution against typhoon

The inspection of stevedoring in harbor

04/

State of the Environment

Environmental Performance Indicators

Port of Keelung proposes Environmental Performance Indicators as trackers for its environmental conditions. These indicators further aids future policymakers in decision-making and implementation.

Ten Significant environmental issues of the Keelung Port		Index item	Calculation method	Index target	Description of calculation	
					2017	2018
1	Air quality	Qualification rate of air quality indices: suspended particulate matter (PM_{10} and $PM_{2.5}$), SO_2, NO_2 and O_3,	Rate of air quality measurements meeting the Air Quality Standards (measured at harbor test stations)	• Minimum standard for daily average PM10: 100.00%; • Minimum standard for daily average PM2.5: 85.00%; • Minimum standard for hourly average SO2: 99.95%; • Minimum standard for hourly average NO2: 100.00%; • Minimum standard for hourly average O3: 97.00%;	• PM_{10} daily average pass rate: 100.00% • $PM_{2.5}$ daily average pass rate: 100.00% • SO_2 hourly average pass rate: 100.00% • NO_2 hourly average pass rate: 100.00% • O_3 hourly average pass rate: 100.00	• PM_{10} daily average pass rate: 100.00% • $PM_{2.5}$ daily average pass rate: 84.38% • SO_2 hourly average pass rate: 100.00% • NO_2 hourly average pass rate: 100.00% • O_3 hourly average pass rate: 100.00
		Replacing old devices with energy-saving devices	Proportion of use of electric gantries or overhead cranes	A usage rate of 100%	• 4 electric overhead cranes have already put into service, yielding a replacement rate of 100%.	• 4 electric overhead cranes have already put into service, yielding a replacement rate of 100%.
2	Port and harbor waste	General waste removed and recycling rate in the harbor land area	• Port waste removed from the harbor land area • Port waste recycling rate in the harbor land area	3% port waste recycling rate in the harbor land area based on general waste removed	• General waste removed from the harbor land area: 1,512 ton • Amount of general resource recovery: 7 ton • General waste recycling rate in the harbor land area: 7/1,512=0.44%	• General waste removed from the harbor land area: 1,968 ton • Amount of general resource recovery: 11 ton • General waste recycling rate in the harbor land area: 1/1,968=0.56%
3	Noise	Daily qualification rate for harbor noise quality	Daily rate of qualified noise quality measurements at harbor test stations *the harbor plant site is a Type 4 noise control zone, meaning that noise is limited to 80 db during daytime (7 AM to 7 PM), 70 db during evenings (7 PM to 11 PM), and 65 db during nighttime (11 PM to 7 AM	Harbor noise quality: 100.00% seasonal daytime qualification rate, 95.00% evening, and 93.00% nighttime	• Daytime equivalent sound energy level (Leq): 100.00% • Evening Leq: 100.00% • Nighttime Leq: 100.00%	• Daytime equivalent sound energy level (Leq): 100.00% • Evening Leq: 98.81% • Nighttime Leq: 96.99%
4	Pollution from river influx	Ratio of river channels or canals installed with interception stations	Number of rivers channels or canals installed with interception stations ÷ total number of river channels or canals in the harbor area × 100%	50% of river channels or canals with interception stations installed	• 1 ÷ 4 × 100% = 25% • Number of river channels with interception stations installed: 1 (Hsuchuan River) • Total number of river channels or canals in the harbor area: 4 (Xiangfeng Street channel, Niouchougang River, Hsuchuan River, and Tienliao River)	• 1÷4×100%=25% • Number of river channels with interception stations installed: 1 (Hsuchuan River) • Total number of river channels or canals in the harbor area: 4 (Xiangfeng Street channel, Niouchougang River, Hsuchuan River, and Tienliao River)
5	Strengthen hazardous cargo management	Number of inspection container freight station managers	Number of inspection container freight station managers to implement self-management plans	Number of inspection container freight station managers to implement self management plans,10 times per year	• Number of inspection container freight station managers to implement self management plans,11 times in 2017	• Number of inspection container freight station managers to implement self management plans,13 times in 2018

04/

State of the Environment

Environmental Performance Indicators

Port of Keelung proposes Environmental Performance Indicators as trackers for its environmental conditions. These indicators further aids future policymakers in decision-making and implementation.

Ten Significant environmental issues of the Keelung Port		Index item	Calculation method	Index target	Description of calculation	
					2017	2018
6	Reducing ship exhaust gas emissions	Ratio of service vessels using low-emission fuels or biodiesels and the volume of low-emission fuels used by service vessels	• Number of service vessels using low-emission fuels (marine diesel oil or super diesel) ÷ total number of service vessels × 100% • Volume of low-emission fuels used by service vessels	100% of service vessels using low-emission fuels or biodiesels	• Ratio of service vessels using low-emission fuels: 100% • Service vessels owned by the Port of Keelung, TIPC: Shuttle Boat:2, deck barge:1 • Service vessels using low-emission fuels (super diesel): 2 • Low-emission fuels used by service vessels: 1,746 L of super diesel • Marine diesel oil used by service vessels: 0 L	• Ratio of service vessels using low-emission fuels: 100% • Service vessels owned by the Port of Keelung, TIPC: Shuttle Boat:2, deck barge:1 (no power), tug boat: 1 • Service vessels using low-emission fuels (super diesel): 3 • Low-emission fuels used by service vessels: 3,189 L of super diesel • Marine diesel oil used by service vessels: 0 L
		Vessel speed restriction policy	• Number of inbound vessel speed restriction guidance activities held (communication records/work logs) • Number of meetings (through written) invitations for addressing vessel speed restrictions • Number of berth meetings addressing vessel speed restriction policies	At least maintain 100 meeting or through written propaganda letter per year	• Number of inbound vessel speed restriction guidance activities: 8,760 times (delivered by system hourly) • Number of berth meetings (e.g. daily berth meeting) addressing vessel speed restriction policies: 248 times	• Number of inbound vessel speed restriction guidance activities: 8,760 times (delivered by system hourly) • Number of berth meetings (e.g. daily berth meeting) addressing vessel speed restriction policies: 248 times • Number of meetings (through written) invitations for addressing vessel speed restrictions: 1 time
		Ratio of service vessels using shore power	Number of service vessels using shore power ÷ total number of service vessels × 100%	All service vessels using shore power	• Ratio of service vessels using shore power: 100%	• Ratio of service vessels using shore power: 100%
7	Vessel sewage discharge	Performance of commissioned qualified operators on cleaning oily bilge water	Number of cleanups conducted by relevant vessels÷ number of vessels that collected oily bilge water × 100%	100% oily bilge water cleanup	• Cleanups conducted by relevant vessels (oily bilge water): 122 • Total oily bilge water collected: 1358.46 ton • oily bilge water cleanup: 100%	• Cleanups conducted by relevant vessels (oily bilge water): 167 • Total oily bilge water collected: 1678.37 ton • oily bilge water cleanup: 100%
8	Cargo spillage	Number of harbor inspections, cargo spillage emergency response drills, and jointly supervised harbor safety drills	Number of harbor inspections, cargo spillage emergency response drills, and jointly supervised harbor safety drills	• 100 harbor inspections • Once cargo spillage emergency response drill per year • 2 jointly supervised harbor safety drills per year	• 1,001 harbor inspections • 1 cargo spillage emergency response drill • 11 jointly supervised harbor safety drills	• 773 harbor inspections • 0 cargo spillage emergency response drill • 13 jointly supervised harbor safety drills
9	Vessels waste	General waste removed and recycling rate in vessels	• waste removed from vessels • waste recycling rate in vessels	100% oily bilge water cleanup	• Waste removed from vessels in Dec 2017: 22.6 ton • Due to contract problems, only the information in Dec was recorded.	• Waste removed from vessels : 504.35 ton • Waste removed from vessels: 100%
10	Dust	Frequency of street washer working and inspection facilities	• Frequency of street washer working • Frequency of inspection facilities	• Street washers should work for 62 times per season at least. • Facilities inspection should implement 4 times per season at least	• Street washers: 248 times • Facilities inspection: 4 times per season	• Street washers: 248 times • Facilities inspection: 4 times per season

Emergency Response

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Emergency Response

Port Emergency Notification and Drill

In order to maintain port safety, Port of Keelung conducts daily land and marine environment inspection. When any suspicious behavior was identified, the inspection personnel will immediately notify for correction or inform competent legal authorities for legal enforcement.

In 2017 and 2018, major port accidents were construction site leakage and vessel collision (no spillage). For port pollution and disaster, Port of Keelung, Keelung City Environmental Protection Department, and the Northern Maritime Affairs Center of Maritime and Port Bureau of MOTC each accepts Public Nuisance Petitions.

Regarding catastrophic events such as vessel or fire explosions, the Port triggers emergency response procedure to cope with disastrous incidence.

Accidental incidents at Keelung Port

Accident type/Year	2017	2018
Vessel collision, shipwreck, fire, oil and other chemical spillage	10	8
Ship machinery breakdown, tilt, strand	10	10
Major warehouse, storage tank explosion, fire, chemical spillage	1	1
Man overboard, occupational accident, sea drifter, others	6	6

Inspection statistics at Keelung Port

Inspection type	2017	2018
Port Environmental Inspection	1,001	773
Pollution Prevention Spot Check	0	0

Port Environment Inspection

To ensure port safety, the Branch Office imposed regulations on bulk stevedoring, increased the management of stevedoring, prevented overloading or leaking, and improved emergency response plans and communication mechanisms.

Keelung Port Drill Records

Date	Drill Record	Content
2017.1.24	Hazardous Cargo shortage and Industrial Pipelines Operation Audit	1. According to the results from “Hazardous Cargo Management System”Port of Keelung conducts unannounced inspections on the management of hazardous goods. 2. As part of the monthly joint safety inspections, Port of Keelung conducts unannounced inspections on the storage of hazardous goods and tracks improvements of companies.
2017.6.14 2017.6.16	Joint Safety Inspection with NMAC in 2017	In accordance with pertaining rules and regulations, Port of Keelung collaborates with the North Maritime Affairs Center (NMAC) of the Maritime and Port Bureau to conduct Joint Safety Inspection.
2018.6.1 2018.6.4	Joint Safety Inspection with NMAC in 2018	In accordance with pertaining rules and regulations, Port of Keelung collaborates with the North Maritime Affairs Center (NMAC) of the Maritime and Port Bureau to conduct Joint Safety Inspection.

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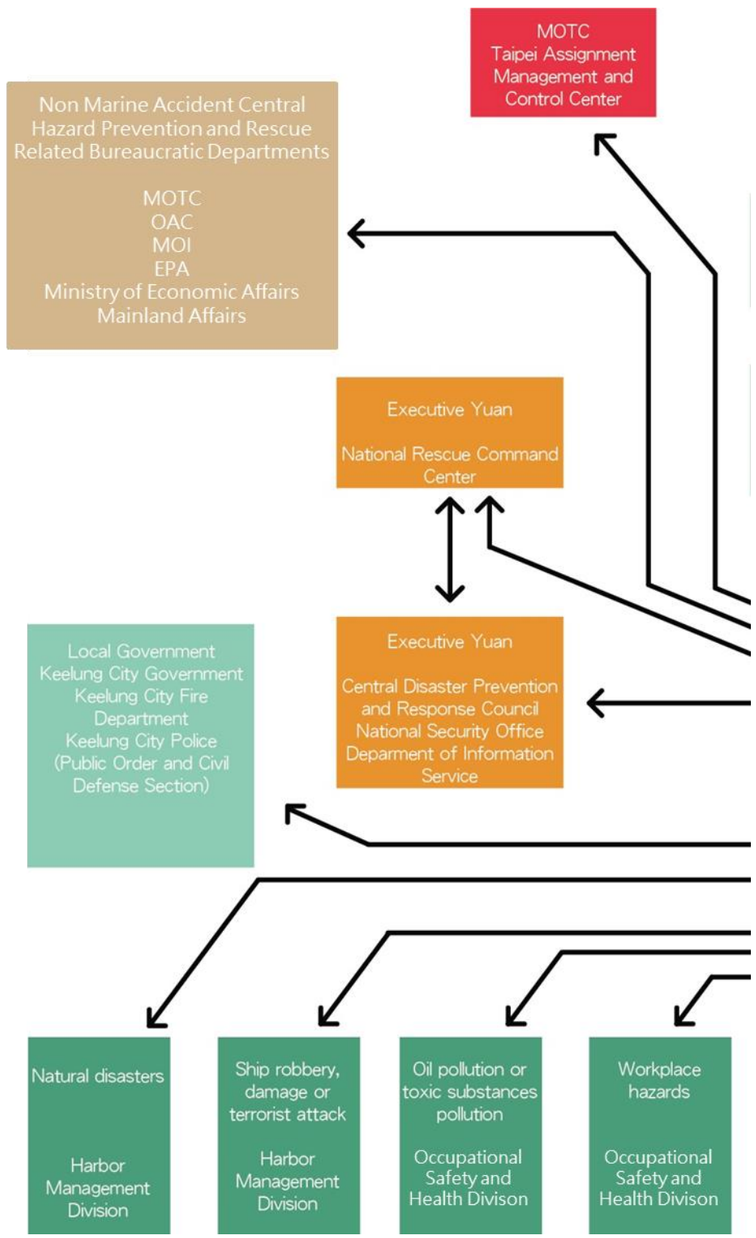
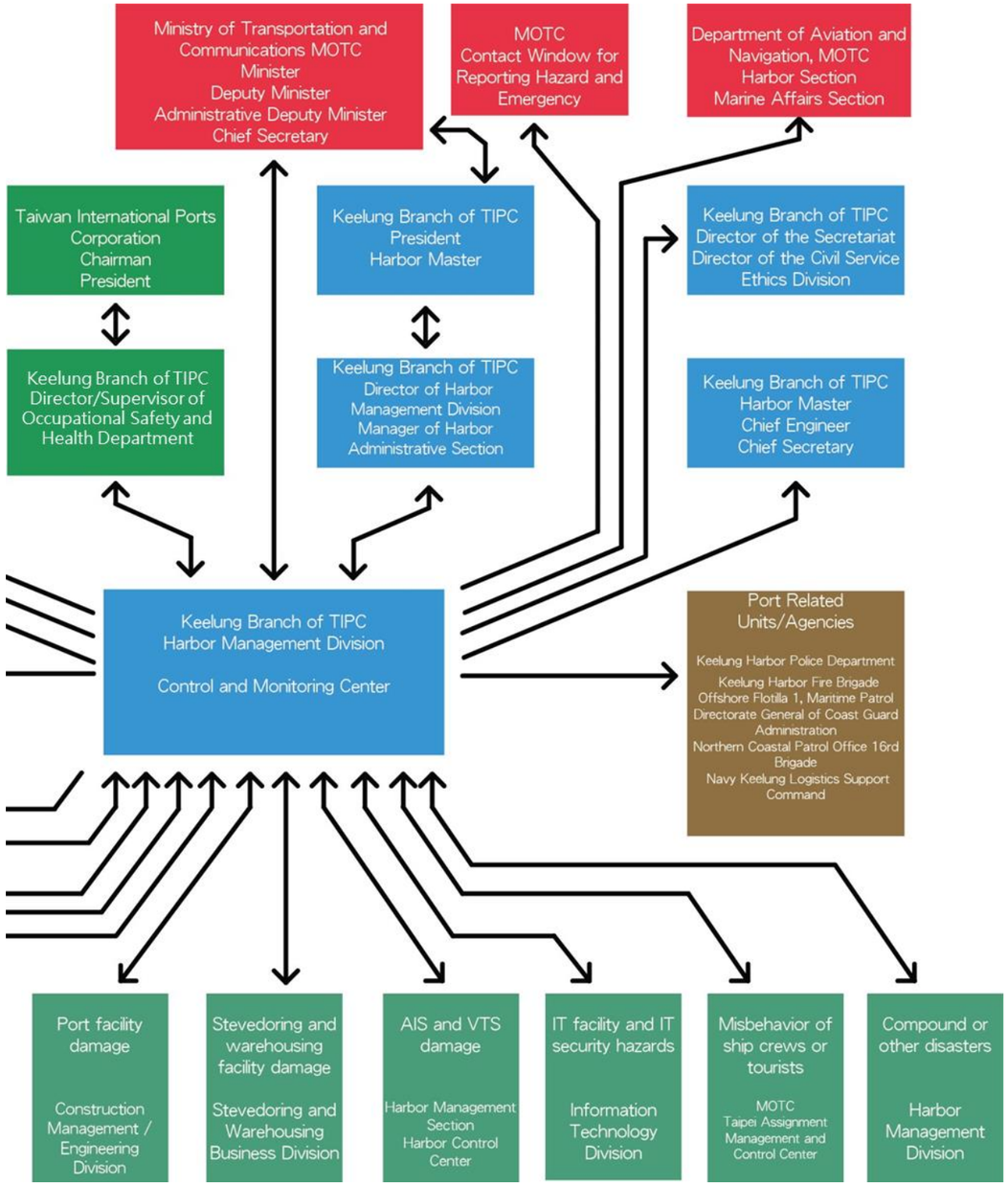
Emergency Response

Emergency Response





Innovation and Collaboration

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Innovation and Collaboration

Innovation

Mutifunctional green building warehouse at West Dock #7 in Port of Keelung Dock #7 in Port of Keelung

Attention/Motives

Port of Keelung faces fierce competition in international shipping market and numerous challenges in port industry. Therefore, in addition to the promotion of construction and shipping projects, which expand the portfolio of the port, Port of Keelung places high emphasis on port logistics to attract international shipping companies. Leveraging the diverse functionalities provided by the warehouse, Port of Keelung seeks to become a leader among international commercial port


候選綠建築證書

建築物名稱：基隆港西七倉庫拆除改建為多功能多用途倉庫興建工程

建築物概要：地上4層鋼骨構造辦公廳、大型空間及住宿類建築

有效期限：自107年7月20日至112年7月19日

評估版本：基本型（2015年版）

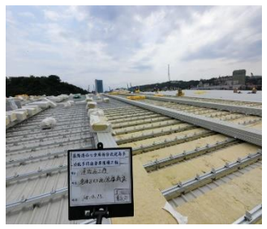
綠建築等級：合格級

內政部 部長

中華民國

Solution

In response to energy conservation and carbon reduction strategy, designs of warehouse at West Dock #7 include natural light/ ventilation, the purchasing of environment-friendly products/ building materials/equipment and reusing dismantled building materials. In addition, costs of maintenance and management have already been incorporated into the plan to prevent a decay in building efficiency and to ensure an as-planned lifespan of the building itself.



Implementation/Timeline

Project launch: Aug.08.2018

Inauguration and start of operation: Dec.28.2019

Investment Amount

Approx. 284 million NTD

Effect/Benefits

- Reuse of removed constructions materials to reduce the amount of waste soil removed from the site
- Planting of 456 sea lettuces and fragrant pittosporums
- Installation of 370 sets of LED light

Environmental Issues

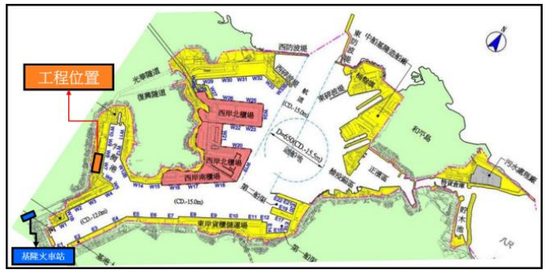
Air quality, trash/harbor waste

Participating Units

Keelung Branch of TIPC

Stakeholders

Port operations unit, the Keelung Harbor Police Department, nearby residents



Construction Site

Building Simulation (left), photo of construction (right)

Keelung Branch of TIPC

Point of Contact: Tong-Chi Li　　Assistant Engineer

Phone: 886-224206373　　Fax: 886-224220657

E-mail: api7298@twport.com.tw

06/

Innovation and Collaboration

Innovation

Certification of Port of Keelung as Environmental Education Site (EES)

Attention/Motives

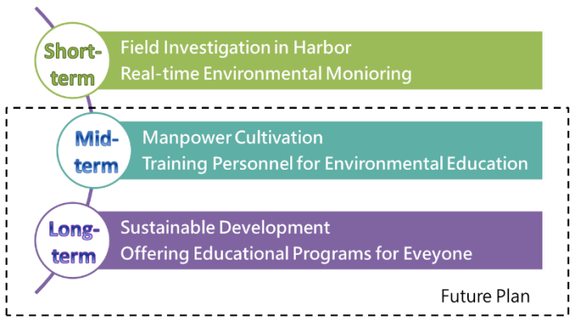
The primary goal of this proposal is for Port of Keelung to seek certification from EPA as an Environmental Education Site (EES). This will raise the profile of Keelung Port as an International Green Port to, and for the Port to become a sense of pride for, the local community. This shall be instrumental in the crafting of a collective identity.

The certification will be followed by the offering of educational programs that raise environmental awareness among the local population and promote environment-friendly practices in various sectors throughout Keelung City.

Solution

The immediate solution is the certification of the Port as an EES. The more long-term goals would involve the marketing of the aforementioned educational programs. The resulting revenue from the said programs will, in turn, support their own sustained operation.

Implementation/Timeline



Investment Amount

Approx. 5.09 million NTD (including field investigation in 2018, monitoring equipment maintenance every year, personnel training and administrative fees for certification. Following certification, the goal is to generate revenue from the programs sufficient for sustained operation.

Effect/Benefits

- Program offers 360 slots per year, with 30 slots per session.
- Program improves the corporate image (demonstrated contribution by the Port to local tourism, public/freight transportation, port environment and community development)
- Raising the environmental profile of the Port to the international community

Environmental Issues

Relationship with the local community, land area development

Participating Units

Keelung branch of TIPC, the Keelung City Government,

Stakeholders

Local population, port operating agency

Field investigation in 2018 (left: black kite / right:: *Aster oldhamii Hemsl*)

Keelung Branch of TIPC

Point of Contact: Yu-Ting Chang Vice Engineer

Phone: 886-224206358 Fax: 886-224223908

E-mail: yuting@twport.com.tw

06/

Innovation and Collaboration

Involvement and Collaboration

The Keelung Port actively collaborates with both domestic and international organizations, including governmental agencies, academics, and industries. Besides sustainable development related exchanges, there are also joint collaboration on technological research, investment, inspection, and academic seminar etc.

International Associations

Association of Pacific Ports(APP)

The APP aims to gather port authorities along the Pacific coast to discuss Pacific marine transporta- tion development, seeking solutions for problems.

The International Association of Ports and Harbors(IAPH)

The IAPH is a NGO with tre- mendous 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 altern- ately in America, Asian Pacific, and European and African regions

Shanghai International Port Co., Ltd

TIPC began working with Shanghai International Port Co. in 2014 to boost technical standards at the two ports. The focus of this collaboration is on the exchange of information concerning equipment maintenance, green energy, environmental protection, and new technical applications.

Ports

Port of Dover

In 2011, the Port of Keelung, TIPC signed a memorandum of cooperation with the Port of Dover, which established a long-term relationship between the two parties in the areas of port risk management system deployment, risk management equipment development, safety management system development and audits, technical training, support, and environmental management systems.

Port of Hakata

The port of Hakata has been actively improving port affairs, IT systems, and relevant environ- mental protection measures in partnership with TIPC since 2014. For example, the ports have exchanged information on electrical RTG cranes, sunshades for mobile refrigerated containers, and hybrid straddle carriers.

Port of Yatsushiro

On August 10, 2015, Port of Keelung began sister port relations with Yatsushiro Port, becoming port partners. Together, they developed new shipping lines for container ships and cruise ships and mutually exchanged and cooperated in various areas, such as economies related to the development of the two ports.

Academic Institutions

National Taiwan Ocean University

National Sun Yet-Sen University

National Cheng Kung University

In order to enhance international competitiveness and transportation quality, create a sound educational and academic research environment, and allow the port and educational institutions to prosper together, Taiwan International Ports Corporation signed a memorandum of cooperation with three public universities in 2012. In the future, the parties to the memorandum will be involved in academic exchanges, research and development, cooperative undertakings between companies and educational institutions, education and training, student internships, and port operation seminars. In addition to enhancing training quality, the educational institutions involved can also provide intelligence to port affairs companies, and thus play an active role in assisting practical port management and operations, which will achieve a win- win outcome.

06/

Innovation and Collaboration

Involvement and Collaboration

The Keelung Port actively collaborates with both domestic and international organizations, including governmental agencies, academics, and industries. Besides sustainable development related exchanges, there are also joint collaboration on technological research, investment, inspection, and academic seminar etc.

Government and Association

Institute of Transportation, MOTC

The Institute of Transportation has conducted research projects on such subjects as “Congestion Relief,” “Capacity Increase,” “Expansion and Use of Current Transportation Facilities,” and “Establishing a Long Term Transportation Development Plan.” In the past, the Port of Keelung, TIPC worked with the Institute of Transportation on many projects such as “How factors of port areas services in Keelung harbor affect cruise passengers’ satisfaction " and " The real-time acoustic wave and current profile monitoring system,” etc.

Environmental Protection Administration

The EPA, Executive Yuan collaborates with the US EPA in accordance with the “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 Environ- mental Protection (1993)," and this partnership has led to development of a series of strategies relating to port environmental issues.

Ocean Affairs Council

To promote multilateral negotiation between Central and Local Governments, Ocean Affairs Council was inaugurated in 2018 and , serving as the official governing body in charge of the planning(“Smart Monitoring System in Harbor Establishment Project”), coordination and implementation of marine-related policies.

Government and Association

North Maritime Affairs Center

North Maritime Affairs Center, Maritime and Port Bureau, MOTC is in charge of Port safety, disaster rescue, pollution prevention services, responsible of decree execution, evidence collection, conducts joint spot check and pollution prevention drills.

Bureau of Environmental Protection, Keelung City

The Port of Keelung, TIPC and the Bureau of Environmental Protection of Keelung City collaborate in regular joint audits and drills in the port areas, and together assist the EPA in organizing relevant meetings and drafting proposals.

Wild Bird Society of Keelung

The Port of Keelung, TIPC has allowed the Wild Bird Society of Keelung to conduct an observation plan in the port's aquatic areas as part of a project to reconstruct black kite ecology at Keelung port.

Joint Safety Inspection with NMAC

Training

07/

07/

Training

Employee Education

In compliance with its environmental policies, the Keelung Port provides suitable environmental education and training programs to raise environ- mental awareness, and improve the competitiveness of the Port of Keelung.

In 2017 and 2018, Keelung Port organized in total 42 environmental education courses for its staff members. The total learning hours exceeded 200 hours. The course content included the viewing of films, school and social environmental education, and information about disaster prevention and response, nature conservation, pollution prevention and control, environment and resource management and GHG accounting.

(Left) Environmental education courses

(Right) Key Infrastructure Protection Drill

The course on “External Environmental Risk Management System”

The drill in precaution against typhoon

Activity of Safety and Health Week

National Disaster Drill

Communication and Publication

08/

08/

Communication and Publication

Communication and Publication

Promotion activities, seminars, workshops, publication, websites, and exhibitions have been organized to align Keelung Port with contractors and potential partners. Therefore, publishing relevant information of the port is helpful to the public, port companies, academic institutions, and subsidiary units.

Activity of beach cleansing

Activity of book floating (sharing) in 2017/2018

Activity of mountain cleansing

Presentation of cruises liners at Keelung Port

08/

Communication and Publication

Communication and Publication

Promotion activities, seminars, workshops, publication, websites, and exhibitions have been organized to align Keelung Port with contractors and potential partners. Therefore, publishing the port' s relevant information is helpful to the public, port companies, academic institutions, and subsidiary units.

Joint Donation for charities

Keelung Maritime Festival in 2017/2018

Charity event "Oh My Princess!" for breast cancer patients

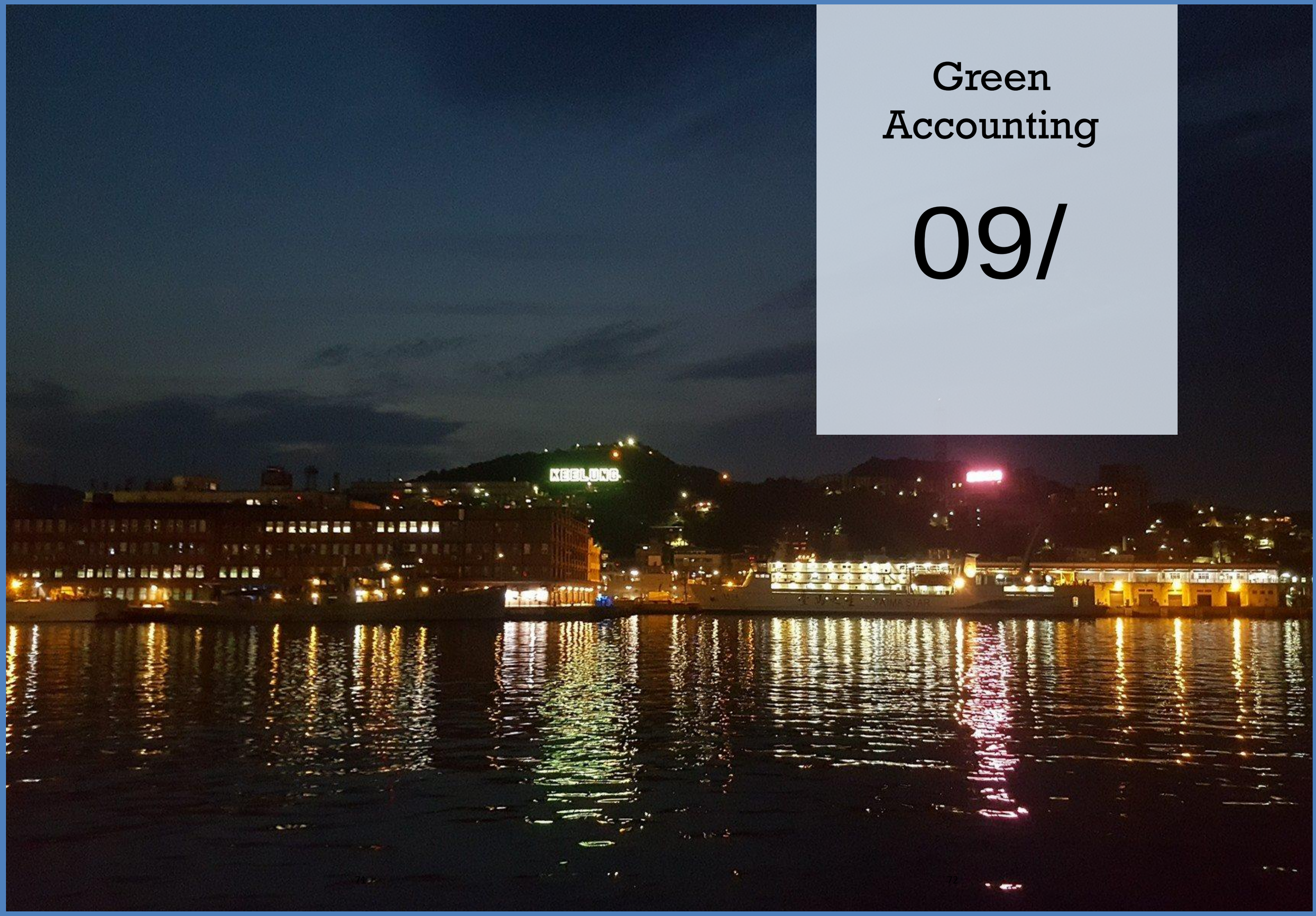
Forum for Harbor Activities in Northern Taiwan

Orientation for recruiting processing manufacturers in 2017

QR code for introduction video of Oh My Princess!

QR code for *Annual Statistical Reports* of TIPC

QR code for facebook fan page of the branch of Keelung, TIPC



Green Accounting

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Green Accounting

Environmental Costs

The investments made by the Port of Keelung, TIPC pertaining to the environmental issues can be primarily divided into employees, environmental maintenance and management, environmental monitoring, publications, and emergency response and communication. The objectives are to improve employee' s awareness of the environment, maintain and improve the quality of the port environment, enhance the emergency response capability, and elevate the public' s knowledge of the port.

The total cost expended by the Port of Keelung, TIPC for the environmental issues was € 1,134,355 and € 1,501,003 in 2017 and 2018, respectively.

Costs related to environmental issues at Keelung Port (Unit: k€)

Items of Expenses	2017	2018
Personnel	423.09	604.73
Environmental Maintenance & Management	624.18	765.47
Environmental Monitoring	72.72	121.29
Pollutuion removal tools	12.64	7.79
Communication & Publication	1.72	1.72
Total	1,134.35	1,501.03

Environmental Investments at Keelung Port

- Employees: Personnel expenses for those involved in environment- operations education, employee education and training, etc.
- Environmental maintenance and management: Port area greening and landscaping, removing wastes, dredging port berths, etc.
- Environmental monitoring: aspects such as air, nose, water quality, sediment, and dredging as well as environmental inspections
- Emergency response: Costs for accident management at the port area as well as for purchasing pollution removal materials
- Communication and publications: Costs for maintaining websites, holding promotional activities, printing environmental publications, etc.

Environmental Assets

Port of Keelung, TIPC has implemented a series of harbor development projects for Keelung Port to develop into a hub for cross-strait cargo ships and international cruises, Pan-Pacific logistics and distribution center and an environment-friendly green port. These projects can be further divided into development plan and plan for general construction and equipment purchase. In 2017 and 2018, the respective amounts of fixed-asset investment toward environmental issues made by Port of Keelung TIPC were €10,126,561 and € 8,579,541, as following:

Year	Project/ Item	Fee (k€)
2017	The improvement project for the drainage of Donghai St.	110.74
	The improvement project for the drainage of Ln. 36, Zhongshan 2nd Rd	10.08
	The improvement project for the drainage at the West Duck #2 in Port of Keelung.	52.72
	The improvement project for fire water pipings at the Ship and Machinery Department, Port of Keelung	24.06
	The construction of multifunctional warehouse at the West Duck #16 in Port of Keelung.	9,727.79
	The construction of waste removal in the warehouse at the West Duck #3 in Port of Keelung.	20.63
	Street sweeper (15 tons)	180.51
	Total	10,126.56
2018	The dredge project for Port of Keelung in 2018	243.55
	Establishment of the power, air condition and fire control system in the Keelung Harbor Building	166.73
	The continue construction of multifunctional warehouses at West Dock #7 in Port of Keelung	8,151.86
	The desilting project from No.100, Ren' an St. to West Dock #21 in Port of Keelung	17.39
	Total	8,579.54

Improvement Recommendation

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Sustainable operation is vital to Port of Keelung. Because the port adjoins Keelung City, Port of Keelung commits itself to cooperating with the local government and building a solid relationship with the locals to reshape the city into a world-class, ecofriendly port city.

Port of Keelung seeks to emulate the manner in which global ports are operated by diversifying its business based on its core port services while ensuring economic and environmental sustainability and undertaking social responsibility. This enables it to reshape Keelung into a more hospitable port city, enhance the port’ s reputation, and create a win-win situation for itself and the local government, businesses, and residents.