
Port of Kaohsiung - Reconnecting the Port and City
Master Plan for Future Development and Construction, 2017-2021


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The Intercontinental Container Terminal Project
Port Reinvention Project

The Port of Kaohsiung is Taiwan's largest international commercial port, with more than 10 million TEU per year. It is also located in the most populous city in southern Taiwan. In addition to Taiwan's 2013 Green Port policy, the Port of Kaohsiung is the first port in Asia to receive the EcoPorts Certificate. Since heavy industry and urban development increase conflicts between the port and city, the vision of this 2017-2021 comprehensive master-plan is to install resilient infrastructure and implement environmentally friendly technologies on one hand, and increase the community outreach and port-city dialogue on the other. This master-plan demonstrates how to achieve the goal of economic development with the climate and environmental issues concerned through 2 major projects: the second phase of the Intercontinental Container Terminal Project and the Port Reinvention Project. These projects' synergy creates a new way to think about the port city's development as a whole, and enhances the UN's SDGs.

Background

The Port of Kaohsiung, Taiwan's largest international commercial harbor, is located on the southwest coast of Taiwan (22°27' north latitude and 120°10' East longitude). In addition to serving as a container transshipment hub port, it is also the major port in Taiwan for bulk cargo import and export. To cooperate with the government's strong efforts to further economic growth, the Port of Kaohsiung must play a more aggressive role in the global economic and shipping market.

The objective of this comprehensive plan is to strengthen the hub port's competitive position in the Asia-Pacific region and as the best service port in Asia. Targets include increasing container, bulk cargo, and passenger transportation; improving port operations and management; and implementing sustainable and green port management.

After the completion of this plan, it will be possible to solve the problem of relocating the CNPC No. 5 Light Industry Company, assist petrochemical companies in leaving the old port area, and build port facilities that are more suitable for modern container shipping. It will also provide the most critical land in conjunction with the city. Identifying how to use the opportunity to reshape the old port and reopen the dialogue between the city and the port is the focus of this project.

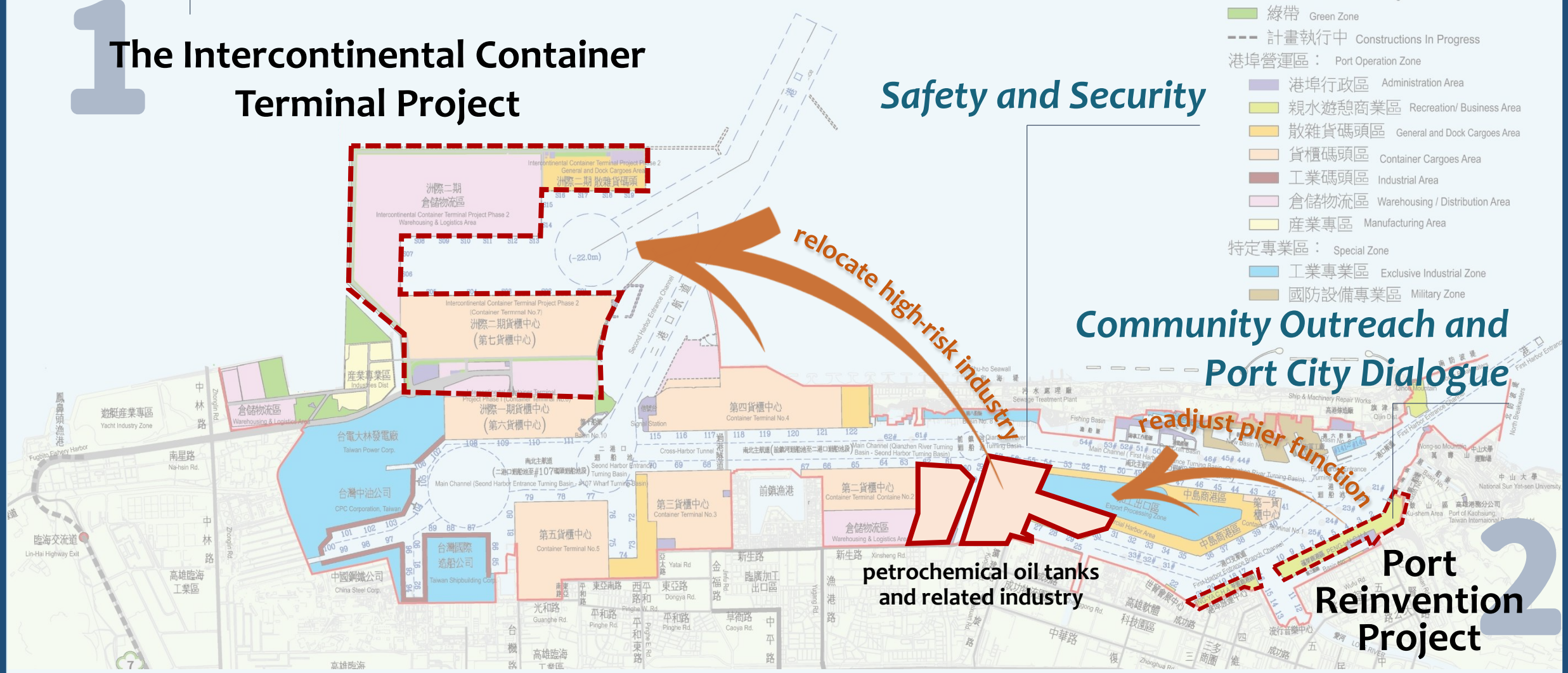

PORT
CITY

Climate and Energy Resilient Infrastructure

1 The Intercontinental Container Terminal Project

Safety and Security

Community Outreach and Port City Dialogue



2 Port Reinvention Project

Challenges

No available shoreline in the port for future development

After years of construction in the Port of Kaohsiung, the local coastline has been almost exhausted, and it is no longer possible to build other terminals in the port area. It is necessary to open a new port area to the outer port and redevelop the shoreline.

Insufficient hinterland and limited development in the port area

In the recent years, the connection between the port and related industries has increased. Some industries have integrated distribution, sub-assembly, and processing operations in the port or neighboring areas, which has increased the demand for hinterland and integrated spatial planning. In addition to the redevelopment and utilization of the land in the old port area, determining how to actively expand the port area to the sea, create new land to meet the needs of the port development, and maintain sustainable development is indeed an urgent need for the next generation of the Port of Kaohsiung.

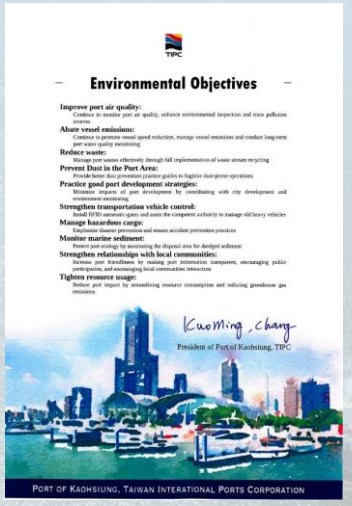
High-risk petrochemical oil storage and related facilities in the old port area

Part of the petrochemical terminal is located at the fourth canal. Given the limited space, not only is it incapable of meeting the original berthing design for the 15,000 DWT ship type, but it also restricts the expansion of the ship type and capacity. Moreover, there are currently more than 300 petrochemical oil storage tanks and operating facilities scattered throughout Zhongdao District, which is close to the core of Kaohsiung City, increasing the risk of disaster.

Lack of integrity in the port-city future development

The Port's existing petrochemical area, fishing ports, and container terminals have been in line with the needs of industrial development for many years. However, the configuration and use of the terminals lack integrity. The terminal areas are separated from each other, and shorelines with identical functions cannot be configured coherently. The ineffective use of land allocation not only affects the efficiency of operations, but also causes many inconveniences in management. Because almost all the hinterland has been developed and occupied, there is no buffer space between the port and the city. The comprehensive port master plan can therefore be a chance to reintegrate the port city area and make port operations more efficient and sustainable.

Environmental Policy & Objectives



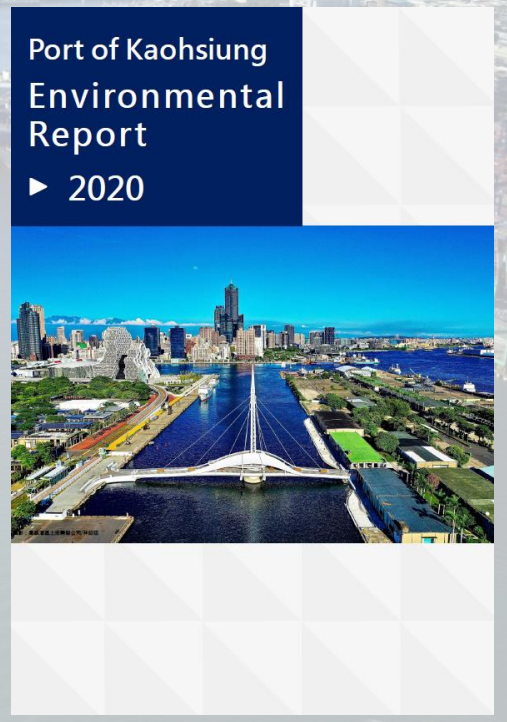
Environmental Report

2012-2013

2014-2015

2016-2017

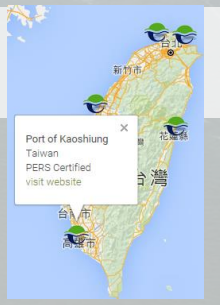
2018-2019



Environmental Commitment

The Port of Kaohsiung is the first port in Asia to receive the EcoPorts Certificate (PERS) in 2013

EcoPorts Certificate (PERS) was renewed in 2015, 2017, 2019



Impact

The comprehensive plan has profound impacts on the Port of Kaohsiung, including industry, economy, urban development, and sustainability. It is likely to bring a brand new look to Kaohsiung Port City and lay the foundation for industrial development in the southern Taiwan. Below are some of the impacts:

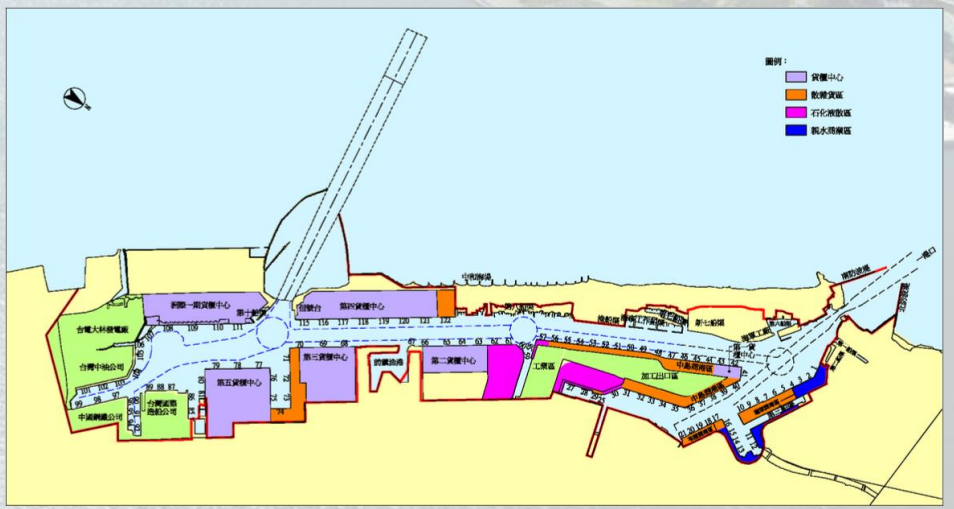
- Enhance the competitiveness of the Port of Kaohsiung
- Drive the fundamental changes of the Port of Kaohsiung

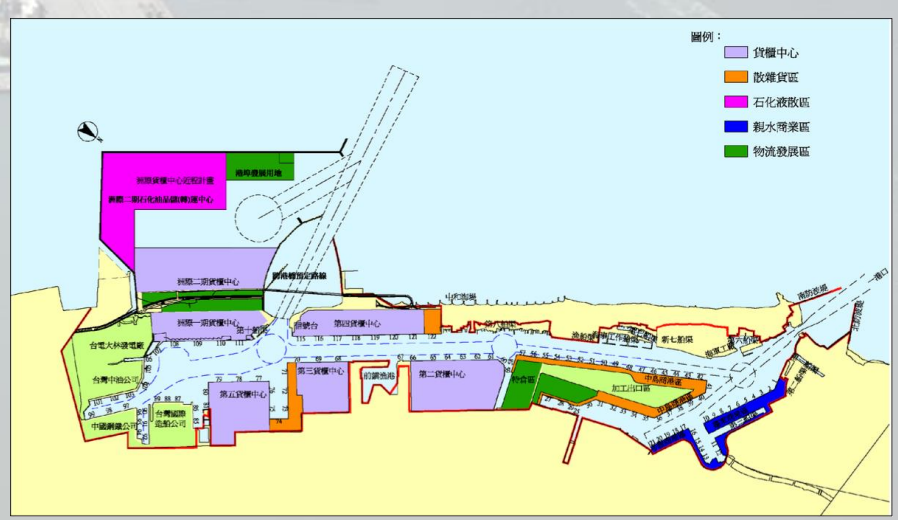
Enhance the competitiveness of the Port of Kaohsiung

This plan entails building a new modern container base to enable future huge container ships to enter the port, increase the energy supply for the container terminal, and promote the convenience and competitiveness of the Port of Kaohsiung. To face the fierce competition among Asia countries, the Port will continue to consolidate its position as a container shipping hub in the Asia-Pacific region with environmental friendly facilities.

Drive the fundamental changes of the Port of Kaohsiung

After the development of this project is completed, petrochemical oil storage and related facilities will be able to relocate smoothly, existing pier functions will be re-adjusted, and homogeneous terminals will be integrated to improve management and infrastructure efficiency. The project is expected to drive strong manufacturing value-added capabilities such as export processing zones, industrial zones, and petrochemical parks around the port area and to further utilize the convenience of port transportation to drive the development of industries in southern Taiwan. In addition, this plan will have a series of related effects on the related logistic chains and drive the fundamental changes at the Port of Kaohsiung. The reinvention of the old port area can reconnect the port and the city and bring the city back to the waterfront.





1 The Intercontinental Container Terminal Project (Phase II)

Innovation and sustainable engineering

Innovation and sustainable engineering:
Intercontinental Container Terminal Project Phase II

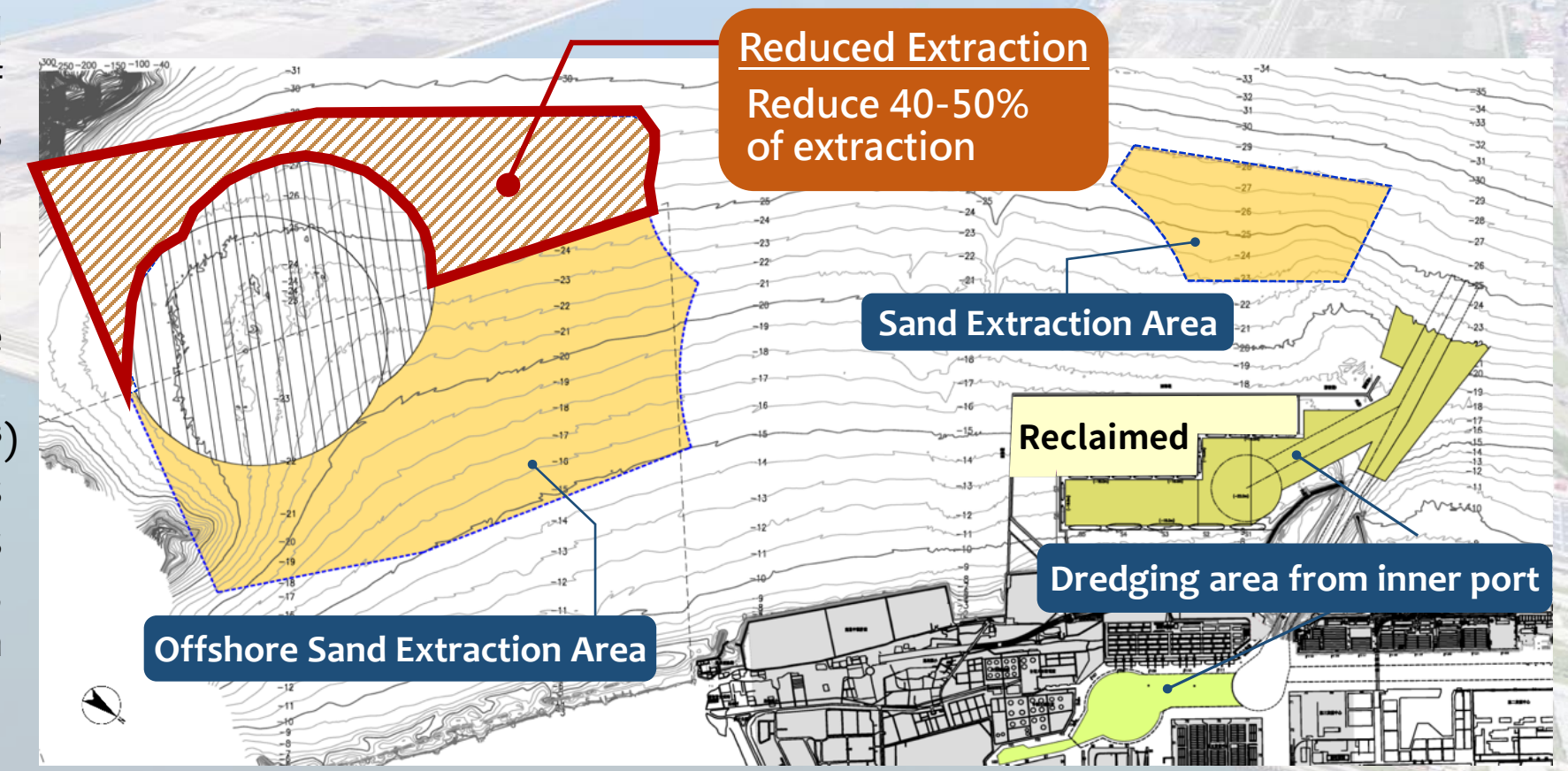
The second phase of the Intercontinental Container Terminal Project includes three major main works: the outer embankment, the shoreline, and new land reclamation. Among them, the new land reclamation project has a total backfill area of 232 ha and a total filling volume of 40.52 million m^3. It is a large-scale dredging, sand pumping, sea reclamation, and land reclamation project in recent years in Taiwan. It includes various environmental friendly strategies from design to implementation.

Innovation and sustainable engineering

Sustainable Design

1) Reuse of dredged earthworks

Based on the environmental assessment, the source of the sand for this project was originally the offshore sand extraction area. The design reused the dredged material from inner port, reducing the amount of sand pumped from the sea (16.82 million m^3) and the number of voyages between offshore locations and the construction site, effectively reducing carbon dioxide emissions.



Innovation and sustainable engineering

Sustainable Design

2) Working ship and machine selection

The reclamation construction project had its own power ship to accelerate the construction rate. Use of closed pipelines can not only reduce pollution from engineering waste, but can also reduce the carbon dioxide emitted during the construction process, which has a considerable impact on construction quality, energy savings, and carbon reduction.

3) Carbon reduction effect

Based on calculations for using the largest self-propelled and self-carrying trailing suction dredger (7,000m³) to fetch sand from the offshore sand collection area, it is estimated the total carbon reduction of this project is about 73,287 tons of CO_2.

4,000m³/hr

Hydraulic Dredger

high safety
high economic benefit
high feasibility

closed pipeline transportation

shorten the construction period

73,287 tons CO_2 reduced

=

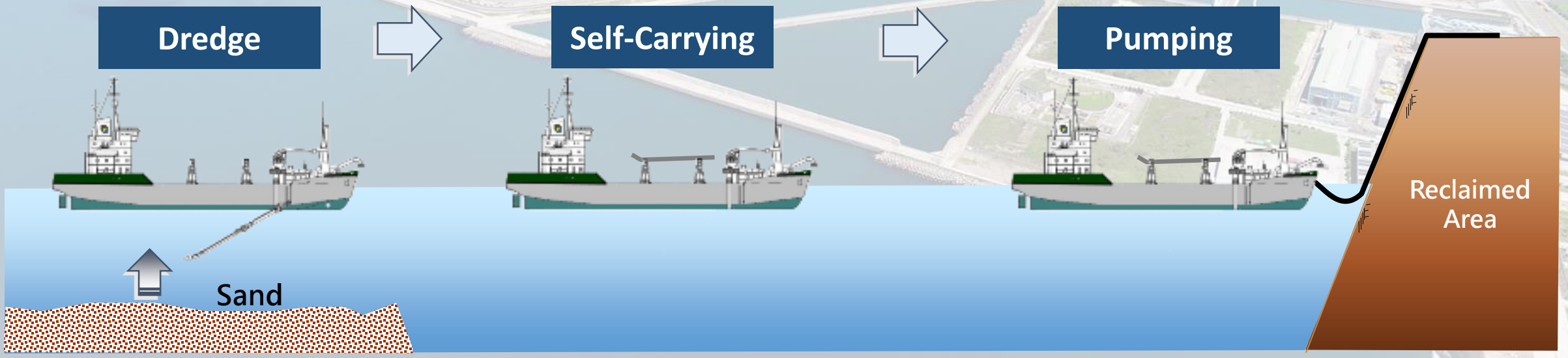
Innovation and sustainable engineering

Environmentally Friendly Construction

1) Adoption of advanced large self-propelled self-carrying trail suction dredger

Utilizing the dynamic characteristics of dredgers, the trailing suction method uniformly collects sand from specific zones to avoid short-term major changes in coastal terrain.

- Protect shoreline
- Reduce drifting sand caused by dredging
- Control water and air quality

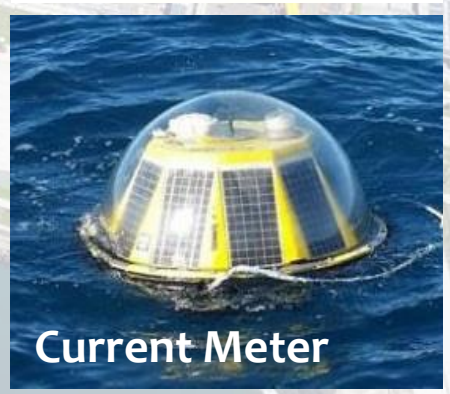


Innovation and sustainable engineering

Environmentally Friendly Construction

2) Application of solar power to construction equipment

- Measuring Equipment
- Hydraulic Equipment of Sand Discharge Pipe
- Current Meter



Innovation and sustainable engineering

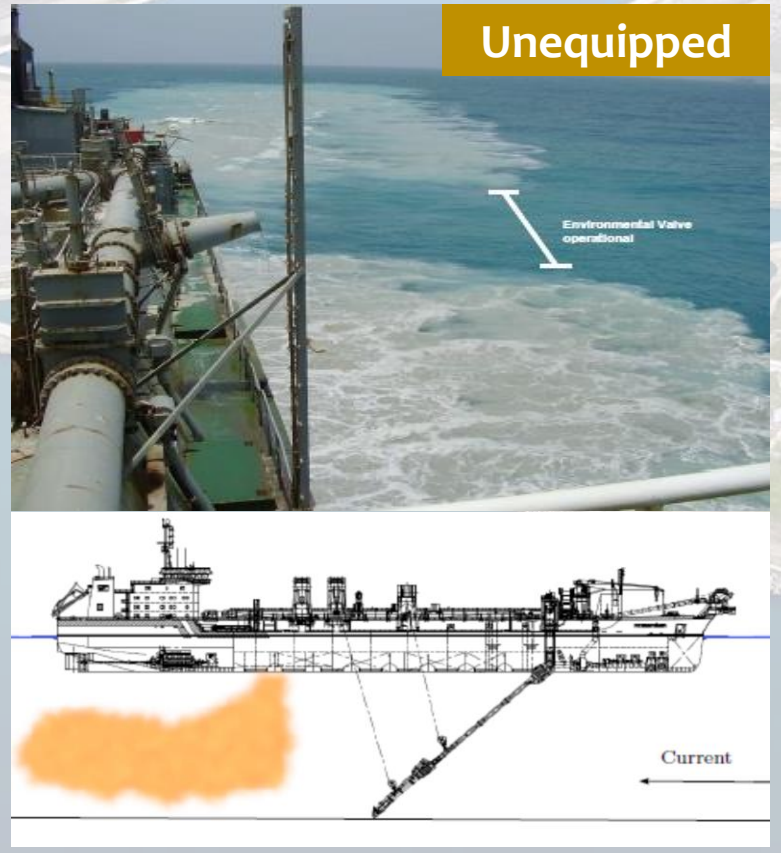
Environmentally Friendly Construction

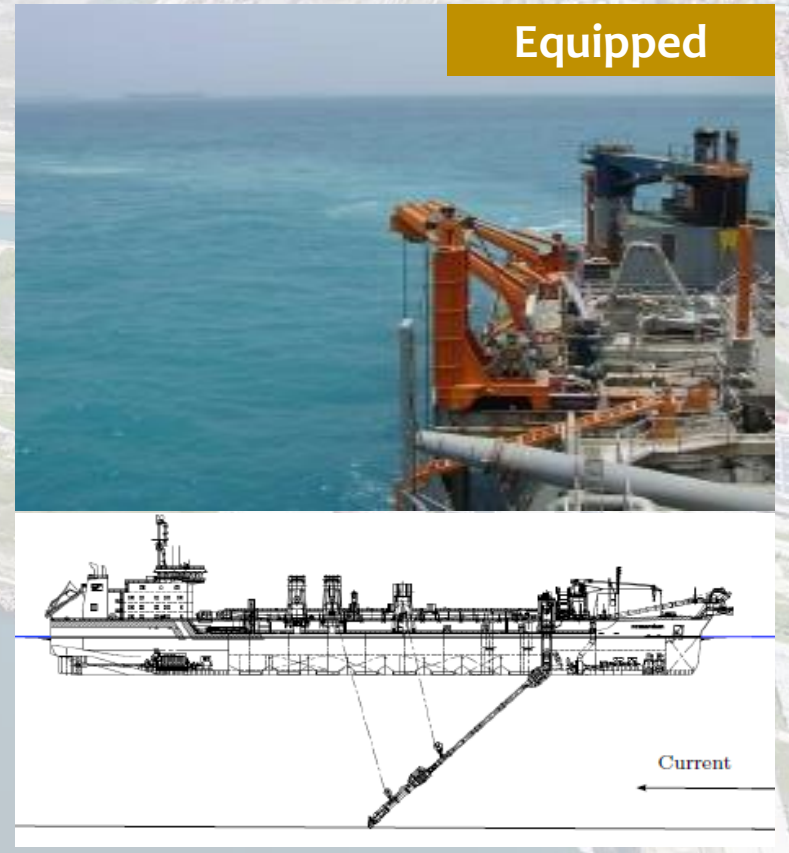
3) Environmental and Ecological Conservation

- **Control water quality** and drifting sand caused by offshore dredging

  The trailing suction dredger is equipped with a “green valve” to ease turbulence and reduce the turbidity of the discharged water.

- **Protect marine ecology**





Innovation and sustainable engineering

Environmentally Friendly Construction

3) Environmental and Ecological Conservation

- **Control water quality** and drifting sand **inside** the reclaimed area
- An energy dissipating bucket is positioned at the outlet of the sand discharge pipe to quickly deposit the filling granules; a dirt prevention curtain is installed near the filling area to prevent the fine granules from floating out
- Control facility on the discharge outlet (Water Box)
- After the reclaimed area is in a closed state, the Water Box drainage system is used instead of pump drainage so that **trapped fish, crabs, and other marine creatures can escape through the outlet waterway**

Cooking Pot

Water Pollution Prevention Membrane (silt curtain)

Outfall Sedimentation Control Box

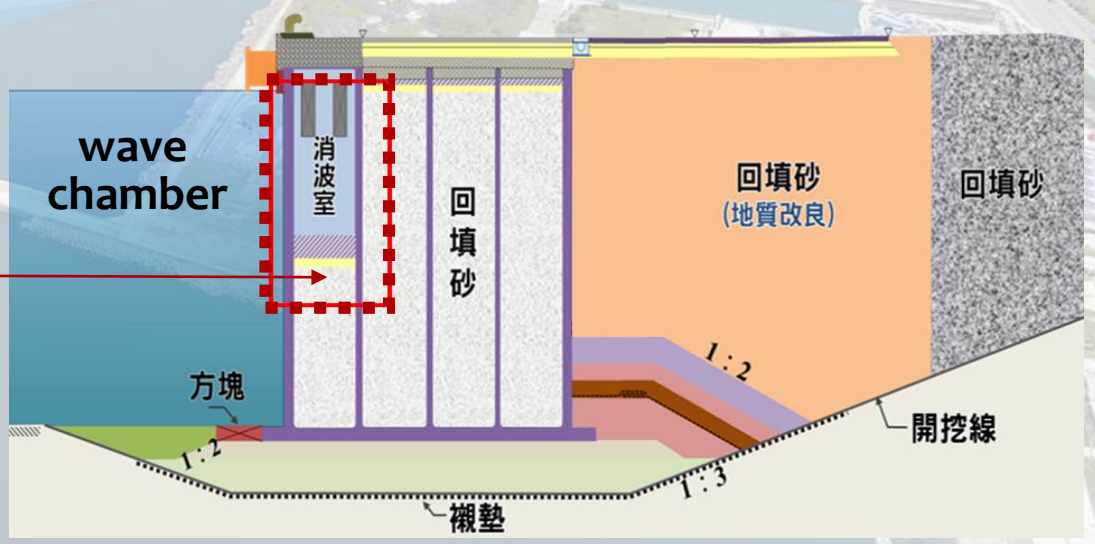
Innovation and sustainable engineering

Environmentally Friendly Construction

3) Environmental and Ecological Conservation

- **Install wave chamber** to dissipate wave energy and increases biodiversity in its vicinity
  - the wave chamber can dissipate wave energy, and increase the loading efficiency of the port
  - provide the habitat of fish, shrimp etc.

interior of the wave chamber

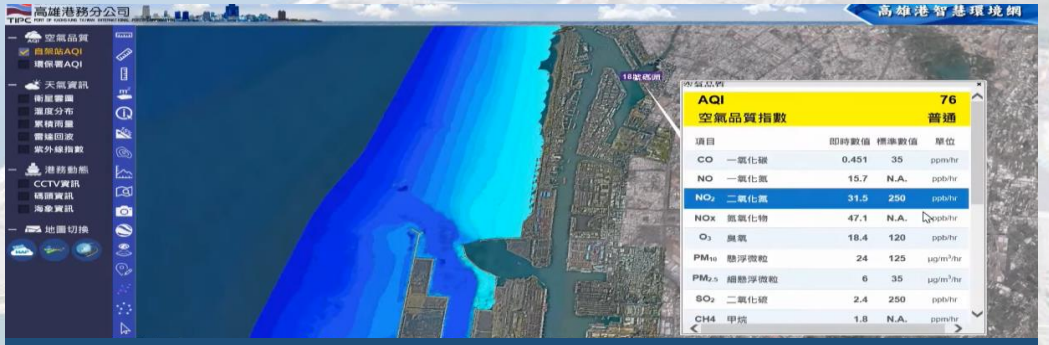


Innovation and sustainable engineering

Environmentally Friendly Construction

3) Environmental and Ecological Conservation

- **Control air pollution and dust** in the reclaimed area: dust nets are laid, and water is sprayed by a water truck to control air pollution
- **Smart Environmental Monitoring Network**
  - reducing the response time of pollution notifications
  - provide port environment information for vessels to enter or exit the port, for navigation, and for handling cargo so as to ensure the safety of piloting and cargo handling
  - cooperating with the Emergency Operation Center



Real-Time Air Quality Index (AQI)

Water Spraying

Anti-dust (dust-proof) mesh

Innovation and sustainable engineering

Healthy Port-City Environment

1) Monitor and Reduce Water & Sediment Pollution

2) Control Land Mobile Pollution Source

- reduce carbon emission from heavy trucks through automatic gate lanes
- diesel vehicle self-management

2019

Carbon

1,653,264 kg emission reduced

Port Reinvention Project

Community Outreach and Port City Dialogue

Port Reinvention Project

The port development policies are aimed at creating a sustainable green port. Therefore, the compatibility with the environment and the urban area of Kaohsiung City is considered during various phases of port development and construction. The Port of Kaohsiung aims to cultivate a public friendly waterfront, and bring good living quality to citizen.

Overall Regeneration Plan

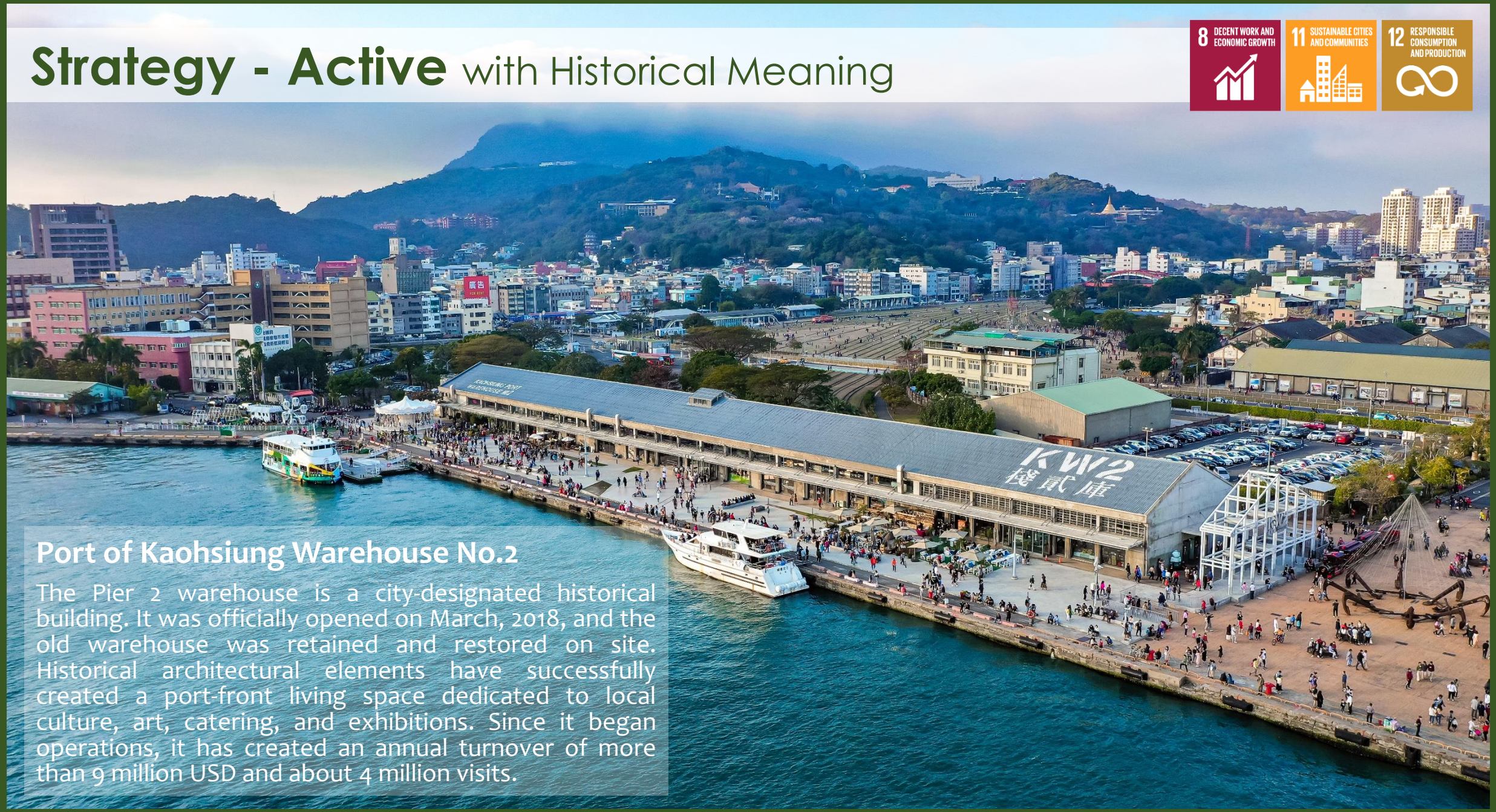
The TIPC and Port of Kaohsiung Land Development Co., Ltd., are currently promoting the development plan of the overall regeneration in the Kaohsiung Multi-Functional Economic Park. New activities and industries can be injected into Kaohsiung Port City, which will drive the regional developments and create sustainable value.

7 AFFORDABLE AND CLEAN ENERGY

8 DECENT WORK AND ECONOMIC GROWTH

11 SUSTAINABLE CITIES AND COMMUNITIES

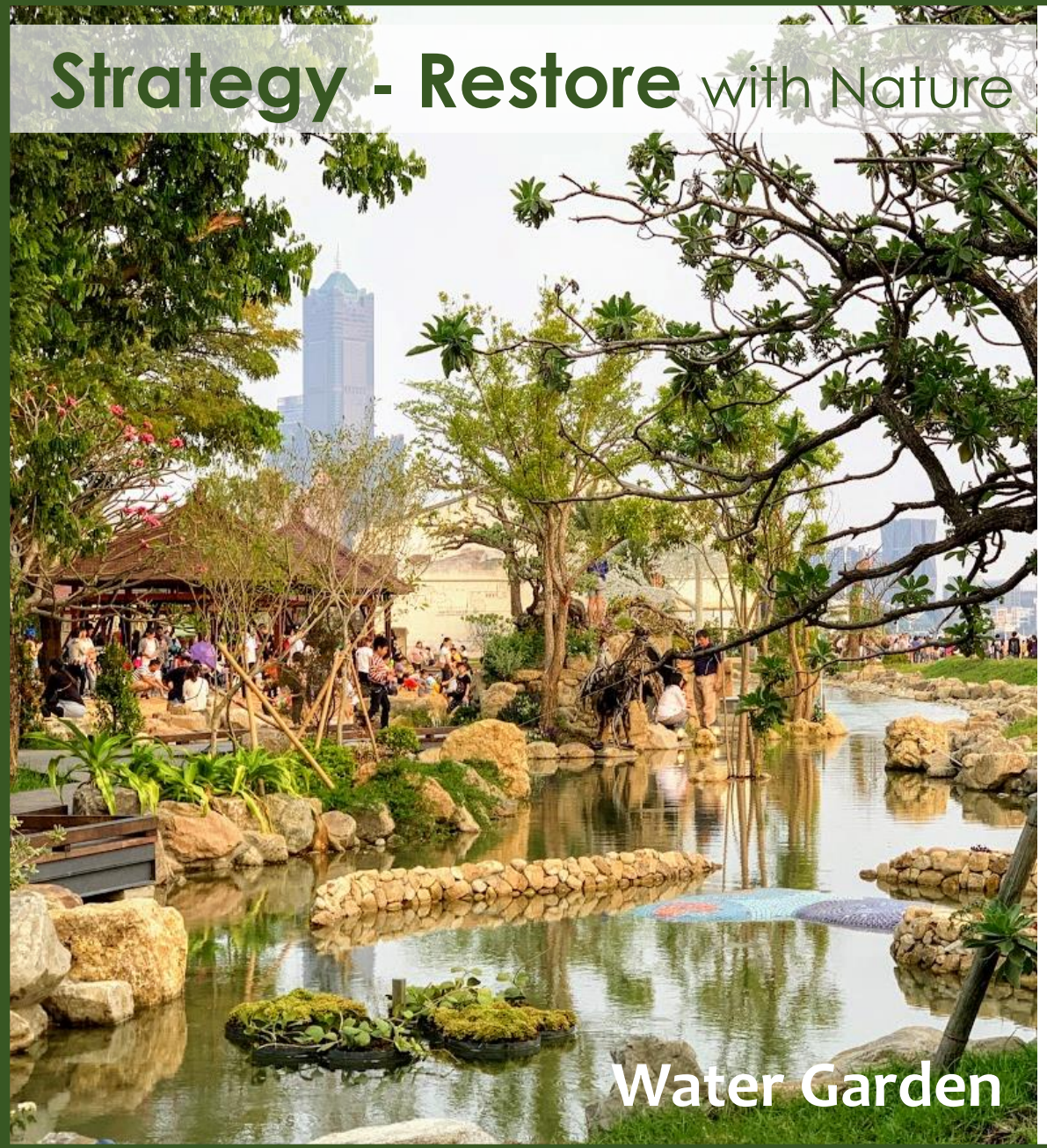
Strategy - Active with Historical Meaning



Port of Kaohsiung Warehouse No.2

The Pier 2 warehouse is a city-designated historical building. It was officially opened on March, 2018, and the old warehouse was retained and restored on site. Historical architectural elements have successfully created a port-front living space dedicated to local culture, art, catering, and exhibitions. Since it began operations, it has created an annual turnover of more than 9 million USD and about 4 million visits.

Strategy - Restore with Nature



Water Garden

To cooperate with the urban and port area drainage projects and carry out plant transplantation in the port area, the TIPC built a 4,300 m² water garden. More than 50,000 landscaping plants were planted in the water garden to create a secret tropical garden. Traditionally, port is a forbidden area that is difficult for the public to access. The opening of the warehouses and water garden means that, for the first time in a hundred years, the public can come to the port for leisure activities. The multi-level recreational space creates romance and surprises. In conjunction with the overall regeneration for of the warehouse complex, citizens and tourists will experience the most beautiful landscapes in Kaohsiung Port City.

Strategy - Connect the port and City

Great Harbor Bridge

The newly constructed bridge located in the Port of Kaohsiung's third ship channel is the longest cross-port revolving bridge in Asia. There have been 1.5 million visits. The Great Harbor Bridge is adjacent to the Kaohsiung Light Rail and is one of the key features in the waterfront corridor of Kaohsiung's Asia New Bay Area.

Strategy - Cooperate

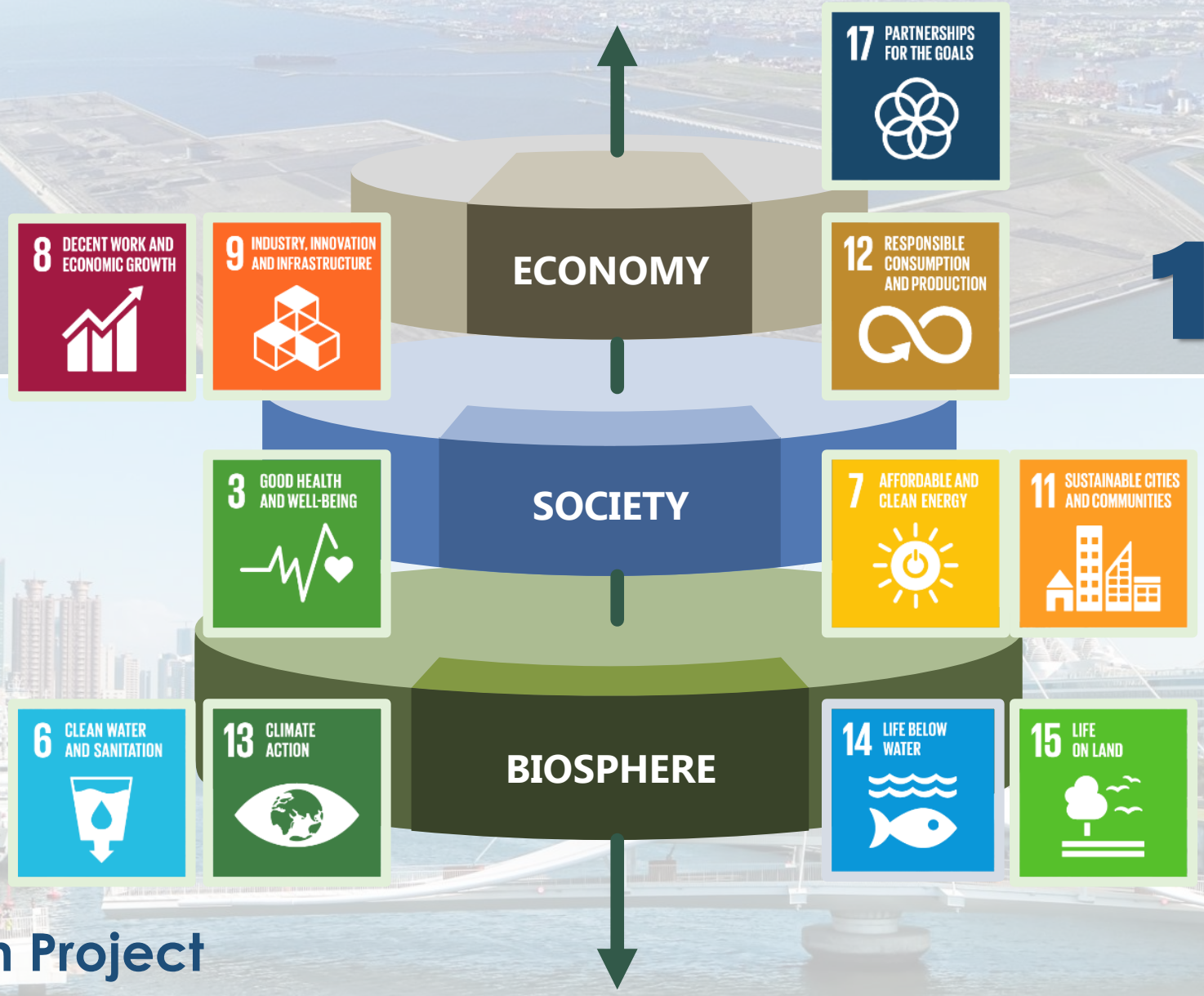
through Port and City Platform

11 SUSTAINABLE CITIES AND COMMUNITIES

17 PARTNERSHIPS FOR THE GOALS

The old area of the Port of Kaohsiung includes critical historical features and cultural connotations. To revive, transform and activate the old port area to create an accessible waterfront, the port authority, TIPC, and the Kaohsiung City Government coordinated to establish the Port of Kaohsiung Land Development Co., Ltd. This communication platform will accelerate the development and reinvention of the old port area, maximize the benefits and value, and create a win-win situation for the port and the city.

The Intercontinental Container Terminal Project



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Port Reinvention Project

Port of Kaohsiung

Reconnecting the Port and City