Kaohsiung
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Kaohsiung City Government

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Kaohsiung

Responding to Climate Change

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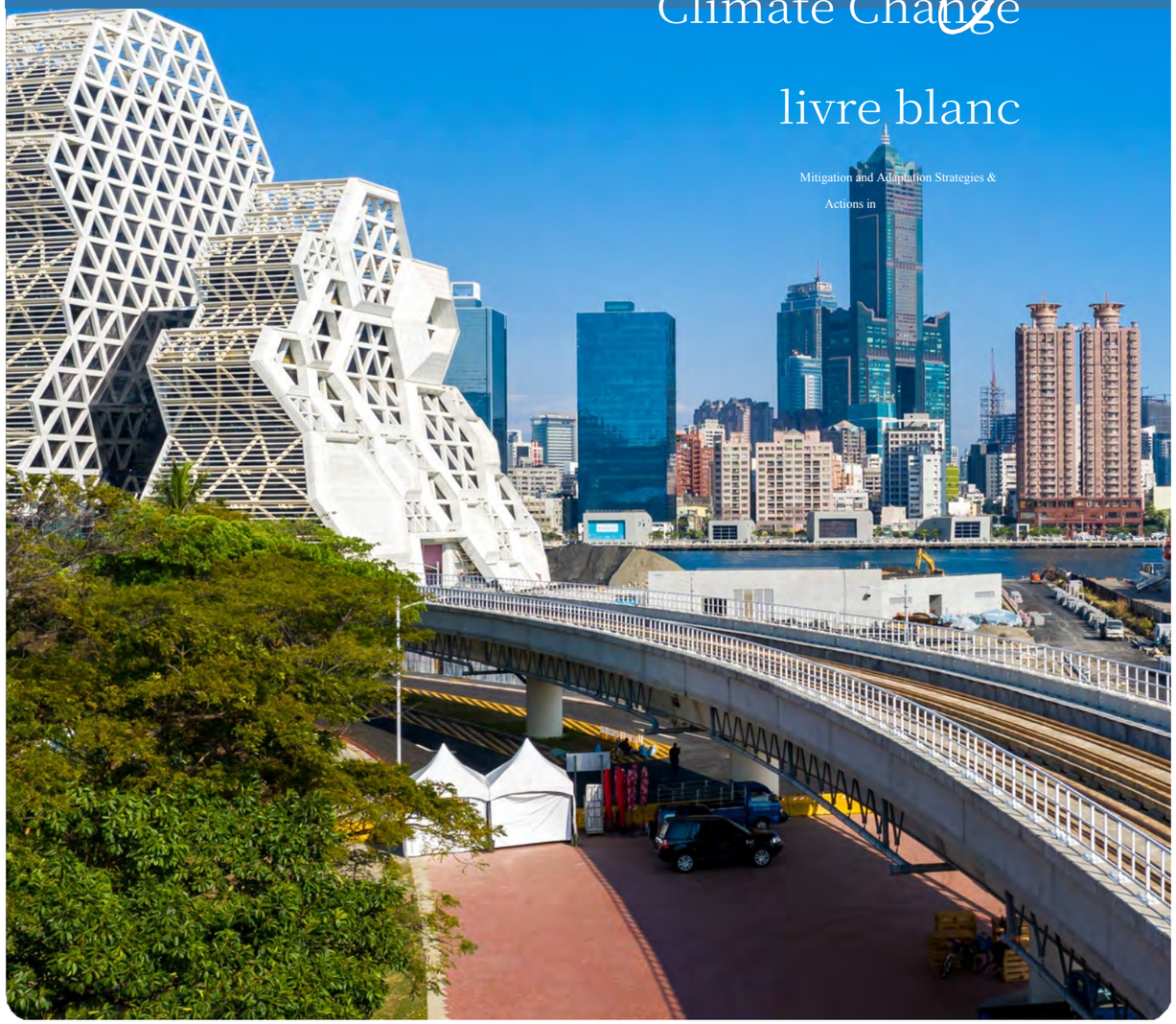
Mitigation and Adaptation Strategies & Actions in



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preamble

From the mayor.

Environmental governance is an important challenge for sustainable development, and it has been five years since the Paris Agreement came into force in November 2016, representing the will of all countries to curb global warming. On the basis that all signatory countries are required to implement the Nationally Determined Contributions (NDC) document and submit an updated report every five years, 2021 is the target year for the global response to the Paris Agreement.

The 26th Conference of the Parties to the United Nations Framework Convention on Climate Change (COP26), hosted by the United Kingdom, can be considered as a benchmarking meeting for achieving net zero emissions by 2050 and reinforcing the ambition to reduce emissions by 2030," said the first assessment of the United Nations Framework Convention on Climate Change, hosted by the United Kingdom.

Although Taiwan is not a member of the United Nations, it has never stopped fighting against climate change. In the face of climate change, we have just survived the drought and water shortage crisis by economizing in the first half of 2021, and we are now preparing for typhoons and floods. Kaohsiung City is an industrial city

With the highest per capita carbon emissions in the country, "carbon reduction" and "adaptation" have always been the goals of the City Government. Reducing air pollution is our unavoidable responsibility, and the City will actively promote carbon reduction as an important part of the city's energy conservation program.

The first step is to require state-owned enterprises in the city to propose short-, medium- and long-term plans for air pollution emission reduction. First of all, state-owned enterprises located in the city are required to put forward short-, medium- and long-term plans to reduce air pollution emissions, and revise the greenhouse gas control enforcement program to promote carbon reduction measures in the six major emitting departments, and at the same time, targeting at The industrial units have formulated stricter standards for the relevant equipment, combined it with high-intensity control measures such as stepping up inspections and imposing strong penalties, and returned the Kaohsiung city to its original state through a multi-pronged and simultaneous approach.

The people of Hong Kong will enjoy better and cleaner air.

In addition, with the integration of "Smart City, Digital Governance, and Diversified Energy" as the main axis, we have initiated the "Green Power Promotion Task Force" and signed a cooperation agreement with the Bureau of Energy of the Ministry of Economic Affairs. Recently, we have also further promoted the "6-Year 1GW Plan", with a target of 1GW of solar power capacity from 2021 to 2026, which will serve as the basis for building a safe, stable, efficient, and clean energy supply and demand system. We expect to attract domestic and overseas high-tech industries and talents in the future to increase quality employment, and to increase the proportion of renewable energy through the pursuit of environmental sustainability.
In order to promote the development of green energy technology, reduce the reliance on fossil fuels, and at the same time reduce air pollution, we have the important responsibility of carrying out the policy direction of "Industrial Transformation".

Kaohsiung's geography has resulted in an uneven distribution of population, with 95% of the population concentrated in the metropolitan area, which accounts for only 25% of the city's total area. Therefore, Kaohsiung relies on the construction of a comprehensive public transportation network, which provides convenience to the public through the use of green transportation tools such as MRTs connecting LRTs, MRT buses, or electric buses, electric locomotives and bikes, bus-type Siu Wongs, and YouBikes 2.0, This will provide citizens with a convenient and safe means of mobility, as well as implement equal rights in transportation and reduce the gap between urban and rural areas in terms of the feasibility of public transportation.

Since Kaohsiung was renamed and reorganized in 1920, it has taken a hundred years and the hard work of countless predecessors to make this city the passionate and energetic city it is today. It has always been the goal of the city government to take care of both economic development and environmental protection. In the process of realizing our dreams, we need the participation and support of our citizens.
In addition, the city government will continue its efforts to promote low-carbon and sustainable policies and actions in the next 100 years. The city government team will continue the efforts of its predecessors, so that in 2021, the year of the next 100 years of development, Kaohsiung will be able to move forward with more solid industrial strength and infrastructure, as well as more emphasis on low-carbon sustainable policies and actions, and steadily move towards the vision of a livable city in the harbor.

Mayor of Kaohsiung Chen Chi-Mai



Summary of results

Kaohsiung is a city in transition. In the face of global climate change and regional extreme weather, the Kaohsiung City Government has long been committed to promoting various mitigation and adaptation actions. In addition to the shared responsibility of being a member of the global village, it is also important to improve the living environment of its citizens and transform Kaohsiung into a low-carbon, sustainable and livable city through the core concepts of energy conservation, carbon reduction, recycling and sustainability.

In 2020, Kaohsiung's net greenhouse gas emissions will be 53.31 million metric tons of CO2e, a reduction of 19.4% compared to the base year (2005), far exceeding the national target of 2025.
This shows that the city's active implementation of various carbon reduction actions has been very effective. Regarding the promotion of renewable energy, following the "100 World Games Photovoltaic Project" and the "Creative City Photovoltaic Project", the city has been actively implementing various carbon reduction initiatives with great success.

Kaohsiung's Green Energy Photovoltaic (PV) "6-Year 1GW Project" is planned to be implemented between 2021 and 2020, with a target of 1GW by 2021, and 1GW by 2021 by 2020.

Setting up 1GW in 2026, with annual power generation of 1.277 billion kWh and carbon reduction of 2.4149 million tons.

The

To cope with extreme climates, reduce impact development and create resilient sponge cities
In Kaohsiung City, 119 regional drainage systems have been established, with a total of 15 flood storage ponds, and it is expected that by the end of 2021, one more flood storage pond will be added (Wujiawei Flood Storage Pond), which will have a total flood storage capacity of 3.86 million tons by then. In addition to the basic flood storage capacity to reduce the occurrence of floods, the retention ponds are also conducive to the regulation of microclimate, reduce the urban heat island effect, provide open space for the public and take care of the natural ecology.

Kaohsiung is a city with a wide range of transportation modes, including metro, bus, ferry, light rail, shared electric scooters, and public bicycles. In order to encourage people to use bicycles for transportation, Kaohsiung has built a bicycle-friendly environment, and is also committed to expanding its road network and increasing the number of public bicycle rental system stations. Bicycle road network is in line with the rapid transit system, and bicycle lanes are installed on scenic roads in the urban area, as well as scenic bicycle lanes along recreational green belts and streams.
As of June 2021, a total of 1,035.3 kilometers have been constructed and completed;
Kaohsiung's public bicycle system was taken over by Smile Bicycle Company in July 2020 and upgraded to YouBike 2.0, and in December of the same year, it was upgraded to YouBike 2.0 by Smile Bicycle Company.


The number of users exceeded one million per month in August 2021, and the cumulative number of users exceeded 10 million in August 2021.

The city's target number of 1,000 rental stations has been achieved ahead of schedule. In addition, by the end of September 2021 The total number of electric buses is 192, exceeding the citywide bus ratio of 19.03%.

The city also promotes energy conservation, carbon reduction, and sustainable environmental education programs in schools at all levels, rooting the concept of low-carbon downward. The city is the first in the nation to install "Automatic Resource Recycling Machines (ARMs)" to provide the public with more convenient recycling channels, and also the first to be adopted by supermarkets, so that more businesses can join in recycling, in order to achieve the concept of ARMs' sustainable management.

In addition, Kaohsiung City will face the threat of COVID-19 international epidemic in 2020, targeting international migrant workers.

In addition to the "innovative epidemic prevention" strategy of centralized quarantine centers for fishermen to live and quarantine after entering the country, enhanced environmental control and vector mosquito surveillance at quarantine prevention hotels, and the implementation of NS1 rapid screening for incoming dengue fever, the strategy of "deciding to fight outside of China - border quarantine" has successfully prevented the dengue virus from entering the country, and for the first time in the past 22 years, the number of confirmed cases of local dengue fever has hit the record high of zero after the Department of Disease Control has had official statistical information since 1998. This is the first time in 22 years since 1998 when the Disease Control Administration had official statistics that there were "zero" confirmed cases of local dengue fever.

Kaohsiung City has also demonstrated positive intentions in international affairs and exchanges, including its participation in the Carbon Disclosure Project (CDP), which has been awarded the highest rating of A (Leadership City) for three times in 2018, 2019 and 2021; and in order to proactively address the problem of air pollution and implement a sustainable city strategy, Kaohsiung City has applied for membership in the Coal Reduction Alliance (CRGA) at the end of 2019. In order to actively address the air pollution problem and implement the sustainable city strategy, we will apply for joining the Coal Savers Alliance at the end of 2019.

"Kaohsiung City is also a member of the Powering Past Coal Alliance (PPCA), and will officially become a member of the alliance in September 2020, joining hands with members of the alliance such as the United Kingdom and Canada, and endeavoring to convert coal-fired power generation into clean energy. In addition, Kaohsiung's cooperation with the Climate Service Center Germany (GERICS) is also ongoing. Through the learning and application of climate change adaptation methodology, the city has selected demonstration sites for climate change adaptation, activated the interview mechanism, and designed, developed, and produced local adaptation solutions together with stakeholders through a bottom-up approach. Programs

The

Chapter 1

Origins and Urban Realities

1 Origin Beginnings

Kaohsiung City is an industrial center in southern Taiwan with many highly polluting industries, including steel, petrochemicals and cement.

In addition to causing air pollution, Kaohsiung also emits a large amount of greenhouse gases. According to the Inventory report, per capita emissions in Kaohsiung in 2020 will be 19.70 metric tons, far exceeding Taiwan's per capita emissions (10.77 metric tons/year) and the global average (4.39 metric tons/year), with industrial processes and industrial energy projects accounting for more than 80% of the total emissions, suggesting that Kaohsiung's GHGs mostly come from industry.

In recent years, the awareness of environmental protection has been on the rise, coupled with the global trend of low carbon sustainability brought about by climate change, Kaohsiung City has been actively implementing specific actions to transform the original industrial town into a low carbon sustainable city through the implementation of the Low Carbon Action Strategy, reforming and improving the efficiency of energy use, implementing the use of renewable energy, constructing a mass transportation system, and upgrading the relevant technologies and capabilities through international city exchanges.

At this stage, "mitigation" and "adaptation" are the active responses to climate change taken by countries around the world. Kaohsiung itself has experienced disasters brought about by large-scale extreme weather such as the 88 typhoon and the 823 flood, and has reflected on the vulnerability of the existing environment to the impact of climate change, which has caused varying degrees of impacts on industries, natural resources, ecological environment, and the lives of the public, and has necessitated the need to invest in a large amount of social costs in post-disaster recovery, which is often a late remedy. It is often too late to take action to remedy the situation.

Therefore, after recognizing the seriousness of the climate change problem, the Kaohsiung City Government, in line with the central government's greenhouse gas reduction commitment (to achieve net zero emissions by 2050) and the related energy saving and carbon reduction promotion strategies, has discussed and formulated specific promotion measures and implementation plans. For example, in 2015, the Kaohsiung City Environmental Maintenance Management Autonomy Ordinance was enacted and published, stipulating that the city government will accelerate the promotion of mitigation and adaptation policies, with a view to further enhancing the quality of the city's environment and living conditions. For example, in 2015, the Kaohsiung City Environmental Maintenance and Management Autonomy Ordinance was enacted and published, stipulating that the city government should accelerate the promotion of mitigation and adaptation policies, with a view to further improving the quality of the city's environment and housing.

In addition to mitigation-related action strategies, Kaohsiung City has been building its climate change adaptation plan implementation structure and establishing a climate change adaptation platform since 2013 to systematically and organizationally carry out climate change-related adaptation actions, targeting eight major areas (disasters, land use, infrastructure, coasts, water resources, energy supply and industry, health, agricultural production, and biodiversity). Through the analysis of hazard potential and vulnerability, we plan the key issues, response strategies and responsible units for each area, and strengthen the adaptation action plan through regular meetings and discussions.

As a member of the global village, Kaohsiung City actively promotes action plans, participates in meetings of international organizations, and signs relevant agreements in both mitigation and adaptation, and continues to promote international exchanges.At the 21st United Nations Conference of the Parties to the United Nations Framework Convention on Climate Change (COP21) held in Paris in December 2015, Kaohsiung City joined the Global Alliance of Mayors (Compact of Mayors) as the only city in East Asia to express its determination to reduce urban inputs. Kaohsiung joined the Global Mayors' Alliance (Compact of Mayors) with many other important cities around the world, and as the only city representative from East Asia, Kaohsiung expressed its determination to reduce urban inputs.

In October 2017, Kaohsiung hosted the 3rd EcoMobility World Festival, showcasing low-carbon mobility tools in planned areas of the city, holding environmental education activities and convening an international symposium, giving citizens and friends the opportunity to experience international events and increasing the value of Kaohsiung's experience in hosting international events.

The Kaohsiung City Government delegation also participated in the 10th ICLEI World Congress (ICLEI World Con- gress 2018) in 2018, and as the chair city of the Eco-mobility Coalition, it was invited to the "Eco-mobility Participatory Urban Design" session to share Kaohsiung's achievements in the promotion of eco-mobility construction; and it also held dialogues and exchanges with the cities of Barcelona (Spain), and the capital of Solomon Islands, Honiara, to discuss and exchange views on eco-mobility. We have also had dialogues and exchanges with Barcelona, Spain, and Honiara, Solomon Islands. Kaohsiung has sent delegates to the ICLEI conference every year since the first ICLEI conference in 2010. In 2019, the 10th anniversary of the ICLEI conference, Kaohsiung representatives from the Environmental Protection Bureau (EPA), Public Works Bureau (PWB), and Transportation Bureau (TB) participated in the conference and gave presentations and held talks at four of the conference sessions, sharing their experiences and challenges of promoting climate change with other cities on an international platform. Through the international exchange platform, Kaohsiung City Government shared with other cities its experience and challenges in responding to climate change.

Kaohsiung City actively participates in international affairs, hoping that through exchanges with international cities and organizations, it can learn from the reduction and adaptation action plans and strategies of other cities, and nurture the energy for climate change-related actions. In order to enable Kaohsiung's actions in response to climate change to be exchanged with international cities and friends, a white paper on climate change response was compiled in early 2017 in the hope that through the book, other cities and citizens can experience Kaohsiung's goals and promotional content in the face of climate change and use it as a publicity tool for international exchanges and publicity, which will continue to be updated this year.

二 The State of the City

Kaohsiung City is a city located in the southwestern part of Taiwan's main island. On December 25, 2010, Kaohsiung City merged with Kaohsiung County to form the Greater Kaohsiung Metropolis, which is currently the third largest city in Taiwan. Kaohsiung City, with its past industrial development, and its proximity to the Kaohsiung Port, which makes it easy to import raw materials, has licensed a number of industrial zones. Kaohsiung opened its port in the late 19th century and was formerly known as "Ta-Dog". During the Japanese rule era, it developed into a port city and a military stronghold, and was known as the "Port City", and after the mid-20th century, it became the political, economic, and transportation hub of southern Taiwan.

Geography

City area

Kaohsiung City is the largest city in the western part of Taiwan, with a total area of 2,951.9 square kilometers, including the Dongsha and Nansha Islands in the South China Sea. There are 38 administrative districts and 891 li (miles) in the city. Among the administrative districts, Taoyuan District in the extreme east and north, Lin Yuan District in the extreme south, and Kajia District in the extreme west (Figure 1-1) are adjacent to Chiayi and Tainan. Overall, it has the characteristics of coastal, metropolitan, and suburban areas.

The characteristics of each area are as follows

Therefore, on environmental issues, it is also necessary to face the issue of marine conservation at the same time.

The environmental issues arising from different geographic backgrounds such as land ecology, hillside disaster prevention, and so on.

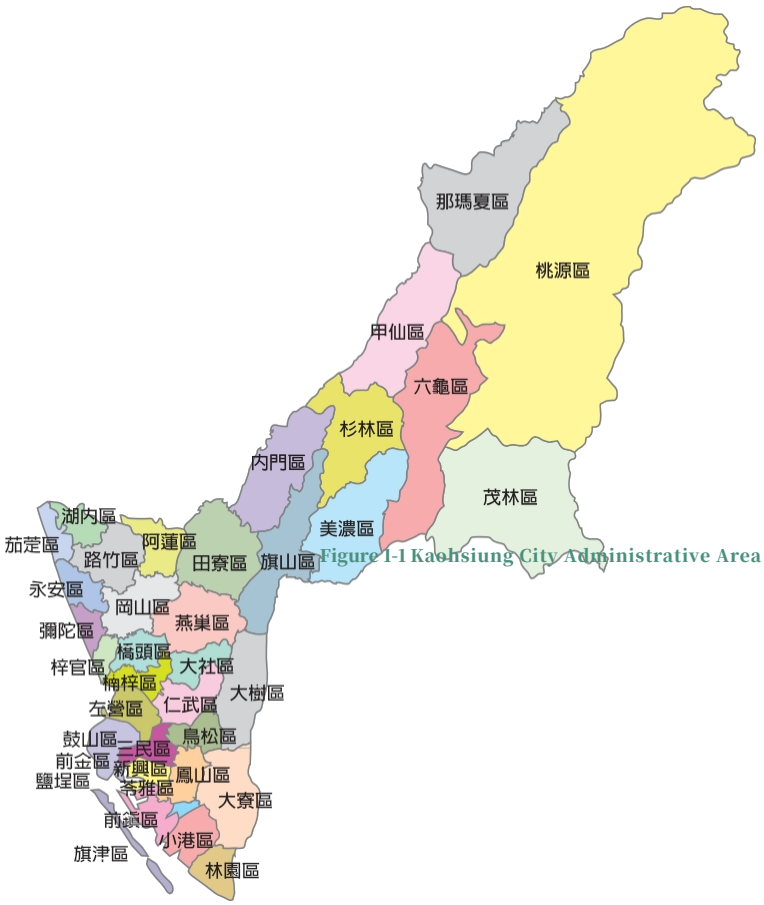


Figure 1-1 Kaohsiung City Administrative Area Map

C=þ★A

As of the end of 2020, Kaohsiung City had 1,119,481 households and a total population of 2,765,932, the third largest among the six cities under the direct administration, with 1,364,243 males and 1,401,689 females.

The population density of Kaohsiung County and Kaohsiung City is 937 persons per square kilometer. In addition, the population growth rate has shown a downward trend since the merger of Kaohsiung County and City in 2011, and its historical population change and growth rate are shown in Figure 1-2, which has shown negative growth in recent years.

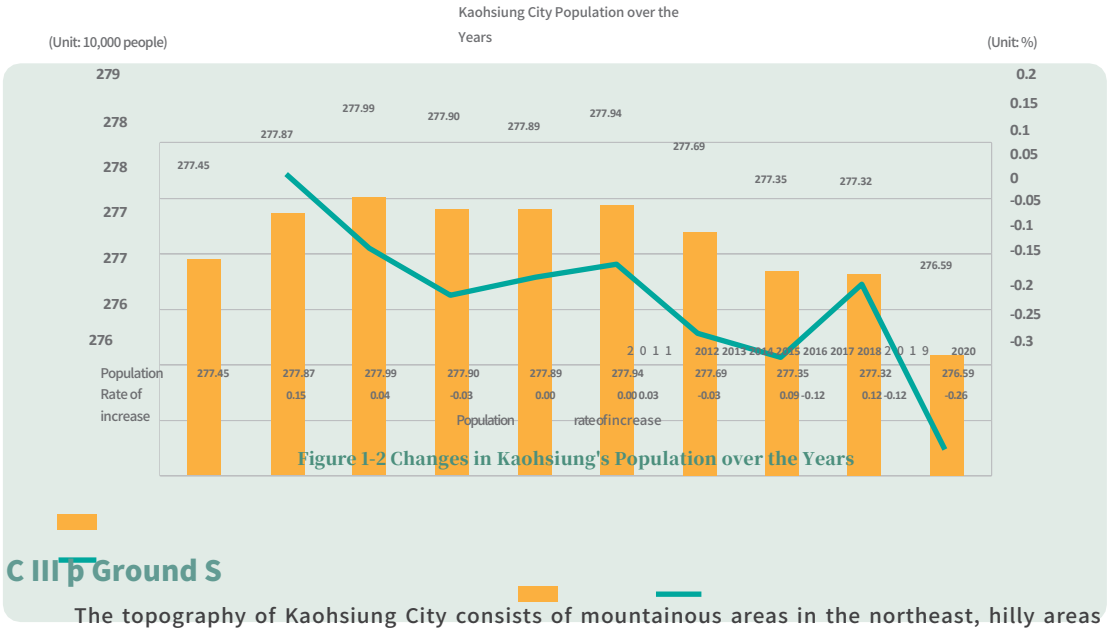


Figure 1-2 Changes in Kaohsiung's Population over the Years

C III þ Ground S

The topography of Kaohsiung City consists of mountainous areas in the northeast, hilly areas in the center, and plains in the southwest. The difference in topography is nearly 4,000 meters, with Taoyuan, Namasha, and Maolin districts having the steepest topography, and the proportion of topography is 74% of the city's total area in the high mountainous and hillside areas, with the overall topography distributed as shown in Figures 1-3. The northeastern mountainous area is a part of the central mountainous area, which includes the Yushan Mountain Range, the Alishan Mountain Range, the Central Mountain Range, and the Central Mountain Range, as well as the Central Mountain Range.

The central hills are the westward extension of the Central Mountain Range. The central hilly area is the westward extension of the Central Mountain Range, roughly located in the area of Tianliao and Yanchao. The Tianliao area is the most developed area in the bad terrain of Kaohsiung and Tainan, with exposed bedrock, sparse vegetation, and obvious rain erosion gullies. To the west and southwest of the area are plains, and the southwest edge of the area is a plain.

Big Kong and Little Kong are both uplifted coral reefs.

Fungshan Terrace is the southeastern boundary of the Kaohsiung Plain.

On the east side of the Pingtung Plain is the Pingtung Plain, and the Coastal Plain is located between Baishalun in Kajiakou District and Shanwei in Linyuan District, which is a sandy coastal terrain.

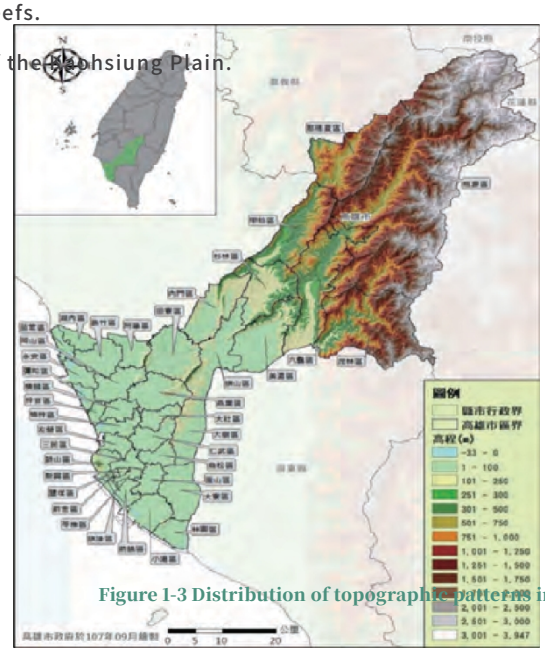


Figure 1-3 Distribution of topographic patterns in Kaohsiung City

C IV þ Geology

The stratigraphy of Kaohsiung City is divided into three geologic regions: the western flank of the Central Mountain Range, the western Foothill Geologic Region, and the coastal plain (alluvial fan), and the overall geologic distribution is shown in Figures 1-4. The western flank of the Central Range is mainly composed of quartzite and quartz sandstone, which are metamorphic rocks. The western flank of the Central Range is composed of quartzite and quartz sandstone, which are metamorphic rocks, while the western flank of the Foothills is composed of sedimentary rocks, sandstones and mudstones. The coastal plain area is formed by the uplift of the earth's crust and the siltation of sand and mud carried by Erren Creek, Agongdian Creek and Gaoping Creek over the years.

The Chai Shan area is a shallow hilly terrain with limestone layers covering most of the ground surface, with occasional sporadic exposed mudstone layers, and is the only coral reef rock upland in the City. The geology is composed of limestone layers and mudstone, and the soft mudstone surface is easily weakened by weathering or water immersion, which causes the limestone layers above to slip and partially fall. In addition, the foot of the coastal slope is eroded by waves and other factors, resulting in continuous stratigraphic sliding phenomenon.

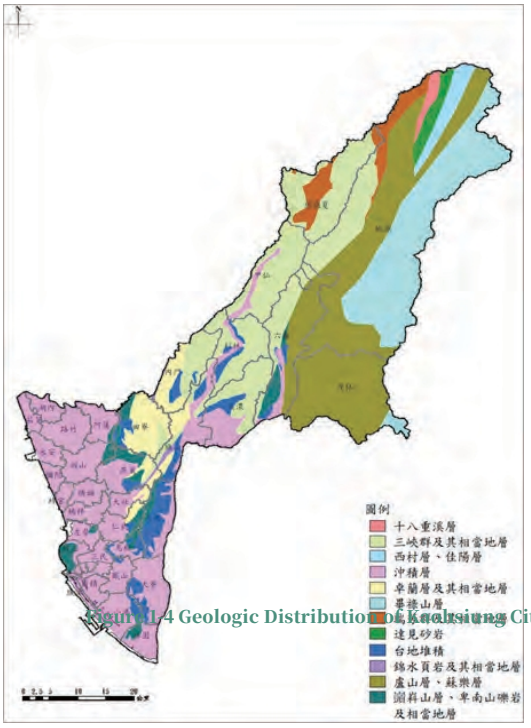


Figure 1-4 Geologic Distribution of Kaohsiung City

C five þ river

In terms of hydrology, Kaohsiung City has eight major rivers (Figures 1-5), from north to south, namely Erren Creek, Agongdian Creek, Dianbao Creek, Houjun Creek, Aihe River, Fengshan Creek (including Qianzhen River), Yanshihang Creek, and Gao Ping Creek, with a total watershed length of about 345 kilometers, and a total watershed area of about 4,034 square kilometers. Due to the topography of the city, most of the rivers are located in the downstream plains and are tidal rivers, which are affected by upstream pollution and tides. In recent years, the original ecological environment of the rivers has been damaged by man-made impacts due to the cementation of river banks along the rivers. In order to restore the ecology of the river, the city has constructed ecological slopes to provide space for aquatic plants and animals to live and gradually restore the natural appearance of the riverbanks.

The rapid increase in the number of factories in the city, resulting in population congregation and urbanization expansion, has led to pollution of rivers, such as Erren Creek in North Kaohsiung, where the main source of pollution is livestock wastewater, and rivers in the central part of the city, such as Dianbao Creek and Houjun Creek.

The main sources of pollution are the metal surface treatment industry and electroplating; urban rivers such as the Ai River are polluted by domestic sewage.

The rivers in Kaohsiung South, such as Gao Ping Creek, are dominated by chemical industry wastewater. Under the City's treatment measures in recent years, the length of the City's mildly and not (slightly) polluted rivers in 2020 has increased from 22.6% in 2016 to 34.9%, and the proportion of moderately polluted river lengths has decreased significantly from 63.1% to 50.6%, indicating that the City's water quality has significantly improved.

In terms of water resources, in addition to the traditional agricultural irrigation bei, there are also some small reservoirs under the jurisdiction, such as Agongdian Reservoir, Fengshan Reservoir, and Clarification Lake, however, due to the increasing demand for quality and quantity of water for industries and people's livelihoods in the area, coupled with the great difference in the quantity of water during the dry period of the GaoPing Creek.

The current supply of water from small reservoirs and rivers is insufficient due to the high turbidity and low utilization rate of the flow during the period of high water; and the high flow rate during the period of abundant water.

Figure 1-5 Geologic Distribution of Kaohsiung City

C VI þ Wetland

The construction of wetland ecology is one of the major projects in Kaohsiung City. Over the past decade, the city has gradually developed 21 wetlands with a total area of more than 1,055 hectares. These wetlands are of various types, of which 3 are national wetlands (Chau Tsai Wetland, Nan Tsi Xianxi Wetland, and Dagi Lake Wetland) and 12 are wetlands of national importance. In addition, Kaohsiung was the first city to introduce the concept of "ecological corridors" in 2003, which connects parks, green areas, ecological reserves and wetlands in Kaohsiung to provide and improve ecological habitats and increase biodiversity.

C sevenþ gas candidates

Kaohsiung has a tropical monsoon climate, and because of its special geographic location, it is one of the few areas in East Asia with a tropical climate, and is the only large city in East Asia classified as having a tropical climate. The average annual temperature in Kaohsiung is around 26℃; the lowest temperature occurs in January with an average of 20.4℃, and the highest temperature occurs in July with an average of 29.9℃. Kaohsiung has the highest number of sunshine hours in Taiwan at 2,426 hours, with an average of 6.6 hours.

Under the influence of global warming, the hot season in Kaohsiung starts earlier to mid-March, and the winters gradually become warmer and warmer. In the past five years, the average daily sunshine hours are all higher than the climate average, increasing by about 194 hours, and the extreme maximum temperature of the city is 37.6°C and the extreme minimum temperature is 7.0°C, as it can be found from the graphs of the interannual changes of the distance level of the temperature at Kaohsiung station between 1931 and 2019 (Figs. 1-6), the The average annual temperature shows an increasing trend year by year.

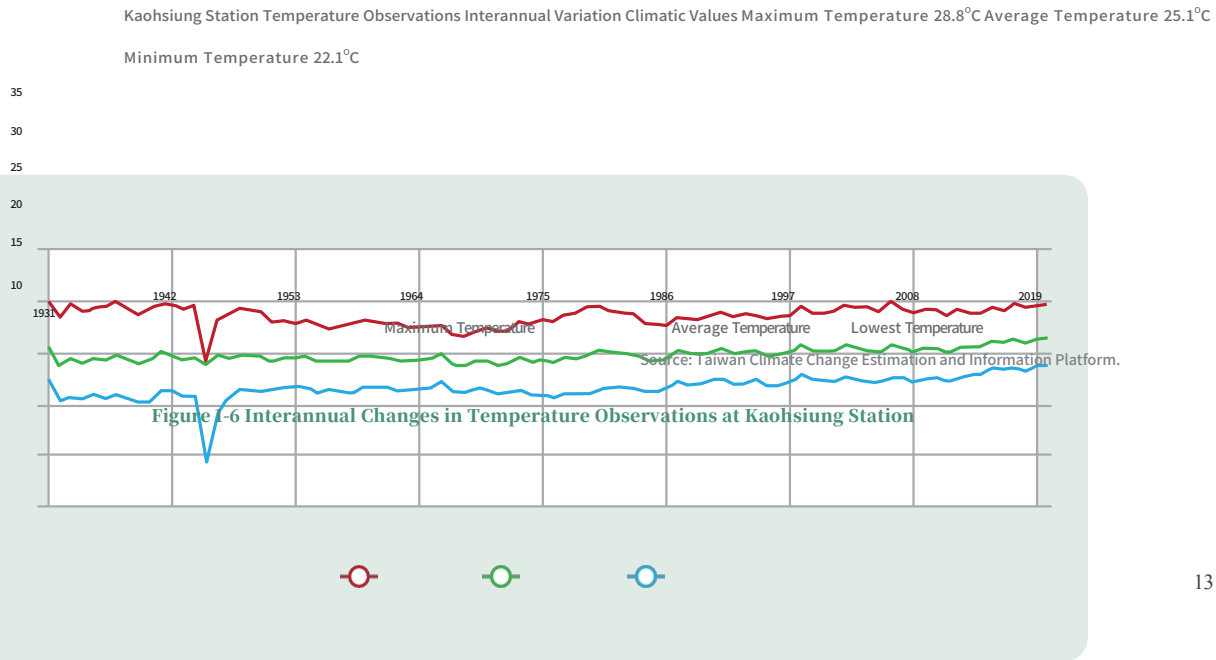


Figure 1-6 Interannual Changes in Temperature Observations at Kaohsiung Station

Current Land Use Situation

In terms of land use, the city's 2020 urban planning area will be 30,001 hectares, and the non-urban development area will be 12,275 hectares, with residential areas accounting for 28.9% of the urban development area, and commercial and industrial areas accounting for 5.22% and 10.43%, respectively. After the merger of counties and cities, due to the increase in land use area, the planned population density of the original urban planning area decreased from 15,453 (people/km$^{2)}$ in 1999 to 8,510 (people/km$^{2)}$ in 2020.

The population density load of the overall Metropolitan Planning Area is significantly reduced, as shown by the fact that the population density load of the entire Metropolitan Planning Area has been reduced by a factor of 1.5/km^2.

As for the public facilities of the urban plan, the 2020 land area has been built up to 12,359 hectares, including 4,235 hectares of roads and footpaths, 2,547 hectares of parks, and 1,351 hectares of schools. Overall, the per capita area of green space in the city reaches 10.83 square meters, which is the highest among the six metropolises.

Industry Structure and Characteristics

C I þ Commerce and Industry

Kaohsiung City is a major industrial center in Taiwan, which not only initiated the development of domestic industries, but also led to the rise of Kaohsiung Port. According to the city's Comptroller's Office, 124,276 businesses will be registered by the end of 2020, an increase of 2,113 businesses compared to 2019. Kaohsiung has the largest number of industries with 18,767 (23.12%) in the manufacturing sector, followed by the business sector and the industrial sector.

15,980 (19.69%) and 12,285 (15.14%) in the wholesale and retail sector. The total number of registered factories was

The top three industries accounted for 31.33% of the total, with the metal products industry accounting for 7,673, the machinery and equipment industry accounting for 31.33% and the machinery and equipment industry accounting for 7,673, with the metal products industry accounting for 31.33% and the machinery and equipment industry accounting for 7.33%.

13.71 %, and 10.91% for food manufacturing.

There are many industrial districts in the city, including Yongan District, Okayama Benzhou Industrial Park, Dashe Industrial District, Renwu Industrial District, Fengshan Industrial District, Linhai Industrial District, Dafa Industrial District, and Linyuan Industrial District, which are mainly for traditional manufacturing industries; Kaohsiung, Nanzi and other processing and exporting districts, and Kaohsiung Software Technology Park, which is mainly for the information software, digital content, and R&D industries; in addition to Nanking Kaohsiung Park, where industries are mainly biotechnology, precision machinery, and optoelectronics. In addition, there is also the Kaohsiung Park of Nanko, where biotechnology, precision machinery, and optoelectronics are the main industries. Overall, the main industries in the industrial zone are basic metal manufacturing, chemical materials manufacturing, petroleum and coal products manufacturing, metal products manufacturing and electronic components manufacturing.

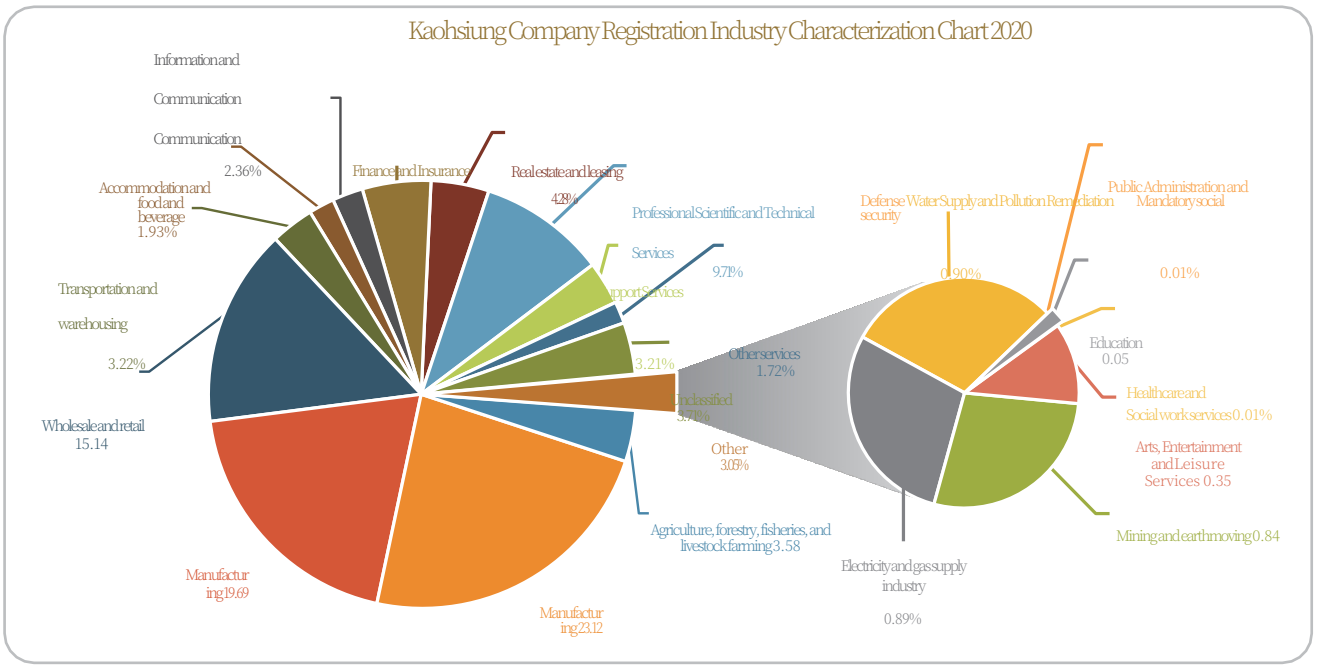


Figure 1-7 Industrial Characteristics of Kaohsiung City

Source: Kaohsiung City Government Accounting Office

C = þAgro-pastoralism

According to the recent report of the Council of Agriculture Bureau, the cultivated area of the city is 47,619 hectares (16% of the total land area), the total output value of agriculture, forestry and animal husbandry is 23.363 billion dollars, the number of farming households is 70,011, and the farming population is 234,683. As for the agricultural industry, the city's agricultural output was valued at $14,666.16 million, with vegetables, fruits, and rice as the major agricultural products, making the city an important producer of fruits and vegetables in Taiwan. Rice production areas are located in the districts of Meinong, Daliao, Qiaotou, Linyuan, and Gangshan, etc. Tropical fruits, especially guava, dates, and lychee (yuhuo bao), are the largest annual production in Taiwan, while other fruits such as pineapple, papaya, longan, banana, lotus flower, and golden splendor mango are also very productive, making the city the capital of Taiwan's fruit industry.

As for the livestock industry, the city's livestock production was valued at $8,696.2 million, of which $3,882.1 million was for hogs, $3,626.01 million for poultry, $656.49 million for cows and milk, and $531.6 million for other livestock products; there were a total of 1,105 livestock farms and farms, of which there were 303,596 hogs, 7,744 cows, 14,022 sheep, There were 906 deer, 5,123,900 chickens, 93,734 ducks and 103,333 geese.

In addition, the city makes good use of its rich agricultural resources, actively promotes healthy organic agriculture and low-carbon diet, encourages enterprises to purchase local agricultural products, and promotes the use of local ingredients in school lunches and green-friendly restaurants to reduce the carbon footprint of food and build a green life. By the second half of 2020, a total of 45 restaurant operators have passed the Green Friendly Restaurant Assessment.

C three þ fishery

The city's fishery industry is categorized into four types according to the area of operation: offshore fishery, inshore fishery, coastal fishery and aquaculture fishery. Statistically, in 2019, the total output of the city's fisheries industry was 512,000 metric tons with an annual value of approximately $30.4 billion, with offshore fisheries 467,500 metric tons accounting for 83.4% of the total contribution, followed by 32,000 metric tons (11.9%) of aquaculture fisheries.

Preliminary statistics show that in 2019, the total fishery production in the City decreased by 66,596 metric tons compared to 2018, with the offshore fishery decreasing by 69,926 metric tons the most, while the other three types of production increased, namely, the inshore fishery increased by 127 metric tons, the coastal fishery increased by 628 metric tons, and the aquaculture fishery increased by 2,575 metric tons.

Tuna, squid and swordfish are the most important catches in Kaohsiung and are known as the "Three Treasures" of Kaohsiung's marine industry.

At present, there are 16 fishing harbors in Kaohsiung. At present, there are 16 fishing ports in the city, 7 of which are concentrated in the Kaohsiung Harbor area, resulting in the co-existence of shipping and fishing industries in Kaohsiung Harbor.

Four Traffic characteristics

Kaohsiung City has been actively promoting a green transportation network in order to achieve the goal of energy conservation and carbon reduction. First of all, the existing C-bikes have been converted and upgraded. Starting from July 1, 2020, the new YouBike 2.0 public bicycle rental system will be available in Kaohsiung City, and the rental stations will continue to be encrypted and whitened in order to provide a denser and more convenient rental service and riding environment for the public. The original target of 1,000 stations by the end of 2021 was completed ahead of schedule on August 30th of the same year, making Kaohsiung the city with the largest number of YouBike 2.0 stations in Taiwan, and surpassing 10 million passenger trips on August 4th.

In addition, there are five shared-carrier operators in the city, with a total of 1,200 shared e-bikes, 2,645 shared e-motorcycles and 100 shared cars. The service area covers 13 administrative districts including Zuoying District, Fengshan District, Lingya District and Yancheng District.

In terms of public transportation, the city has responded to the purchase of low-carbon and green means of transportation and accessible buses, while pursuing urban carbon reduction and social welfare; as of the first half of 2021, the total number of accessible buses in Kaohsiung has reached 596. The project includes 192 electric buses. In terms of the MRT system, there are two MRT lines (the Red Line and the Orange Line) and a circular light rail system that is the first of its kind in Taiwan. The two main lines of the MRT are 42.7 kilometers long, with a total of 37 stations. The first phase of the Circular Light Rail (C1-C14) was completed on September 26, 2017, and the second phase of the Great Southern Circle (C14-C17, C32-C37) will be opened to traffic on March 1, 2021, combining cultural, creative and waterfront tourism industries, which is expected to gradually boost Kaohsiung's tourism industry. It is expected that after the completion of the Bay Area construction, there will be an annual demand of about 4 million trips, and the circular light rail can relieve the huge flow of people.

In terms of external transportation, in addition to a number of national highways and provincial highways leading to all parts of Taiwan, the Taiwan Railway Administration's Longitudinal Line and the Taiwan High Speed Railway also run through Kaohsiung City and have stations. For international transportation, the Kaohsiung International Airport and Kaohsiung Port are the main bases for air and sea transportation respectively.

In terms of private motorized transportation, in 2020, there will be 919,000 passenger cars and 2,038,000 motorcycles in Kaohsiung, totaling 2,957,000 registered vehicles. In order to improve the air pollution caused by old motorcycles, the city has been actively replacing highly polluting transportation equipment (two-way motorcycles and old diesel vehicles), and in 2020, the number of two-way motorcycles to be phased out will be 25,113, and the number of diesel vehicles to be phased out will be 2,046, which are the highest in the country.

Energy use

C1)Electricity Consumption

According to the Local Energy Governance Sharing Platform (LESP), the total electricity consumption in Kaohsiung in 2020 will be 30.6 billion kWh, and the total electricity consumption profile in the last five years has been generally showing a yearly increasing trend (annual growth of about 286 million kWh), except for 2019, when electricity consumption decreased (470 million kWh), and 2020, when electricity consumption grew slightly by 150 million kWh due to the climate (e.g., Figure 1-8).

Electricity consumption category statistics, the residential increase of 323 million kWh of electricity is the most obvious (growth of 5.8%), followed in order by the industrial increase of 270 million kWh (1.5%) and agriculture, forestry, fisheries and animal husbandry increase of 0.08 billion kWh (3.2%); institutions (-4.6%) and services (-5.4%) are showing a decline in the situation, respectively, a decrease of 317 million kWh and 43 million kWh, the 2020 compared to the 2016 The cumulative growth in 2020 over 2016 is 14.3 GWh.

The largest share of electricity consumption in 2020 will be in the industrial sector with 17,987 million kWh (59%), followed by the residential sector with 5,829 million kWh (19%) and the service sector with 5,590 million kWh (18%).

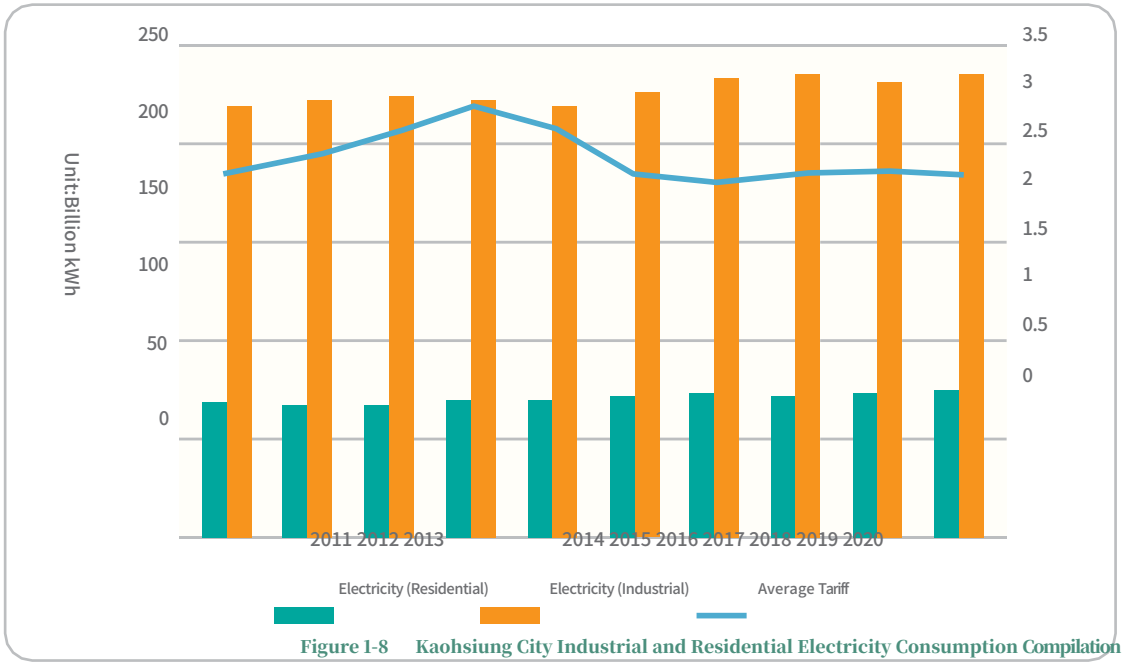


Figure 1-8 Kaohsiung City Industrial and Residential Electricity Consumption Compilation

Source: Taiwan Power Company

C=þOil use

According to the statistics from the Bureau of Energy of the Ministry of Economic Affairs, Kaohsiung's oil sales have been on a slow upward trend over the years, and the gasoline sales volume in 2020 will be 1,064,292 kilobuttons, an increase of 0.53% compared to 2019. As for gasoline stations, the city has initiated station reduction measures since 2011, reducing the number of stations from the existing 274 stations year by year to approximately 263 stations by 2020. In the future, the city will continue to promote green transportation and the public transportation service network, popularize the concept of energy saving and carbon reduction, change the public's usage habits, reduce energy consumption, and reduce air pollution and greenhouse gas emissions.

C III þ Water use profile

According to the Department of Water Resources, Ministry of Economic Affairs, various water use statistics database for 2019, Taiwan's regional domestic water consumption amounted to 3,185.51 million cubic meters, an increase of approximately 29.7 million cubic meters from 2018, and the part of domestic water supply by piped water, the prevalence rate was 94.39%, an increase of 0.29 percentage points from 2018.

In terms of industrial water consumption, the city's industrial water consumption in 2019 will be 242.62 million cubic meters, which is 14.5% of the nation's industrial water consumption (1,671.35 million cubic meters), of which "basic metal manufacturing" will have the highest water consumption, followed by "petroleum and coal product manufacturing", "metal product manufacturing", "chemical material manufacturing", "food manufacturing", "machinery and equipment manufacturing" and so on, with the water consumption of these six sectors exceeding more than 80% of the total industrial water consumption. These six industries accounted for more than 80% of the total industrial water consumption.

Current Status of Greenhouse Gas Emissions

More than two-thirds of the world's population and business activities are concentrated in cities, and frequent economic activities consume more than 80% of the energy and emit large amounts of greenhouse gases, which indicates that the issue of urban emissions reduction has already played a pivotal role in greenhouse gas management.

In order to understand the relationship between development activities and GHG emission characteristics in the city, which can be used as a reference for reduction targets and policy formulation, the city completed the 2003-2019 citywide GHG inventory in accordance with the "Guidelines for GHG Inventory Calculation at County and Municipal Levels" of the Environmental Protection Administration, Executive Yuan, and the internationally recognized "2006 IPCC Guidelines for National Greenhouse Gas Inventories". In accordance with the "Guidelines for Calculating Greenhouse Gas Inventories at the County and Municipal Levels" of the Environmental Protection Administration, Executive Yuan, and the internationally recognized "2006 IPCC Guidelines for National Greenhouse Gas Inventories", the City has completed the calculation of the citywide GHG inventory for the period of 2003-2019, and has obtained the GHG Inventory Verification Statement through the third-party certification organization, British Standards Institution (BSI), which has conducted the external verification.

Kaohsiung's heavy industries are densely distributed, which not only consume a large amount of energy, but also produce extremely high greenhouse gas emissions. According to the latest GHG inventory report, the net GHG emissions of Kaohsiung City Administrative Region in 2020 will be 53,311,000 metric tons of CO2e, of which, in terms of the emission structure, the industrial sector (including energy and manufacturing processes) accounts for more than 80%, followed by the residential and commercial sector, the transportation sector, and the waste sector, which shows the necessity and importance for the city to actively promote the reduction of GHG emissions from the industrial sector. This shows the necessity and importance of actively promoting GHG reduction in the industrial sector. Figures 1-9 show the comparison of the city's emissions and emission structure over the years.

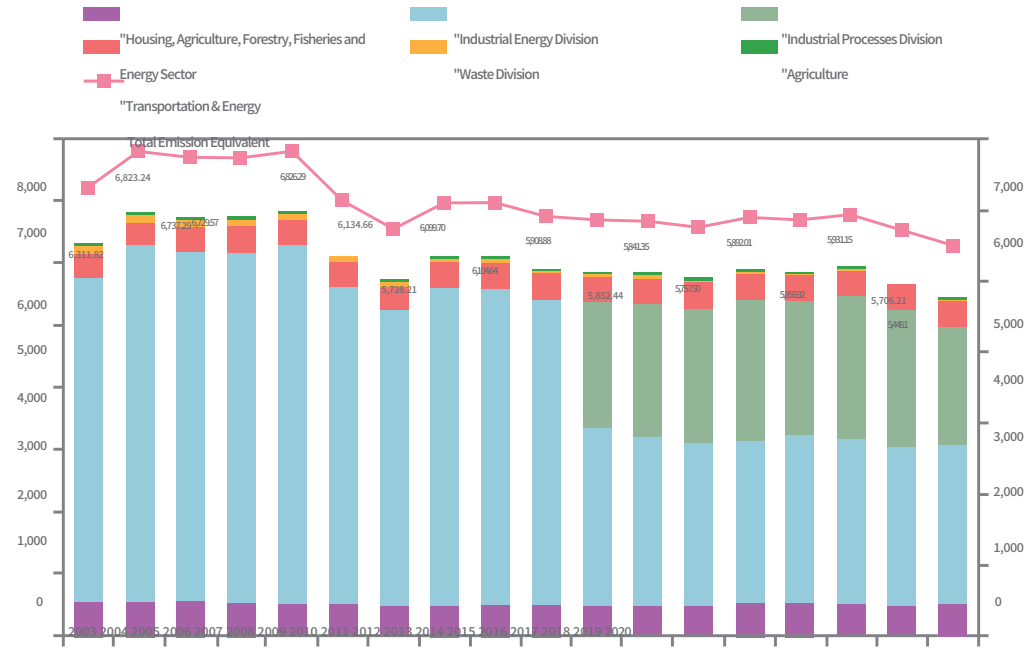


Figure 1-9 Kaohsiung City GHG Emission Trend over the Years

Chapter II

International Trends in Climate Change

Hurricanes, Forest Fires, and Floods Record in 2020 Due to Increased Impact of Climate Change

According to Münchener Rück, natural disasters caused economic losses of up to US$210 billion globally that year. In the United States, losses from natural disasters amounted to US$95 billion, almost as much as the US$1.5 billion lost in the United States.

The year 2021 has not been quiet either. In mid-July, heavy rains in western Europe caused days of flooding in Germany, Belgium and the Netherlands, with more than 200 people dead or missing. Meanwhile, serious flooding occurred in Zhengzhou, Henan Province, China, and Mumbai, India.

According to the "Sixth Assessment Report on Climate Change (IPCC AR6) - Report of Working Group I" released on August 9, 2021 by the United Nations Intergovernmental Panel on Climate Change (IPCC), the recent Earth's climate system and its various facets have changed to an extent unprecedented in the past centuries and millennia. The recent changes in the Earth's climate system and its various facets are unprecedented in the past few centuries to millennia. Anthropogenic climate change has affected many extreme weather and climate events around the globe, and since the release of AR5, observations of extreme events (e.g., heat waves, heavy rains, droughts, tropical cyclones) and evidence of their anthropogenic impacts have intensified.

As a result, countries are stepping up their efforts to combat climate change, from setting bolder emission reduction targets and protecting forests to phasing out coal-fired power plants, each of which is a critical step. Over the past year, countries have been announcing national-level carbon neutrality or net zero emissions targets. The United Nations Environment Programme estimates that if countries that have announced carbon neutrality targets, including the United States, are able to implement specific carbon reduction policies, global warming at the end of the century could be lowered to 2.5 to 2.6 degrees Celsius, which would be closer to the 2-degree target. This would be closer to the target of 2 degrees Celsius.

The impact of climate change has long been a global challenge that not only affects all countries, but also requires real change on the part of politicians and policy makers. The success or failure of the global response to climate change will not be determined by promises, but by concrete actions at the national level and by local governments.

The decision was made in cooperation with the city and the business.

Section 1 Important United Nations Processes for Addressing Climate Change

In 1990, the United Nations General Assembly resolved to establish the Intergovernmental Negotiating Committee for a Framework Convention on Climate Change, INC/FCCC, in order to address the issue of climate change. and authorizes the drafting of the provisions of the Convention on Climate Change and all legal documents deemed necessary.

In 1992, the Committee adopted the United Nations Frame- work Convention on Climate Change (UNFCCC), which aims at stabilizing and maintaining the concentration of greenhouse gases in the atmosphere, adapting the climate system to climate change without human interference, and at the same time taking into account the needs of food production and economic development. production and economic development at the same time. The Conference of the Parties (COP) is the supreme authority of the Convention, which meets regularly once a year to evaluate the fulfillment of the Convention and the legal documents adopted by the Conference of the Parties, and the important development schedule over the years is shown in Figure 2-1.

In 1997, the Kyoto Protocol was adopted at the 3rd Conference of the Parties (COP3) in Kyoto, Japan. The Kyoto Protocol is a set of binding greenhouse gas (GHG) emission targets and timeframes (with target years from 2008 to 2012) for industrialized countries that were then Parties to the Convention.

In 2007, Indonesia Bali convened COP13, in response to the first phase of the Kyoto Protocol commitment to end in 2012, so the development of a new climate change framework framework road map - Bali road map (Bali Road map)
To start post-Kyoto negotiations to sustain and accelerate global action against warming, to establish post-Kyoto (post-2012) national reduction targets and to negotiate on climate change adaptation, finance and technology transfer.

、開發中國家減緩行動與能力建置等議題。

In 2009, Copenhagen, Denmark hosted the COP15 conference and reached a consensus on 5 issues, namely "Shared Vision", "Greenhouse Gas Mitigation Actions", "Adaptation to Climate Change", "Science and Technology Development and Transfer", and "Financial Aid and Investment", and signed a new climate , which has effectively achieved the ultimate goal of "stabilizing the concentration of greenhouse gases in the atmosphere in order to prevent the climate system from being jeopardized by man-made interference". The ultimate goal of the Convention is to "stabilize the concentration of greenhouse gases in the atmosphere in order to prevent the climate system from being jeopardized by human interference".

At the COP17 meeting held in Durban, South Africa in 2011, the key conclusions included deciding on the governance mechanism of the Green Climate Fund and the source of the fund, establishing it as the main body of the financial mechanism of Article 11 of the Convention, and setting up a board of trustees and a secretariat in the operational structure to facilitate supervision and management, so as to enable the purpose of its establishment, which is to provide poor countries with funding and technical support to cope with climate change, to be realized .

獲

In 2013, at the COP19 in Warsaw, Poland, the more prominent consensus and resolutions included the Further Advancing Durban Platform, the Green Climate Fund, long-term finance, the Warsaw International Mechanism for Loss and Damage, the last of which enables the more vulnerable countries and regions that have been suffering from the effects of climate change for a long period of time to use this as a means to address the impacts of climate change on their economies. Warsaw International Mechanism for Loss and Damage), the last of which enables more vulnerable countries and regions that have been suffering from the impacts of climate change for a long period of time to receive grants through the establishment of this mechanism , which is similar to the goal of the Green Climate Fund.

獲

In 2014, at the COP20 meeting in Lima, Peru, the Lima Call for Climate Action was adopted, paving the way for the Paris Agreement the following year. One of the important resolutions includes the requirement for countries to submit Intended Nationally Deter- mined Contributions (INDCs) in the first quarter of 2015, disclosing their carbon reduction targets, adaptation strategies, financial support, technology development and transfer, and capacity building, etc., depending on the situation of each country. In addition, for the first time, the Conference addressed the fact that oceanic islands are under threat by including "Loss and Damage" in the document, and called for financial support from developed countries, emphasizing the principle of "common but differentiated responsibilities".

In 2015, COP21 was held in Paris, France, and an important milestone was the formal presentation of the Paris Agreement, which was voted on by the representatives of 195 signatory countries. It is also the first important agreement in human history to explicitly stipulate that the warming rate should be less than 2°C, which is of great significance to the future fight against climate change, the mitigation of the average temperature rise, and the reduction of greenhouse gas emissions. significance for the future fight against climate change, slowing down the average temperature rise and reducing greenhouse gas emissions.

Before the COP22 held in Morocco in 2016, the Paris Agreement passed the final threshold and entered into force on November 4, and the first Conference of the Parties serving as the meeting of the Paris Agreement (CMA) was convened at the Conference, which was aimed at discussing the content of the Agreement to replace the Kyoto Protocol, which expires in 2020; and the "Nationally Determined Contributions" (INDCs) proposed by countries in the content of the Agreement. The CMA will discuss the contents of the agreement to replace the Kyoto Protocol, which will expire in 2020; and in the agreement, the development of normative systems, verification procedures, guidelines (Modalities, Procedures, Guidelines) for Nationally Determined Contributions (INDCs) proposed by each country, as well as the discussion on the schedule of the five-yearly global stocktaking must be completed within two years, so as to facilitate the global stocktaking of the world's energy consumption and the development of the global economy. Important resolutions at COP22 include the establishment of a climate change guidebook for reference by all countries by 2018, the establishment of a foundation to assist developing countries in responding to climate change, and the establishment of an international fund to assist developing countries in responding to climate change.

In addition, 47 developing countries have declared their commitment to developing 100% renewable energy.

COP23 in 2017 continued to promote the negotiation of the follow-up to the Paris Agreement and the drafting of the details to accelerate the implementation and operation of global reduction actions. In addition, COP23 focused on small island states suffering from the impacts of climate change, discussing the identification of losses and damages and the preparation of a successor compensation fund, assisting highly vulnerable regions to strengthen their resilience, and raising the awareness and importance of climate finance, green funds, renewable energy, clean water resources, and climate risk projects. The conference mentioned the following key points, including promoting alliances between civic organizations, academia, the private sector and government agencies, and strengthening city-level engagement to accelerate climate resilience, in the hope that through innovative actions and investments, the climate change agenda will be strengthened.

In addition, we will develop a new industrial model that integrates the economy with climate action to move towards a zero-carbon economy.

COP24 was held in Katowice, Poland, in December 2018, and its most important objective was to adopt the Paris Agreement Rulebook, which will serve as the basis for the Global Stocktake , whereby signatories will review their Nationally Determined Contributions (NDCs) in 2020 . The results of the first phase of carbon reduction and adaptation. There are also exciting financial developments. Germany and Norway pledged to double the Green Climate Fund to help developing countries combat climate change; the World Bank announced a $200 billion increase in its post-2021 climate action program; and the Adaptation Fund, which is designed to mitigate the impacts of warming, received a $129 million injection at .

COP25 is a critical time to review the voluntary national emissions 獲 reductions submitted by governments. In addition, Article 6 of the Paris Agreement (Article 6) on an international carbon emissions trading mechanism was originally planned to be finalized in 2019, so that a consensus could be reached on the carbon market and other forms of international cooperation; regrettably, no agreement could be reached in the negotiations on Article 6, and it has been left to be discussed at COP26.

COP26 was postponed to October 31-November 12, 2021 in Glasgow, UK due to the COVID-19 outbreak. The Glasgow Climate Pact was adopted.
The NDC program requires countries to revisit and strengthen their 2030 targets in the Nationally Determined Contributions (NDC) program in order to align with the Paris Agreement's temperature control targets by the end of 2022, i.e., to limit warming to 1.5℃; and

In addition, countries must accelerate their efforts to phase out "coal-fired power generation without carbon capture technology" and to phase out
"Inefficient Fossil Fuel Subsidies". This is the first time that coal use has been explicitly reduced in an agreement, a major breakthrough in fossil fuel restrictions. Unfortunately, China and India intervened at the end of the negotiation session, so that the original language that was supposed to be about "phasing out" the use of coal was weakened to "phasing in," to the regret of the negotiators from many countries.

Other important conclusions of the meeting included: 100 leaders committed to end or reduce deforestation by 2030; nearly 90 countries agreed to reduce methane emissions by 30% by 2030 (2020 baseline); developed countries will provide US$100 billion (about 2.8 trillion Taiwan dollars) annually by 2025 to help developing countries reduce carbon emissions and cope with climate change; and delegates also finalized the 2015 Paris Agreement Rulebook, including the mechanism for a global carbon market. Representatives also finalized the 2015 Paris Agreement Rulebook, including the global carbon market mechanism.

Figure 2-2 Declaration on Forests and Land Use by Key Global Leaders at COP26

Source: COP26 flickr

Global warming and climate change have become a fact, and the huge losses caused by climate disasters in recent years have further demonstrated the urgency of improving the environment. From civil groups, local governments, countries to international organizations, all of them regard climate change as the biggest challenge and issue, hoping that through technological research and development, changes in behavioral patterns and the power of solidarity, they can change the current life style through mitigation and adaptation, reduce the cumulative impact of human behavior on the environment, and establish a sustainable low-carbon society, so as to give future generations a chance to enjoy the benefits of a low-carbon society. We will also establish a sustainable low-carbon society and provide a more ideal living space for future generations.

Key Trends in the United Nations Climate Convention Over the Years

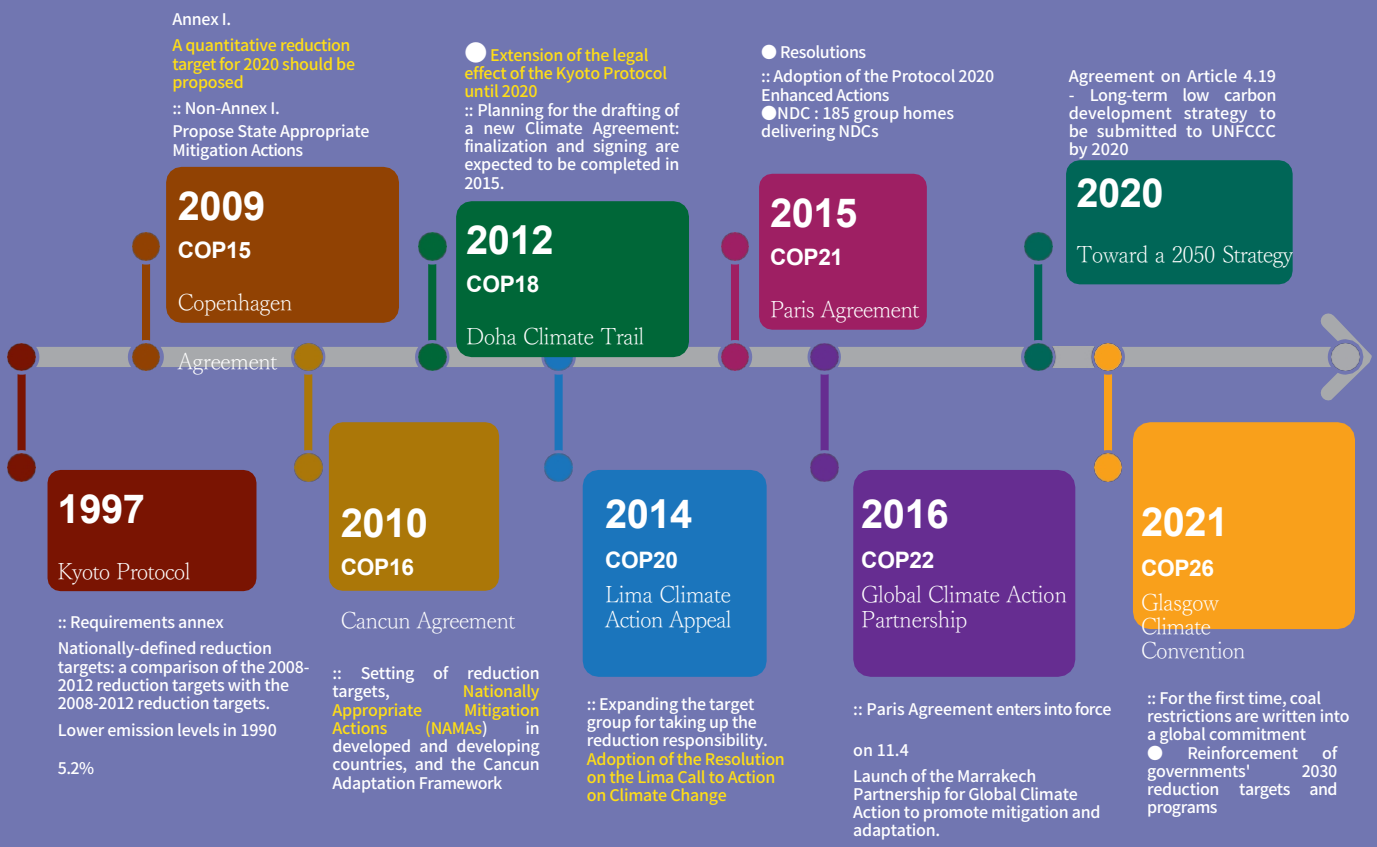


Figure 2-1 Timeline of Important Developments of the UNFCCC over the Years

II Trends in international development in the wake of the Paris Agreement

In 2015, the Paris Agreement was proposed at COP21 as an important agreement on the future of climate change and a normative document to be followed. on October 4, 2016, the European Parliament passed the EU's proposal and ratified the Paris Agreement with an overwhelming majority, which officially crosses the threshold for entry into force, 'with more than 55 countries having formally ratified it and covering 55% of the world's emissions', making the Paris Agreement officially enter into force on November 4, 2016. The Paris Agreement entered into force on November 4, 2016

The adoption of the Paris Agreement means that it will replace the Kyoto Protocol after 2020 and become the climate change agreement that all countries in the world should follow to strictly plan and implement their own mitigation and adaptation actions.
In order to achieve the goal of keeping warming to no more than 2℃ (the target is 1.5℃), each country should review its Nationally Determined Contributions (NDCs) on a five-year cycle to adjust the direction of the reductions and the targets. In addition, developed countries must provide adaptation funds for other countries to utilize and implement relevant actions.

The Paris Agreement as a whole covers climate change response-oriented issues, including mitigation, adaptation, finance, capacity building, technology development and , and the addition of loss and damage. The topics of loss and damage are also added.
In addition to the NDCs, the Government of the People's Republic of China (PRC) has initiated studies and discussions on compensation for damages for countries affected by the impacts of climate change, and the commitment of the Green Climate Fund (GCF) of US$100 billion per year to be invested by the developed countries will remain unchanged after 2020, and at the same time, it has requested that countries should fulfill their NDCs, plan to take stock of the overall progress of global climate action every five years, and submit reports and reviews, so as to enhance transparency action on mitigation and climate action (transparency action and support). transparency action and support.) The overall Paris Agreement is summarized in Figure 2-3.

Paris Important Issues and Trends in the Follow-up to the Entry into Force of the Paris Agreement

At the 2016 COP22, in addition to discussing the content and details of the Paris Agreement, which will come into effect soon, climate finance will also be a focus of attention, as a number of development banks have found that climate finance has shown a declining trend in 2014-2015, which is not conducive to the achievement of the target. In addition, in terms of climate finance projects, according to the annual statistics, 66% of the projects were used for mitigation, but only 14% were used for adaptation, which is obviously imbalanced and skewed, and therefore the proportion of the relevant mitigation and adaptation investment projects should be adjusted.

In 2017, the overall international climate change situation presented a serious challenge, as the United States, the world's second largest emitter, re-examined the Paris Agreement document it had agreed to sign in 2016 after the election, and in August, the President issued a formal withdrawal from the Agreement and withdrew the voting document from Congress, thus casting a shocking bomb on the fight against climate change.

At the COP23 conference held in November of the same year, in addition to ongoing discussions on amendments to the content of the agreement, another key issue - human mobility - was also raised. The UN Refugee Agency (UNHCR) and the International Organization for Migration (IOM) have jointly pointed out that in the past decade, an average of 22 million people have moved each year due to the impacts of climate change, and the majority of them still wish to be resettled in their original places of residence. Therefore, it is important for countries to take a proactive approach and prioritize action on climate change, and to put forward practical and preventive policies to combat future challenges.

In October 2018, the United Nations Intergovernmental Panel on Climate Change (Intergovernmental Panel on Climate Change, IPCC) released the "Special Report on Global Warming of .5°C", according to which the current According to the report, the earth's warming has already reached 1°C. If the earth's warming cannot be prevented from exceeding 1.5°C, the number of vertebrate animals and plants in the world will be reduced by half, which will ultimately lead to runaway climate change, seriously affecting the ecology and the living space of human beings. The report suggests that in order to stop runaway global warming, carbon emissions must be reduced by 45% by 2030 and return to zero by 2050.

In December of the same year, after 13 days of discussion, the COP24 Conference finally agreed on December 15, 2018, Poland time, with nearly 200 countries signing on to a further "Implementation Manual," a nearly 160-page document that governs how participating countries will measure and report their carbon emissions, as well as their national reduction targets, in order to reach the global goal of a warming temperature below 2 degrees Celsius. The document is part of the Paris Agreement. This document serves as the guiding principles for the implementation of the Paris Agreement once it is on the road, including decisions on the effective implementation of the provisions of the Agreement by 2020, transparency and verification of the development of each country's climate plan, and requirements and standards to be followed by future parties to ensure that the Paris Agreement is implemented.

The Paris Agreement was able to go on its way and be implemented as scheduled.

Carbon Neutral and Net Zero Emissions Commitment

2020 is an important milestone year for climate action. Despite the COVID-19 pandemic.

However, in order to achieve the Paris Agreement target of limiting global average warming to 2.0°C by 2100. Many countries/states/cities/businesses around the world have made Net Zero Emissions (Zero Emissions) commitments, which means reducing or stopping carbon emissions, net of certified greenhouse gas removals (carbon credits), through various sectors to zero.

EU commits to net-zero emissions by 2050, sets more aggressive carbon reduction targets for 2030

Before COP26, the EU also strengthened its commitment to climate diplomacy and public climate finance by supporting countries to move away from coal. In Asia, on October 26, 2020, just one week before the U.S. presidential election, Japanese Prime Minister Yoshihide Suga announced Japan's 2050 carbon neutrality goal, followed two days later by South Korean President Moon Jae-in's announcement of net-zero emissions by 2050 in a speech to the National Assembly. According to the Energy & Climate Intelligence Unit of the UK's Department of Energy and Climate Intelligence, as of February 15, 2021, a total of 127 countries around the world have proposed net-zero emission targets (including those that have enacted legislation/are in the process of enacting legislation/have proposed policies/are included in their policy agendas, e.g., Figure 2-4)

The total carbon emissions are 26,338 million tons, accounting for more than 60% of global emissions.

Carbon Neutrality is the process of offsetting the carbon footprint (i.e. greenhouse gas emissions) of an organization or product through self-reduction and external offsets to achieve zero carbon emissions. According to the United Nations Intergovernmental Panel on Climate Change (IPCC) Special Report on Global Warming of 1.5°C, "Carbon Neutrality" is associated with "Net zero CO2 emissions" means the same thing, i.e., a global balance of anthropogenic carbon dioxide emissions and removals over a specified period of time. "Net zero emissions, on the other hand, is about actually removing greenhouse gases from the atmosphere, rather than using carbon trading to obtain carbon offsets, which is more stringent than carbon neutrality.

For many countries, phasing out coal is a critical first step towards carbon neutrality, but it is not without challenges and often requires policy interventions. International cooperation and learning can provide significant support in addressing these challenges.

IPCC AR6 WG1 reports key findings

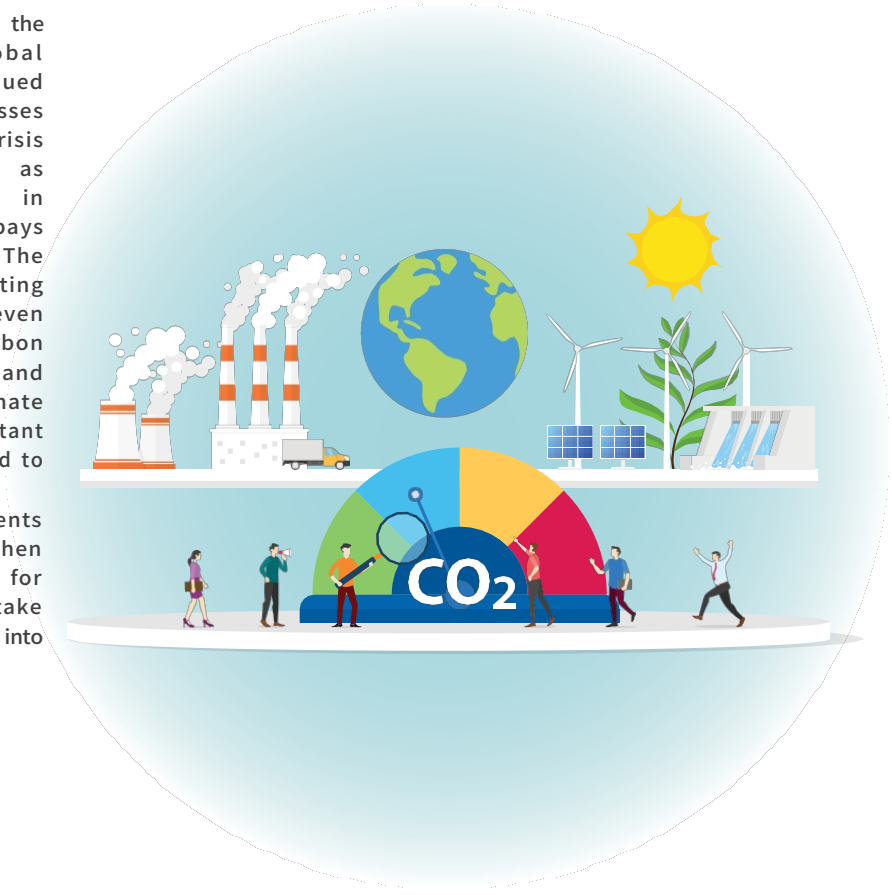
In August 2021, the United Nations Intergovernmental Panel on Climate Change (IPCC) released its Sixth Assessment Report on Climate Change (IPCC AR6), which presents scientific data on the impacts of human activities on climate change. According to the report, the global surface will continue to warm until at least the middle of this century, regardless of emission scenarios. Unless carbon dioxide and other greenhouse gas emissions are drastically reduced within a few decades, global warming will exceed 1.5 °C and 2.0 °C in the 21st century. The AR6 report also points out that even if the world manages to hold the 1.5 °C threshold, it will not be able to avoid ongoing climate crises, such as a continuing decline in the global ice sheet, rising sea levels, and a number of alterations to the oceans (ocean warming, deep-sea acidification and deoxygenation).).

The report emphasizes that, from a physical science point of view, if anthropogenic global warming is to be controlled to a certain extent, it will not be possible to achieve the same level of warming in the future.

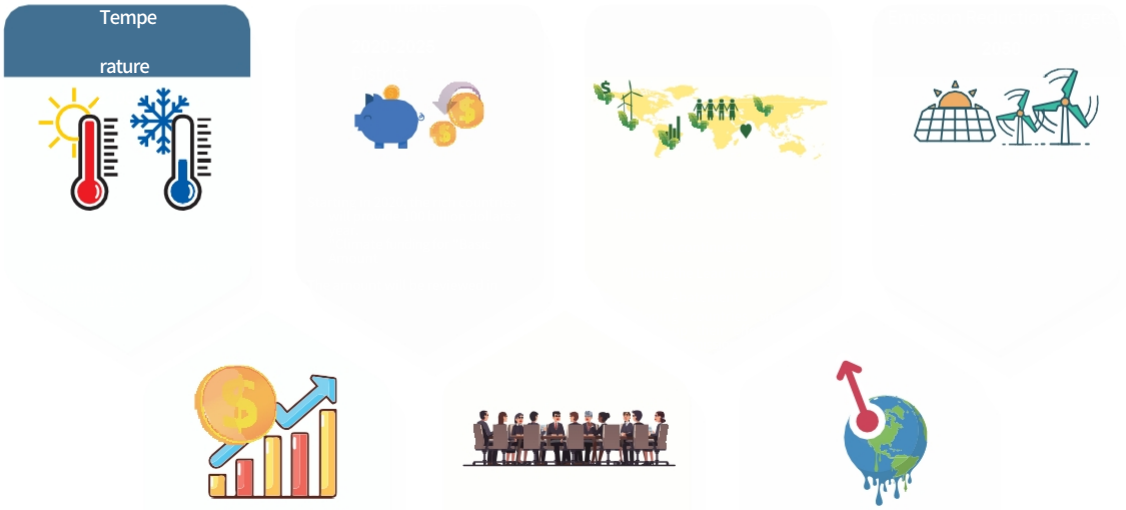
In addition, there is a need to curb the continuing accumulation of carbon dioxide emissions to at least "net zero", while significant reductions in other greenhouse gas emissions, including rapid and sustained reductions in methane emissions, will curb the warming effect of aerosol depletion and improve air quality.

In the eight years since the previous IPCC AR5 report, global greenhouse gases have continued to increase, but more businesses and people are realizing the crisis and making changes, such as technological breakthroughs in renewable energy, a polluter pays carbon pricing system, etc. The financial industry is also exerting its influence by reducing or even divesting from high carbon emission enterprises and coal and oil mining. The risk of climate change has become an important issue that mankind cannot afford to ignore.

It is expected that governments around the world will strengthen climate governance, prepare for extreme climate shocks, and take early action to turn crises into opportunities.



Summary of the Paris Climate Agreement
The historic agreement ratified by 195 countries comes into force in 2020.



Source: AFP

Figure 2-3 Summary of the Paris Agreement

Target year	Country Home
Achieved	Bhutan, Republic of Suriname
2030	Uruguay
2035	Finland
2040	Austria, Iceland
2045	Sweden
2050	USA, South Africa, Laos, Korea, Mauritania, Rwanda, Zambia, Yemen, Uganda, Tanzania, Togo, Sudan, Somalia, Slovenia, Slovakia, Sierra Leone, Senegal, Sao Tome and Principe, Romania, Peru, Pakistan, Niger, Nepal, Myanmar, Mozambique, Mali, Malta, Malawi. Lithuania, Madagascar, Liberia, Lesotho, Latvia, Hungary, Haiti, Guinea-Bissau, Guinea, Greece, Gambia, Eritrea, Ecuador, Djibouti, Democratic Republic of the Congo, Czech Republic, Cyprus. Afghanistan, Croatia, Chad, Central African Republic, Canada, Cambodia, Burundi, Burkina Faso, Bulgaria, Bangladesh, Armenia, Angola, Afghanistan, Niue, Mauritius, Colombia, Vanuatu, Tuvalu, Trinidad and Tobago, Tonga, Timor-Leste, St. Vincent and the Grenadines, St. Lucia, St. Kitts and Nevis. South Sudan, Solomon Islands, Seychelles, Samoa, Papua New Guinea, Palau, Nicaragua, Nauru, Namibia, Monaco, Mexico, Maldives, Luxembourg, Lebanon, Kiribati, Jamaica, Italy, Grenada, Antigua and Barbuda, Guyana, Micronesia, Ethiopia, Estonia, Dominican Republic, Dominica, Cook Islands, Comoros, Cape Verde, Benin, Belize, Belgium, Barbados, Bahamas, Argentina, Switzerland, Chile, Ireland, European Union, United Kingdom, Spain, Portugal, Norway, New Zealand, Netherlands, Marshall Islands, Germany, France, Fiji, Denmark, Costa Rica.
2060	China

Source: Energy & Climate Intelligence Unit website and BSI research.

Figure 2-4 Countries with Zero Net Emission Targets

3 Greenhouse Gas Reduction Targets and Actions

Chapter III

The IPCC's Sixth Assessment Report on Climate Change (AR6) predicts that the global surface will continue to warm until at least mid-century under any emissions scenario. Without significant reductions in carbon dioxide and other greenhouse gas emissions in the coming decades, global warming will exceed 1.5°C or 2.0°C in the 21st century. This warming will result in changes to the climate system, including increased frequency and intensity of extreme high temperatures, heavy rainfall, and droughts. If countries or cities do not take active and specific measures to reduce emissions, they will face catastrophic climate problems.

Section I Taiwan Greenhouse Gas Reduction Program

As new issues are taking shape internationally, the European Union announced a net-zero carbon emissions target of 2050 by the end of 2019, and the world's first carbon border tax scheme for high-carbon imports of steel, aluminum, cement, fertilizers, and electricity in 2021, with the carbon border tax scheduled to be implemented in 2026.

After the official launch of the GHG Act, the country's long-term reduction target for 2050 was set at less than 50% of the 2005 level by 2050 (see Figure 3-1). In accordance with Article 33 of the Act, the EPD formulated a total of 16 articles in the "Enforcement Rules of the Greenhouse Gas Reduction and Management Act" and promulgated the "Enforcement Rules of the Greenhouse Gas Reduction and Management Act" on January 6, 2017, which clearly delineates the matters of responsibility of the central and local authorities.

In addition, the Temperature Control Law has been completed to regulate the details of the matters promoted by the governmental agencies.

In the face of international issues such as the "net zero carbon emission target" and the "carbon border tax", at this stage, China will adopt the carbon reduction path of slowing down and then accelerating the reduction of greenhouse gases, and will gradually establish a total quantity control and trading system ranging from exempting from verification and allocation to priced allocation and sale for the management measures with economic incentives, and will actively carry out the amendment of the "Greenhouse Gas Control Law", in the hope that it will converge with the international community, and will challenge and t費n to the target of achieving net zero carbon emission by 2050. emissions by 2050.

Section II Kaohsiung City Greenhouse G... Pathway

Kaohsiung City's 2020 greenhouse gas emissions will be 54.481 million tons of CO2e, with a net emission of about 53.311 million tons of CO2e, and the per capita emissions will be as high as 19.70 metric tons of CO2e per person, much higher than the per capita emissions of 10.77 metric tons of CO2e per person (in 2019) in China and the global average of 4.39 metric tons of CO2e per person (in 2019), although Kaohsiung City's Although Kaohsiung's per capita emissions have been decreasing year by year, they are still 1.82 times higher than the national average and 4.48 times higher than the world's per capita emissions.

In 2020, Kaohsiung's net GHG emissions will be 53.311 million metric tons of CO2e, with the industrial energy and manufacturing sector accounting for 81.96% of the total, demonstrating the significant relationship between industrial transformation and the city's carbon reduction efforts. Kaohsiung's net GHG emissions in 2020 have been reduced by 19.4% compared to the base year (Figure 3-2), far exceeding the national target of 2025. This shows that Kaohsiung's proactive promotion of carbon reduction actions has been highly effective, and also demonstrates a new green point and turning point for climate action, and that Kaohsiung will cooperate with the national policy on GHG reduction in the future, and will work towards the goal of carbon neutrality by 2050.

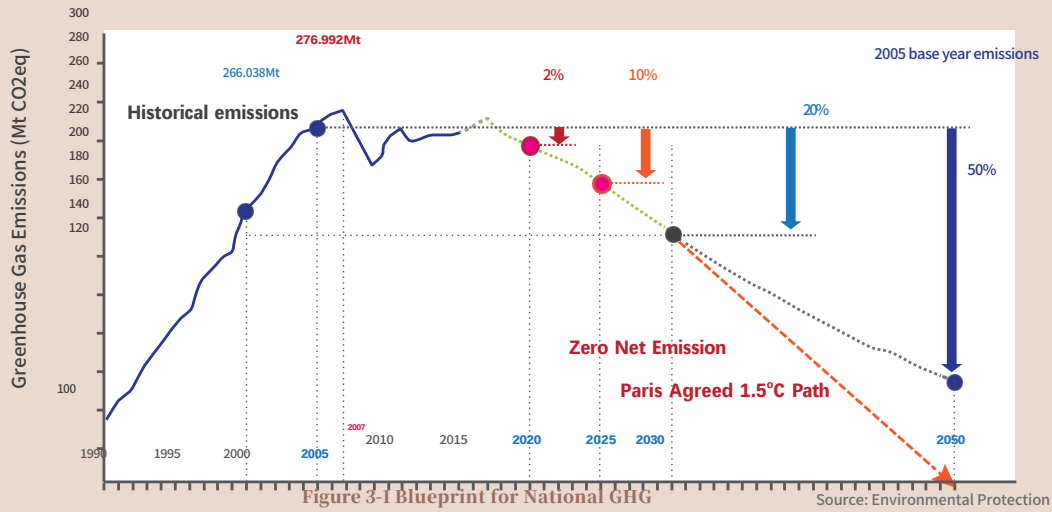


Figure 3-1 Blueprint for National GHG Reduction Pathways

Source: Environmental Protection Administration, Executive Yuan

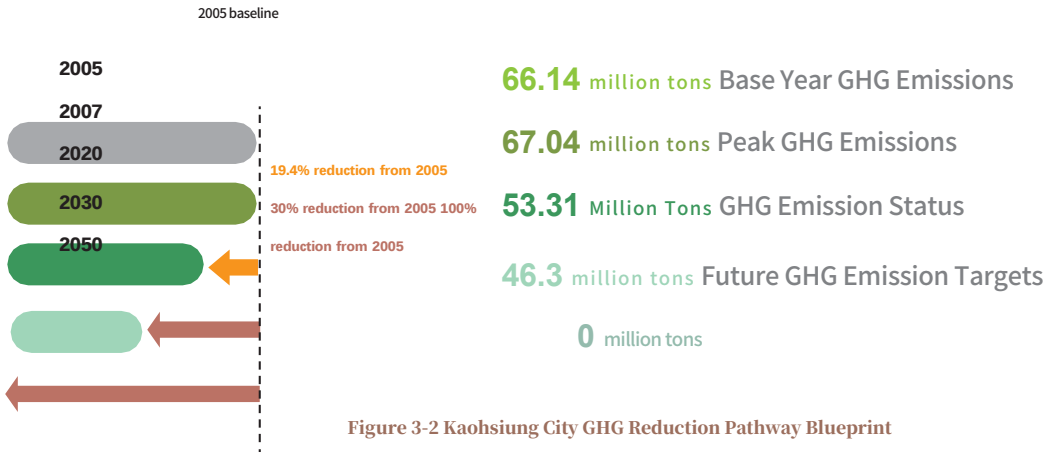


Figure 3-2 Kaohsiung City GHG Reduction Pathway Blueprint

Section III Kaohsiung City GHG Emission Control Action Program Phase I Results

The Kaohsiung City Control and Enforcement Program (Phase I), covering the period of 2018-2020, is designed to reduce reliance on fossil fuels and reduce air pollution by increasing the proportion of renewable energy, developing green energy sharing appliances, transforming and adding value to industries, and recycling in an environmentally sustainable manner through the management of each department's scope and attributes, and the formulation of specific promotional measures and action items in line with their professional authority and responsibility. We will work together to implement the program and review the annual greenhouse gas emissions on a rolling basis to achieve Kaohsiung's reduction targets.

The total carbon reduction of the implementation plan is 3.405 million tons of CO2e, of which 2.018 million tons are mainly from the manufacturing sector, 706,000 tons from the residential and commercial sector, and 279,000 tons, 267,000 tons, 108,000 tons, and 28,000 tons from other sectors such as energy, agriculture, transportation, and environment, etc., as shown in Table 3-1 for details.

Table 3-1 Carbon Reduction in the First Phase of Kaohsiung's Greenhouse Gas Reduction Strategy

Departments	Reduction Strategy	Promoter	Carbon Reduction
renewable energy	:: Promotion of renewable energy	Works Bureau, Economic Development and Labour Bureau	27.9
manufacture	Expanded promotion of energy resource integration in industrial areas Promoting environmental recycling in industrial areas Green transformation of high carbon emission industries (e.g. relocation of Kaohsiung oil refinery) ● Replacement of oil-fired boilers or use of low-carbon fuels in business establishments (industries) :: Enactment of an autonomous ordinance on greenhouse gas control in the industrial sector Establishment of the Industrial Energy Saving and Carbon Reduction Technical Advisory Panel Development of reduction credits/carbon labeling products Public-Private Interdepartmental Cooperation on Greenhouse Gas Reduction	Environment Bureau, Economic Development and Labour Bureau (EDB)	201.8

housekeeper	Enforcement of the Green Building Autonomy Ordinance to create a green building environment in the city ● Promote green roof program to reduce heat island effect Installation of energy-efficient street lamps to save electricity consumption of public lighting Promoting electricity and fuel saving measures in the public sector Kaohsiung City-County and City Jointly Promote Electricity Saving Action for Residents and Businesses ● Installation of LED signs and bus shelters Enhancement of power saving benefits Expanding urban parks and green spaces Promoting community-wide tree planting Creating a green living space Subsidizing public and private open space greening projects Promote the Urban Flower Field Scheme and the Three-dimensional Greening of Buildings Promoting the Community Greening and Landscaping Program to Beautify the Cityscape Encourage green consumption and promote energy-saving and simple living habits. ● Energy users set energy saving targets of 1% per year ● Visited 20 types of designated energy users to check their compliance with the three energy saving requirements The Ministry of Education subsidizes local governments to organize environmental education counseling groups.	Environmental Protection Bureau, Economic Development Bureau, Works Bureau, Education Bureau, Transport Bureau, Metropolitan Development Council.	70.6

Departments	Reduction Strategy	Promoter	Carbon Reduction
Agriculture	:: Promote green and friendly restaurants using local ingredients :: Promoting the organization of vegetarian lunches in schools to reduce carbon emissions ● Create an ecological corridor in Kaohsiung, linking up the network of wetland parks. Expanding urban parks and green spaces Promoting community-wide tree planting Creating a green living space Counseling to encourage afforestation to increase forest area and enhance the natural environment :: Promoting biogas generation, reuse of biogas and replacement of energy-saving lamps in livestock farms Use of animal manure and urine digestate as farmland fertilizer Fishing Vessel and Raft Acquisition and Disposal Scheme :: Promoting the Fishing Vessel Incentive Moratorium Program	Works Bureau Education Bureau Agriculture Bureau Metropolitan Development Authority Marine Department	26.7
Transportation	Expansion of a diversified bicycle road network Promotion of low-carbon transportation tools ● Introduced incentives for public bicycling to increase willingness to use bicycles ● Expansion of service area with additional public bicycle system stops ● Provide public transportation system ticket integration and interchange discounts Provision of regional shuttle bus service :: Promoting the E-bus program (installing smart stop signs and strengthening the dynamic information system of buses) to enhance the efficiency and usage ratio of public transportation services. Promote the construction of Kaohsiung Circular Light Rail Transit (LRT). Promoting the replacement of One Card Digital Student Identity Card for new senior secondary vocational students and transfer students in the city ● Replacement of old diesel ferries to create electric ferries Procurement of low carbon energy or clean fuel vehicles for public vehicles Introducing electric or low-carbon energy buses to promote low-carbon transportation. ● To tie in with the Electric Vehicle License Tax Reduction and Exemption Scheme :: Implementation of high parking rates and motorcycle parking charges Provide bicycle parking racks to provide a bicycle-friendly environment. Provision of a subsidy program for the replacement of old motorcycles with new electric motorcycles Phase I & II Retirement of Old Diesel Vehicles	Rapid Transit Authority Transportation Bureau Environmental Protection Bureau Finance Bureau Tourism Bureau Education Bureau Administration and International Office	10.8

Environment	Implementation of Green Purchasing in the Public Sector :: Increasing the prevalence of sewerage connections Increasing the number of recycling channels to promote waste reduction and recycling Training of environmental volunteers to promote environmental awareness at the grassroots level Inventory and verification of greenhouse gas emission sources for targets above a certain size.	Environment Bureau Water Resources Bureau	2.8
Total Quantity of goods			340.5

Each Departmental Reduction Results Highlights

Energy Department

In order to promote the development of green power, the Kaohsiung City Government has been promoting "Solar Green Financing" since 2012.

"In 2020, the Kaohsiung City Green Power Promotion Task Force was established to build on the foundation of the past and actively promote the development of green power, expanding to include energy-saving initiatives, smart meters, and the creation of green energy demonstration zones, in order to build Kaohsiung into a high-tech, low-carbon, smart green city. The Green Power Promotion Task Force has been actively developing the application of renewable energy through three major planning directions: energy creation, energy conservation, and energy storage, and has been carrying out five major tasks, including the "priority demonstration and promotion of fishery and power coexistence zones," "promotion of photovoltaic roofing in public and private housing," "acceleration of power saving and low-carbon action plans through energy-saving service models," "friendly downsizing of electric power plants in Kaohsiung City," and "green energy planning for school buildings and the development of smart electricity use. Continuing to promote the six innovative ordinances, matchmaking and subsidy programs, and working with the Bureau of Energy of the Ministry of Economic Affairs to promote Kaohsiung's green power policy and industry development, Kaohsiung's cumulative capacity of solar photovoltaic installations has reached 984.01 MW.

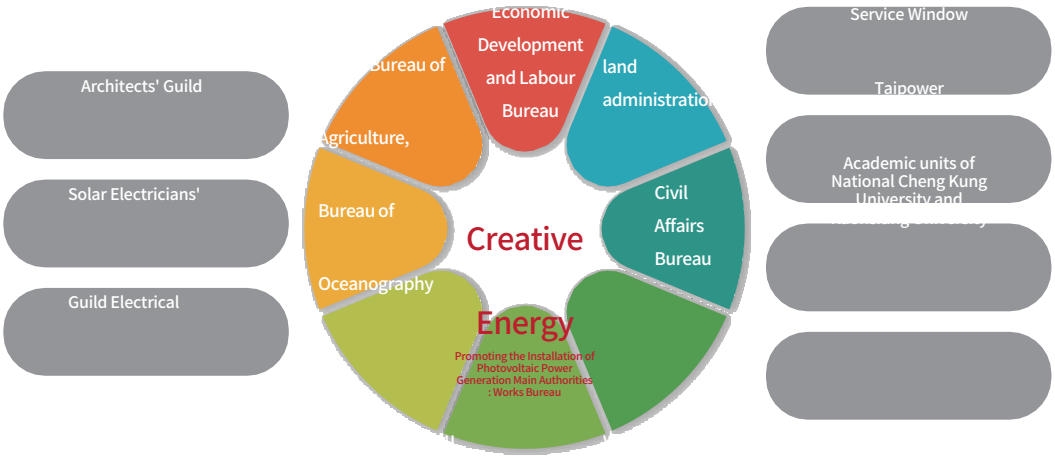


Figure 3-3 Partners of Kaohsiung Green Power Promotion Group

Manufacturing

In 2015, the Kaohsiung refinery ceased production and relocated, reducing carbon emissions by 2.6 million tons of CO2e. In 2017, the Kaohsiung Municipal Emission Standards for Air Pollutants for Combustion Equipment and the Kaohsiung Municipal Subsidy Measures for Switching to Low-Pollution Gas Fuel for Combustion Equipment were released to promote the use of clean fuels by industry operators, and the Linhai Industrial Park's Regional Energy Integration Program was formed. The Kaohsiung City Energy Saving and Carbon Reduction Counseling Group has been formed to assist industries in process and energy saving improvements, and to promote matchmaking enterprises to assist housing and commercial departments in the replacement of energy-consuming facilities.

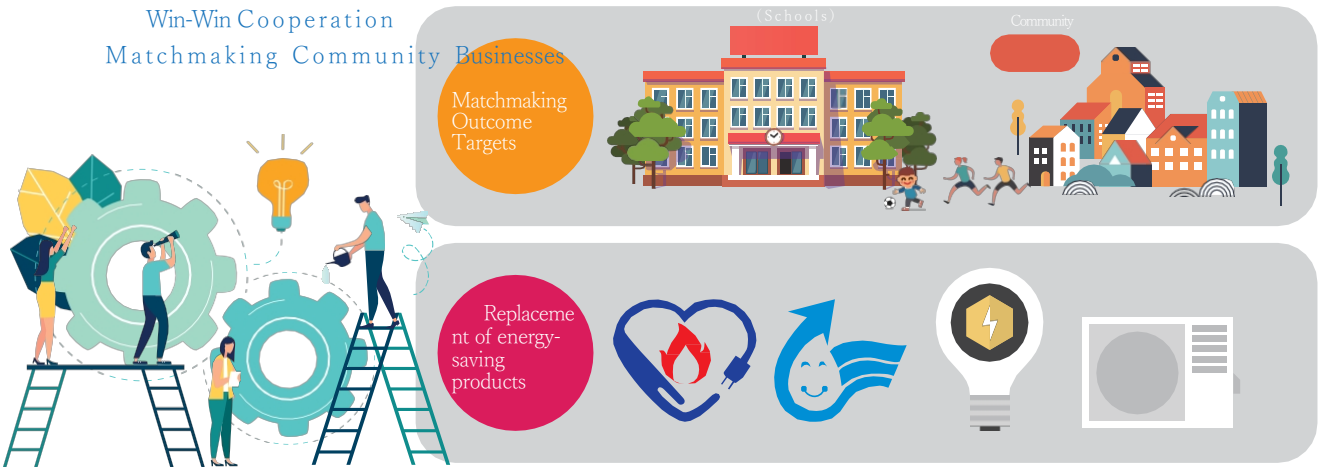


Figure 3-4 Public-Private Interdepartmental Cooperation on GHG Reduction

Residential and commercial sectors

The city's energy users have set energy conservation targets, saving 1% of electricity annually and reducing carbon emissions by a total of 417,590,000 tons. In response to Kaohsiung City's environmental issues, we plan to establish the Kaohsiung Sustainable Living Environment Transformation and continue to promote

"The Kaohsiung Alcove Project, which will enter Kaohsiung Alcove 3.0 from 2020, emphasizes the improvement of air pollution and the increase of three-dimensional green coverage to create healthy buildings in Kaohsiung Alcove. At the same time, the "Green Roof Project" has been promoted to reduce the heat island effect, greening can also retain water and sequester carbon, reduce temperature and save energy by 30%, and has created a green area of 460,000 square meters; and the "Green Building Autonomy Ordinance" has been implemented to make it mandatory for all types of buildings to comply with green building regulations, and with the integration of various benefits, carbon can be reduced by 1,380,000 metric tons per year.

Figure 3-6 Rooftop Greening of Kaohsiung Alley

圖3-6高雄巷屋頂綠美化

費。The city's replacement of 128,000 energy-saving LED streetlights is expected to save 70 million kWh and $110 million in electricity annually.

In addition, it will provide 27,000 tons of carbon reduction.

Figure 3-5 Kaohsiung Alley Solar Power Facility

IV Transportation Departments

Kaohsiung actively promotes green sharing of transportation tools. As of September 2021, 197,000 two-way motorcycles have been replaced, the highest number in the country; in conjunction with the MRT system, the bicycle road network in the country has a length of 1,035.3 kilometers. Kaohsiung's public bicycle C-bike was retired in July 2020, and Smile Bike officially operated and upgraded the YouBike 2.0 in July. In December of the same year, it exceeded one million passenger trips per month, and in March of 2021, it set a record for the highest number of daily passenger trips at 48,000, and the cumulative total of passenger trips in August exceeded 10 million, and the city's goal of 1,000 rental stations was reached ahead of schedule.

Kaohsiung is a city with a variety of transportation means, including metro, bus, ferry, light rail, shared electric motorcycle, public bicycle, etc. The integration of transportation means through the MeNGo Monthly Transportation Pass can achieve the most optimal service.
MeNGo Card (Monthly Pass) is continuously offered by the Municipal Government. The city continues to offer the MeNGo Card (monthly pass), which includes four discounted monthly pass options: Unlimited Access, Bus Access, Bus + Passenger Access, and Ferry Access, as well as a 7-day pass (weekly pass) for students. By purchasing the Unlimited Access option, the public can make unlimited use of the city's public transportation services during the same month, and also receive four free ferry rides!

Free YouBike 2.0 for the first 30 minutes of unlimited rides, and free MenGo Point 200 or 600 points.
In addition, it can be used for cabs, shared electric scooters, and monthly passes for metro transfer parking; on October 1, 2021, t費 MenGo Hourly Pass (24, 48, 獲d 72 hours) will be launched, which will facilitate the public to use buses, metro, and other public transportation to travel around Kaohsiung, enhance the development of the quality of public transportation in the Greater Kaohsiung area, and at the same time, contribute to the mission of improving air pollution and reducing greenhouse gas emissions.

Electric vehicles are gradually taking off, but small cars are only part of the fossil fuels used in transportation, and there are other areas such as freight transportation, aviation, shipping, etc. Ferry transportation within the city's jurisdiction will give priority to old diesel ferries.

Figure 3-7 Kaohsiung YouBike 2.0 Public Bicycle System with Flexible and Dense Stations

The Government will replace the "Flagstaff No. 1" and "Flagstaff No. 2" ferries with electric ones; strengthen the promotion of low-carbon and green buses and the pursuit of sustainable development in the city, with a total of 192 electric buses as at the end of September 2021, which is more than the ratio of the city's total number of buses to the total number of electric buses in Hong Kong.
19.03%. It is expected that the proportion of electric buses in the city will reach 60% in 2025 and 100% of buses willbe electrified in 2030.


Figure 3-8 Kaohsiung City Shared Rides

V Agriculture

Kaohsiung City has 21 wetland parks with a total area of more than 1,055 hectares; by 2020, the average ratio of green space per citizen will reach 10.3 square meters.
Since 2011, there have been more than 45 green-friendly restaurants using local ingredients; promoting the policy of using animal husbandry manure, urine, and digestate as farmland fertilizer; currently, the city has approved 100 animal husbandry businesses to use digestate as farmland fertilizer, with a total approved application volume of 140,416 tons/year.
In addition, it reduced the use of 6,835 packages of chemical fertilizers; promoted incentives for voluntary fishing moratoriums and encouraged fishermen to adjust their operating periods, expecting a sharp reduction in the amount of fuel used by fishing vessels, with a cumulative total of 3,592 vessels and a total carbon reduction of 243,000 tons of CO2e.


Figure 3-9 Livestock Wastewater Facility Treatment Situation

VI Environmental Departments

Promote energy conservation, carbon reduction, and sustainable environmental education programs in schools at all levels to root the concept of low carbon downward. The nation's first "Automatic Resource Recycling Machine (ARM)" provides the public with a more convenient recycling pipeline, which will recycle 4.22 million waste containers in 2020, with the number of users reaching 930,000. The nation's first adoption by supermarkets, which will enable more businesses to join the recycling ranks through corporate adoption, in order to achieve the concept of ARM's sustainable management. Since 1980, we have been building sewage treatment plants and burying sewage lines, and after the merger of counties and cities, sewage treatment plants have been constructed.
Sewer takeover has increased significantly from less than 20% to 47.02% as of September 2021


Figure 3-10 Kaohsiung City Strengthens Sewer Sewer Takeover Rate


Figure 3-11 New Generation of Automatic Resource Recovery Machines

Chapter 4 Climate Change Adaptation Strategies and Actions

The melting of the Arctic ice sheet, forest fires in California and Australia, deadly floods in Asia, and drought followed by torrential rains in Taiwan are all real-life examples of extreme climate change that will once again set off alarm bells for climate change from 2020 to the present.
According to the National Oceanic and Atmospheric Administra- tion (NOAA) global temperature data for July 2021, the combined land and According to the U.S. National Oceanic and Atmospheric Administra- tion (NOAA) global temperature data, the combined land and ocean surface average temperature for July 2021 is 0.93°C above the 20th century average of 15.8°C, making it the hottest July in 142 years of record keeping. This will be the hottest July in 142 years of record keeping.

Taiwan is a small and densely populated country with a high incidence of natural disasters such as typhoons, heavy rains, and earthquakes. In addition, the rapid development of the society has increased the vulnerability of the environment, which has led to an increase in the frequency and scale of disasters in recent years. According to the Natural Disaster Hotspots: A Global Risk Analysis (World Bank, 2005), Taiwan ranks first in the world in terms of the area of land exposed to more than three natural disasters at the same time and the percentage of the population at risk, which is 73%. This demonstrates the urgency of climate change related actions.

Currently, mitigation and adaptation are the two most important strategies for coping with the impacts of climate change in the world. With regard to the latter, the Council for Economic Development of the Executive Yuan (now the National Development Commission) commissioned the Academia Sinica to establish an interdisciplinary team of consultants, and invited representatives from relevant ministries, experts and scholars, NGOs, and the industrial sector to set up the "Planning and Promoting Adaptation to Climate Change: Policy Framework and Action Plan" on January 29, 2010.
The "National Climate Change Adaptation Policy Framework" was developed by the "Taiwan Climate Change Adaptation Task Force" to propose a "National Climate Change Adaptation Policy Framework" with reference to international practices, and was divided into eight adaptation areas: disasters, infrastructure for sustaining livelihoods, water resources, land use, coasts, energy supply and industry, agricultural production and biodiversity, and health.

As for Kaohsiung City itself, in terms of adaptation development, it has cooperated with the "National Climate Change Adaptation Policy Framework" and the "Local Government Climate Change Adaptation Plan" promoted by the National Development Commission of the Executive Yuan, and completed the assessment of the impacts of climate change (temperature change, rainfall change, extreme weather, and sea level rise) on the city's eight major areas of adaptation (disasters, livelihood infrastructure, water resources, land use, coast, energy supply and industry, agriculture, production and biodiversity, and health). We have completed an assessment of the impacts of climate change on Kaohsiung's eight adaptation areas (disasters, infrastructure, water resources, land use, coastline, energy supply and industry, agriculture and biodiversity, and health), as well as the implementation of Kaohsiung's Local Climate Change Adaptation Program, which will help Kaohsiung move towards a sustainable city under climate change.

In 2015, in response to the passage of the Kaohsiung City Environmental Management Autonomy Ordinance and in order to promote the city's adaptation policy, the existing Kaohsiung Sustainable Development Committee was upgraded to the Kaohsiung Sustainable Development and Climate Change Adaptation Committee (hereinafter referred to as the Sustainable Development Committee), which proposes appropriate adaptation actions to match the existing Sustainable Development Committee's indicators and greenhouse gas reduction measures, in order to build a sustainable and low-carbon city.

In 2020, Kaohsiung City will reorganize its indicator structure with reference to the United Nations and national sustainable development goals, and set the following indicators

From 2020 to 2024, 80 sustainability-related KPIs will be developed, focusing on the following core objectives: ending poverty, sound quality of life, clean water resources, industrialization, innovation and infrastructure, sustainable cities and villages, responsible production and consumption cycles, and climate change response. In December of the same year, Mayor Chen Chi-Mai's 100-day policy address also pledged to initiate the compilation of the Kaohsiung City Sustainable Development Voluntary Review Report, demonstrating Kaohsiung City's determination and achievements in promoting sustainable development.

In June of the same year, the first Voluntary Local Review (VLR) of Kaohsiung City was completed through a number of inter-bureau meetings, civic cafes, results demonstration workshops, and expert consultation sessions, gradually focusing on Kaohsiung City's sustainability highlights.

Development Process program

In 2005, Kaohsiung City and Pingtung County jointly set up the Kaohsiung Regional Sustainable Development Committee to establish a regional cooperation mechanism, and formulated the Kaohsiung-Kaohsiung Sustainability Measurement System, which is a system to demonstrate the degree of sustainability in the region.

In April 2012, the "Kaohsiung City Council for Sustainable Development Setting Key Points" was revised and the organizational structure was adjusted to six groups (Sustainable Vision, Sustainable Environment, Sustainable Transportation, Sustainable Economy, Health and Well-being, and Sustainable Education) to continue to implement the promotion of a sustainable eco-city through communication, coordination, and division of labor integration.

In 2015, the Kaohsiung Adaptation Council for Sustainable Development and Climate Change was passed, based on the division of authority and responsibility of the working groups of the Council for Sustainable Development and the expansion of the four groups (Sustainable Water Resources, Sustainable Construction, Sustainable Safety, and Sustainable Coast), with the overall organizational structure shown in Fig. 4-1, to strengthen the completeness and feasibility of the policies of the eight adaptation areas and to serve as an important foundation for Kaohsiung to promote the resilient city transformation, with the objectives set as shown in Table 4-1. The objectives are shown in Table 4-1.

The Kaohsiung City Council for Sustainable Development has been in operation for many years and is now in its sixth term from March 1, 2021 to February 28, 2023, with a total of 21 members. Every five years, the Council evaluates and updates the indicators of each group based on the results of the Sustainability Council, the city government's policy plan, the national sustainable development goals, and the objectives of climate change adaptation. In order for the City's sustainability efforts to respond to international trends, it is important to emphasize the importance of sustainability in the City's work. In order to meet the needs of the local community, during the period of 2020-2024, Kaohsiung City's Voluntary Inspection Report and the indicators of the National Environmental Protection Program will also be included in the Sustainability Conference for reporting and tracking, so as to present the results of the city's performance in sustainable development.

Figure 4-2 Kaohsiung City's Fifth Second Sustainable Development and Climate Change Adjustment Conference

Organizational Structure of Kaohsiung City Sustainable Development and Climate Change Adaptation Association

metropole Lands BureauWater Resources BureauWorks BureauAgriculture BureauEconomic Development BureauOcean Affairs BureauEnvironmental Protection BureauLegal Affairs BureauResearch and Examination BoardFinance Bureau	Environment Bureau Agricultural Affairs Bureau, Urban Development Bureau, Works Bureau, Marine Department, Water Resources Department, Indigenous Peoples' Association of Hong Kong Research and Examination Board.	Economic Development and Labour Bureau Financial Services and the Treasury Bureau Comptroller's Office Environmental Protection Bureau Tourism Bureau Agriculture Bureau Oceanic Bureau Works Bureau Research and Examinat	ion Board Transportation and Development Bureau Youth Bureau	Transport Bureau Finance Bureau, Economic Development Bureau, Mass Transit Railway Bureau, Environmental Protection Bureau, Hong Kong Police Force, Hong Kong Examinations and Assessment Authority, Works Bureau, Administration Division	Works Bureau Bureau of Transportation, Bureau of Fire Prevention, Bureau of Rapid Transit, Bureau of Police, Bureau of Disaster Prevention, Bureau of Oceanography, Bureau of Water Resources.	fire dep art me nt Disaster Prevention Office, Public Works and Water Resources Bureau, Agriculture Bureau, Police Department, Civil Affairs Bureau, Social Affairs Bureau, Health Bureau, Environ	mental Protection Bureau, Mass Rapid Transit Bureau, Water Resources Bureau, Transportation Bureau, Education Bureau, Information Bureau, Ocean Affairs Bureau, Military Service Bureau, Labor and Welfare Bureau, Tourism Bureau, Cultural Affairs Bureau, Personnel Office, Research and Examination Council, and the Association of Former Citizens.	education bureau Home Affairs Bureau Social Welfare Bureau Culture Bureau Environmental Protection Bureau HKU Information Services Bureau	Health Bureau Agriculture Bureau, Environmental Protection Bureau Social Bureau, Home Affairs Bureau Education Bureau, Fire Services Bureau Police Department, Metropolitan Labor Bureau, Personnel Office of the former People's Liberation Army, Drug Prevention Bureau of the Research and Examination Council, Transportation and Development Bureau

water authority

Marine Bureau, Transportation Bureau, Environmental Protection Bureau, Health Bureau, Fire Bureau.

water authority

Environment Bureau

Agriculture Bureau

Economic Development Bureau

Works Bureau

Education Bureau

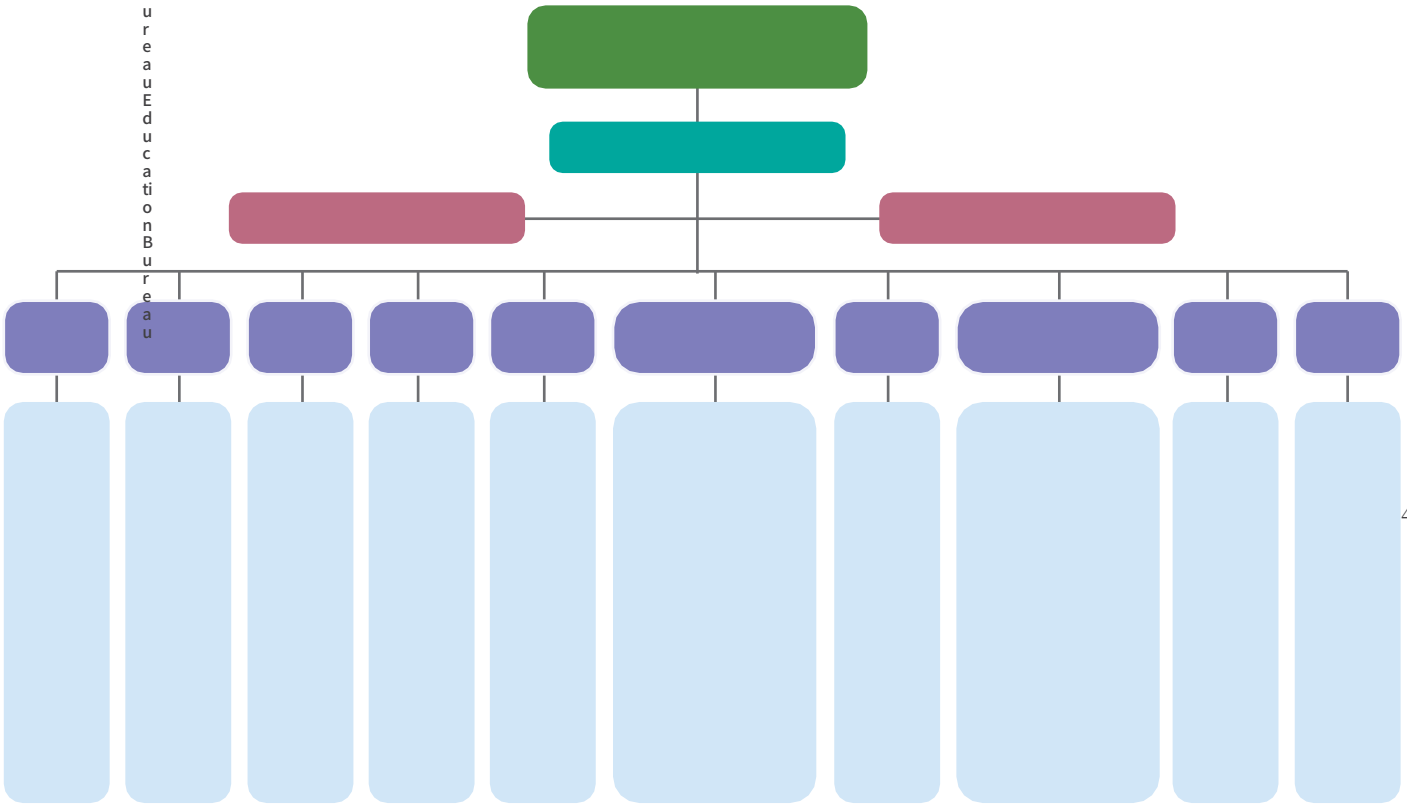


Table 4-1 Kaohsiung City Climate Change Adaptation Targets for Eight Areas

Disasters	:: Build a comprehensive disaster prevention and response system, improve early warning capabilities, and reduce loss of life and property in disasters. :: Adopt a water management strategy that is consistent with the texture of land change, promote integrated watershed and drainage management, and unify the concepts of drainage systems, soil and water conservation, and hilltop and flood prevention, so as to improve the flood control capacity of the city. Maintenance and reinforcement of the maintenance infrastructure. :: Comprehensive review of the problem of localized low-lying areas prone to flooding, improvement of the drainage system in low-lying coastal areas and desilting of streamcourses.
Water Resources	:: Strengthening the water resources management mechanism and enhancing the functions and effectiveness of water dispatching facilities, such as reuse of sewage and wastewater In addition, it promotes the technical needs for flood prevention and control, coastal protection, and ground subsidence prevention and control, as well as the design and planning of new water resource facilities and the promotion of diversified water supply strategies in accordance with the demand for water. :: Strengthening the management of reservoirs and their catchment areas and integrated watershed management, monitoring the water quality of environmental water bodies, preventing and improving pollution, and creating an environment for important rivers and streams. :: Strengthen drought prevention and emergency response, establish a drought prevention and relief system, set up a complete drought prevention and relief system from the central to the local level, and strengthen research on drought warning systems. :: Promote research on water conservation technologies for industries, develop various alternative water source technologies, and organize water conservation and water saving campaigns.
Agricultural and biodiversity	Planning and implementation of restoration of degraded ecosystems in accordance with ecological principles. :: Developing measures for rice production under the new meteorological environment. :: Protecting and linking existing protected areas or potential biodiversity hotspots, and building ecological networks to promote biodiversity. :: Developing measures to cope with catastrophic weather conditions on agricultural production.
seashores	Establish a long-term monitoring system for sea level, coastal and ground subsidence, and strengthen the establishment of a coastal zone database to regularly evaluate the results of observations, and utilize satellite remote sensing and geographic information systems to classify potentially hazardous areas in the city, placing climate change prevention as a major priority for urban development. Enhancement of flood control infrastructure and drainage systems in coastal areas, as well as disaster simulation and modeling. , updating high target flood and coastal defenses to minimize potential impacts. Raise the existing buildings in the low-lying areas and review the planning of the waterfront industrial areas to include the factor of possible sea level rise in the EIA. :: Strengthen education and public awareness of the risks posed by sea level rise, develop standard operating procedures for disasters and evacuation routes and locations, publicize hazardous areas, and develop post-disaster recovery plans to mitigate the damage to affected residents.

	Review the advantages and disadvantages of existing spatial planning in adapting to climate change and take the impact into consideration. Organize various types of land use monitoring or integrate the existing GIS database to grasp the current land use situation in the jurisdiction, so as to revise and adjust the land use adaptation strategies and regulations accordingly, and actively manage the situation.
land use	Enhance the effectiveness and adaptability of land flood control in urban areas, and plan for the necessary flood retention space and urban disaster prevention and evacuation sites and facilities. Review and adjust land use plans and management in areas prone to typhoon and tidal wave overflow, strengthen the mechanism for reviewing development permits for coastal areas, and review the design of urban plans in consideration of sea level rise. :: Protecting and strengthening the disaster preparedness of critical public infrastructure and institutions, including hospitals and clinics, schools, mass transit systems, power plants, water supply plants, etc., to reduce the impact of disasters.
Maintenance Infrastructure	:: Strengthen research on the adaptive capacity and implementation of infrastructure, including flood management systems, urban drainage systems, and water supply management mechanisms. Participate in international academic research to strengthen disaster prevention capabilities through the exchange of research results and technologies. :: Integrate transportation system planning and urban plans to develop a sound rail-based mass transit system and encourage the public to use the urban mass transit system.
Energy Supply and Industry	In line with industrial development policies and plans, we have established independent disaster prevention capabilities for industries to strengthen their ability to adapt to climate change and to change their industrial structure and energy resource demand patterns. Strengthening the adaptive capacity of industrial zones, such as establishing early warning systems and emergency response systems, conducting education and training, introducing insurance systems, etc., and conducting training on policies related to disaster prevention in industrial zones. :: Strengthen the training of human resources and the research and development and promotion of technologies for energy supply and industrial climate change adaptation, and create an environment conducive to the innovation and upgrading of industrial climate change adaptation technologies.
well-being	:: Strengthen the public's knowledge of prevention and health care for cardiovascular and respiratory diseases caused by climate change, and enhance the promotion of preventive and health care measures such as prevention and treatment, health education and training. ● To implement emission reduction to achieve the air pollution emission reduction targets, and to strengthen the operation and functional maintenance of air quality monitoring stations to provide real-time air quality monitoring information. To prevent and control the occurrence of indigenous dengue fever cases, strengthen surveillance and notification during normal and epidemic periods, and promote related epidemic prevention and publicity work. To study various types of vector mosquitoes, identify the vectors of infection, vector mosquito densities and breeding conditions, and establish a database of basic management systems for infectious diseases to provide strategies for the prevention and control of infectious diseases and disease vectors. :: Establishment of an epidemic disease surveillance system and a notification system, and timely release of surveillance results to provide public health personnel In order to prevent the introduction of pathogens from outside the country, the government and the public should provide early warnings to medical units and the public to fight the vectors as soon as possible.

SectionII - Kaohsiung City Climate Change Ada

Program Kaohsiung City Climate Change Ada

In 2013, Kaohsiung City held the "First Climate Change Adaptation Platform Meeting" to analyze the background information and location of the city's climate change, to discuss the possible impacts of the city's current situation and the threat of climate change, to explore the systematic impacts on the city's eight adaptation areas when the climate change factors (temperature change, rainfall change, extreme weather (heavy rainfall), and sea level rise) are changing, and to conduct vulnerability assessment and analysis within the areas and adjust the current adaptation plans and topics. In addition to analyzing the vulnerability assessment and adjusting the current adaptation plans and issues, the city also plans and proposes adaptation strategies and actions for each area, with a total of 75 strategies and 424 actions.

On November 25, 2014, a Strategy and Action Workshop was held with recommendations from experts and academics and the Bureau.

In addition, the Government should also consider the feasibility of centralized funding support, the feasibility of spatial governance,

flagship integration, and remedial measures to fill the gaps.

The program has been adjusted and focused into 83 short-term projects and 21 integrated short-term adaptive actions, based on factors such as building foundation, short-term momentum, and other factors.

In 2017, the MOST TaiCCAT tool was used to quantify the vulnerability of Kaohsiung City's eight major areas and to identify the risk hotspots in each area, and to link the integrated short-term actions in the past, in accordance with the principles of "streamlining and focusing" and "prioritizing" planning as the basis for rolling corrections, and the important actions include the Adjustment Action for the International Rolling Review, the Adjustment Action for the Prevention and Rescue of Extreme Disasters due to Climate Change, the Adjustment Action for Industries Impacting Kaohsiung City, the Adjustment Action for Reviewing the Configuration of Vital Infrastructure of Highway System, and the Adjustment Action for Coastal Areas. The important actions include the adaptation of international rolling review, the adaptation of climate change extreme disaster prevention and relief, the adaptation of industries in Kaohsiung City to cope with the impact of climate change, the adaptation of highway system life-sustaining infrastructure configuration review, and the adaptation of coastal areas.

Kaohsiung City's adaptation strategies for different areas in response to climate change are organized as follows:

Grasping data on vulnerability to natural disasters due to climate change for land management

In accordance with the National Land Planning Act, the Metropolitan Development Bureau has formulated the city's national land plan, and the Bureau of Land Management has carried out the actual designation of the functional zoning of the national land, which includes: "National Land Conservation Areas" to strengthen resource conservation and national land security, "Marine Resources Areas" to integrate the diversified needs of the sea, and "Agricultural Development Areas" to ensure good agricultural land and food safety.

"Urban and Rural Development Areas" promotes intensive development and growth management in urban and rural areas. In order to minimize the impact of development on the environment, it will manage land use and climate change adaptation plans according to the functional zoning of each country, ensure national security, conserve the natural environment and human assets, and promote the rational allocation of resources and industries.

Based on the RCP8.5 scenario of the 5th IPCC report, the MOST Disaster Management Information R&D Application Platform simulates and analyzes rainfall through dynamic rainfall scales to analyze the hazards, vulnerabilities, and exposures of inundation and slope hazards in future scenarios, and to estimate the risk level to assist governmental decision makers in taking adaptive measures, disaster prevention and mitigation planning, etc., or evaluating the major development and response measures in the high-risk areas to reduce or mitigate the occurrence of disaster risks. The EPA program also helps decision makers in the government to adopt adaptation measures, disaster prevention and mitigation plans for high-risk areas, or to evaluate the response measures for major developments, in order to reduce or mitigate the risk of disasters and protect the target groups from the impact of disasters. The EPA program team collated relevant data from Kaohsiung City and found that the risk of flooding will be highest in Zuoying, Nanzi, Sanmin, Xinxing, and Qianjin, which have the highest risk in the base period.
In addition to Dashe, Daliao, Tianliao, and Linyuan districts, the risk of other districts also increased, as shown in Fig. 4-3; the slope risk is still the most serious risk in the base period, such as Liugui, Koshien, Maolin, Taoyuan, and Namashia, while Tosong, Alien, Tianliao, and Gangshan showed signs of easing, as shown in Fig. 4-4.

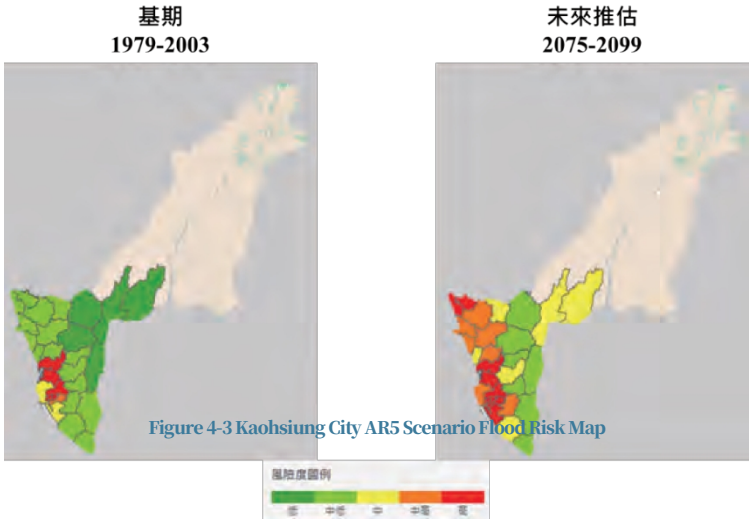
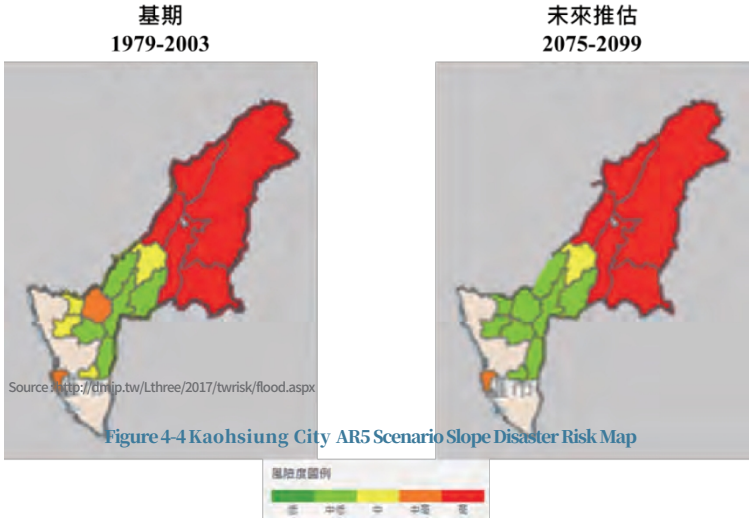


Figure 4-3 Kaohsiung City AR5 Scenario Flood Risk Map



Source: http://dmlp.tw/Lthree/2017/twrisk/flood.aspx

Figure 4-4 Kaohsiung City AR5 Scenario Slope Disaster Risk Map

Climate Change Extreme Disaster Prevention, Rescue and Adaptation Operation

Kaohsiung City has strengthened its overall disaster prevention capacity through the implementation of the Disaster Prevention and Rescue Deep Cultivation Program. Following the second phase of the program from 2015-2017, in order to deepen the capacity of disaster prevention and rescue at the grassroots level as well as the community's independent disaster prevention and rescue, Kaohsiung City has promoted the five-year "Disaster Prevention and Rescue Deep Cultivation Phase III Program" since 2018, with the work items including the investigation of disaster potential, the revision of regional disaster prevention and rescue plans, and the inventory of the energy used for disaster prevention and rescue, Promote resilient communities, publicize the disaster prevention morale system, invite businesses to participate in disaster prevention, and plan and build disaster prevention parks. Highlights include:

Disaster Potential Analysis and System Strengthening

Based on the City's natural hazards such as wind and water hazards, slopes, earthquakes and tsunamis;

toxicity and chemical hazards; and industrial pipelines.

man-made disasters, such as dengue fever and other biological pathogenic disasters, study and plan the city's 38 districts of short-, medium-, and long-term

Plan Improvement Measures: In 2021, update a total of 4,416 various disaster potential analysis maps and disaster prevention maps, including: 78 municipal maps, 2,556 district maps, and 1,782 citywide disaster prevention cards for 891 miles in English and Chinese.

The

Disaster Prevention and Relief Programs and Procedures

Completing the compilation of disaster prevention and relief plans for the 38 districts in the city, and organizing them every two years in accordance with the Disaster Prevention and Relief Act.

The revision of the plan is based on the newly promulgated Disaster Prevention Information Recognition and Updating Program, and is based on the Disaster Potential Classification System.

Analyze the additions and deletions of disaster species in various districts.

Disaster Prevention and Rescue Energy Integration

After investigating the equipment and other resources of each district office and completing a comparative assessment with the EMIC system, we will analyze the situation in each district.

Before and after the implementation of the program, the results show that the manpower, material resources and capacity for disaster prevention and relief have been substantially increased.

The disaster potential maps were used to determine the potential of the disaster. In addition, the team was commissioned to review the material and engineering maintenance contracts signed by the district offices and to assist in examining whether manufacturers have signed contracts with various public offices. The disaster potential mapping was used to conduct a disaster assessment of the suitability of civil asset storage sites and to propose relevant review recommendations to enhance the effectiveness of the disaster relief efforts.

In addition, we organize disaster prevention education and publicity for different target groups to enhance

the public's knowledge of disaster preparedness and self-rescue.

In addition, the government will reduce the incidence of disasters and minimize damage to the community in order to facilitate sustainable development. In terms of disaster prevention and education, it will combine agencies, schools, and organizations to hold 7,202 events in 2020, and increase the intensity of disaster shelters, accumulating 451 shelters for 275,031 people (accounting for 9.97% of the city's registered population).

Gaoxiong City Diversified Water Resources Development and Adaptation Actions

In order to cope with the increasing demand for water resources for people's livelihood, agriculture and industrial industries in Kaohsiung, the water supply from reservoirs and streams alone is not enough to meet the demand, especially in recent years when the drying period is lengthening, and it is a priority to actively promote the development of diversified water sources and to put forward water resources development plans accordingly. To this end

In addition, Kaohsiung City promotes multiple water solutions, such as the Volt Flow Water Project (8 locations), recycled water, water discharge recycling, and the joint use of Tainan-Kaohsiung water sources, which can be used as a backup water source during droughts and allow for more space for water resource allocation during weekdays.

Recycling of wastewater after treatment is an important part of the sustainable development of water resources, therefore, the city has organized the recycling of wastewater from wastewater treatment plants. Until June 2021, a total of 6 public sewage treatment plants will be put into operation, namely Fung Shan Water Resource Center, Central District Sewage Treatment Plant, Tai Shue Sewage Treatment Plant, Nan Tsz Sewage Treatment Plant, Chi Mei Sewage Treatment Plant, and Gang Qiao Sewage Treatment Plant, which can provide a total of 58,978 CMD of discharged water (including reclaimed water) for internal and external use.

Figure 4-5 Fung Shan Water Resource Center

The

The Department of Economic Affairs Water Resources Department and the Water Company have been actively developing underground vadose water since 2015, and have now completed the Cipo along Gao Ping Creek.

The maximum water supply from the eight vadose zone projects (as shown in Figs. 4-6), including Tai Chuen, can reach 790,000 tonnes per day, and the standby function has achieved the effect of stabilizing the water supply.

Figure 4-6 Schematic Location of Vadose Water and Groundwater Development in Kaohsiung City


手巾寮地下水
10
溪埔 15
傍河 10
高屏堰
大泉 15
竹寮 10
3
九曲堂 5
翁公園 10
拷潭深井 4
會結 5
圖例:
3 地下水量:3 萬噸/日
10 伏流水量:10 萬噸/日

Adaptation Exercise for the Review of the Provision of Infrastructure for Maintenance of the Highway System

The impacts of climate change can trigger extreme hazards such as high temperatures, sea level rise, droughts and rainfall. Hazards can easily lead to negative impacts on the maintenance infrastructure. The increased frequency of heavy rainfall in recent years has not only increased flooding, but also increased the risk of flooding.

The risk of river, slope and embankment scouring, which could result in urban road and slope collapses, embankment erosion and other disasters that could threaten the lives and properties of the public, are all issues that the City must review and respond to in the future.

In addition, in order to build a resilient city, the Kaohsiung Land Project strives to link infrastructure to strengthen the city's disaster prevention capability, and regularly reviews public infrastructure to strengthen its functions and improve its effectiveness through management systems and mechanisms. In addition, population density, distribution of major industries, urban watersheds, and complex disaster trends are incorporated into the planning of related infrastructure, and are prioritized or included as enhancement measures in land use plans. In the future, we will review and adjust the land use and management of areas prone to typhoon and tidal flooding to protect and enhance the disaster prevention capabilities of important public infrastructure and organizations.

Continuous promotion of the Intelligent Flood Control Management System

In response to the increasing frequency of disasters and changes in management thinking, the Kaohsiung Water Resources Bureau has promoted the "Kaohsiung Intelligent Flood Control Network Promotion and Construction Program" to gradually expand monitoring equipment, collect large amounts of data and analysis, and improve the efficiency of prediction and early warning as a basis for flood management and administration. The project builds an Internet of Things (IoT) transmission to the cloud to collect big data and develop Kaohsiung City's intelligent flood control management system and flooding warning system, with the hope that, under the mutual assistance of the central and local governments, an AI intelligent flood control network model will eventually be developed, so that disaster prevention personnel can grasp the information on the situation of the disaster, and in response to the threat of flooding caused by the future pattern of short-term heavy rainfall, to prevent and reduce flooding and minimize the threat of the public's life and property and the loss of life and property.

The Water Resources Bureau is also planning to organize the Kaohsiung City Intelligent Water Monitoring Network Project, initially planning to use the Ai River and the Baozhu Ditch as the demonstration area, and to widely distribute IoT IoT sensing components and communication methods in various water facilities to collect a large amount of data and conduct an overall analysis. In order to understand the flow conditions in the city's underground pipelines and collect data on the undulation of the groundwater level, new storm sewer-related monitoring equipment will be added to analyze the direct response of rainwater runoff and to provide information about the flood retention ponds.

The intelligent joint operation of hydraulic and electrical facilities, such as pumping stations and water gates, can find the optimal mode of operation between collection and discharge to achieve the goal of flood water resource utilization.

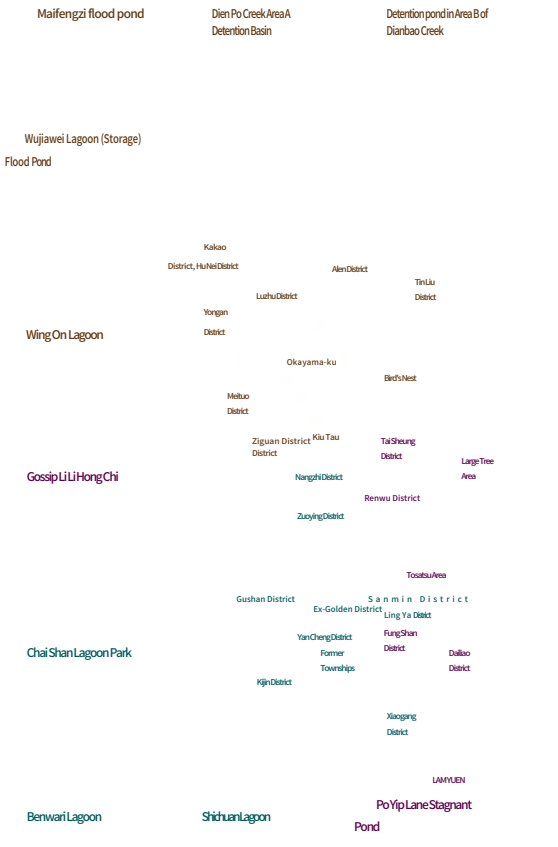
Micro Stagnant Flood Complex Space Demonstration and Adaptation Actions

Kaohsiung City, based on the results of the analysis of the vulnerability to climate change flooding and the national land strategy for flooding, has targeted highly vulnerable and

In highly populated urban planning areas, we will select demonstration areas and evaluate the public facility sites (parks, green areas, plazas, etc.).

The feasibility of using the site (e.g., parking lot, etc.) as a flood retention space and elevated flood protection.

The city is often paved in an impermeable way, like a concrete jungle, which does not allow excessive rainwater infiltration into the ground surface, when faced with the threat of extreme weather, typhoons or short delays in the onslaught of heavy rainfall often lead to accumulation, flooding does not recede, and the low-lying areas of low-lying areas are even overflowing, so the city currently has a total of 15 stranded flood ponds (Figures 4-7), with a total storage capacity of about 3.26 million tons, and it is estimated that at the end of this year (2021), another 1 additional stranded flood pond (Wujiawei stranded flood pond), by then the total flood storage capacity of 3.86 million tons, the highest in Taiwan. A detention pond (Wujiawei detention pond), when the total flood storage capacity of 3.86 million tons, ranking first in Taiwan, the other has been agreed by the central government to subsidize the processing of Guangchang detention pond and Dienbao Creek D detention pond - Phase II, is expected to reach a total of 4.24 million tons of flood storage in 2030, the concept of the concept of reservoirs, rainfall is too much when the conductive water storage, drought sent to the water balance, like a sponge, like the sponge in the suction and release of the control of the free flow, and is conducive to It is favorable for regulating microclimate, reducing the urban heat island effect, providing citizens with open space and taking into account the natural ecology and low-maintenance management functions, and greatly increasing the ability of Kaohsiung City to contain water and resist disasters (Figure 4-8).

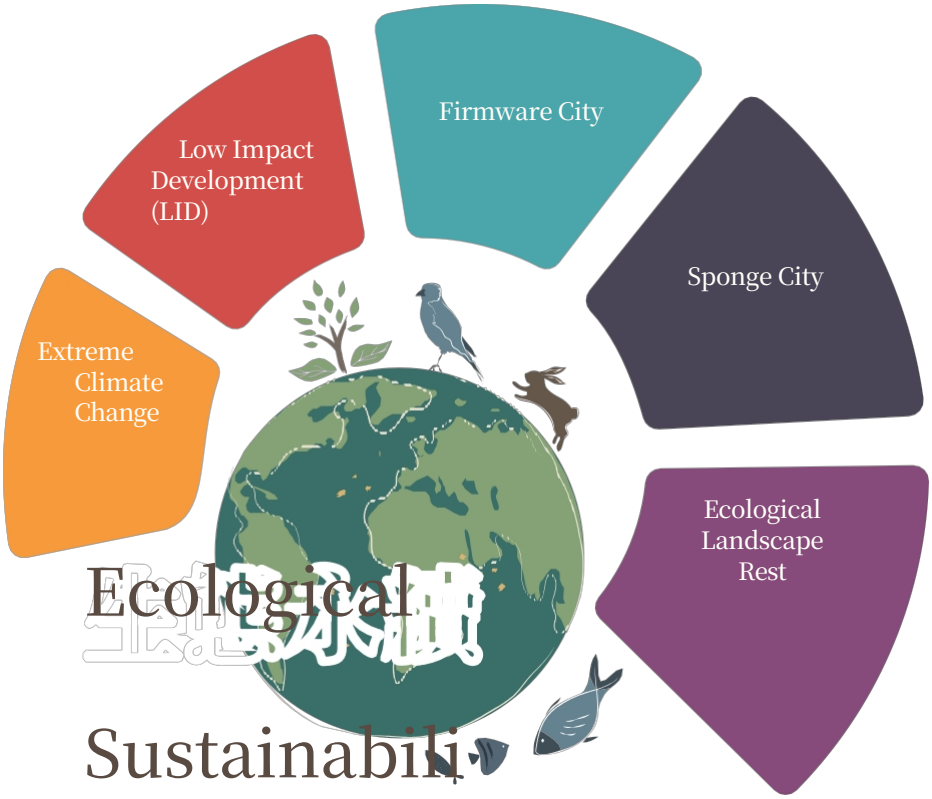


Kaohsiung City Stagnant Pond Distribution Map

Name of the flood storage tank	滯洪量 (million tons)	Explanation
1. Frontier flood ponds	37.5	completed
2. Dien Bao Creek Area A Detention Basin	43	completed
3. Dingbao Creek Area B Detention Basin	105	completed
4. Dingbao Creek Area D Detention Basin - Phase 1	25	completed
5. Lion Rock Creek Stagnant Pond	20	completed
6. North House Lagoon	2.8	completed
7. Benan Lagoon Park	0.8	completed
8. Stagnant Pond at Peak Ditch	22.5	completed
9. Fung Shan Canal Stagnant Pond	18	completed
10. Po Yip Lane Stagnant Pond	10	completed
11. Ten full lagoon pools	6	completed
12. Honholi Lagoon Pond	11	completed
13. Chai Shan Lagoon Park	6.5	completed
14. Bagua Li Li Hong Chi	1.5	completed
15. Yongan Lagoon	17	completed
16. Wujiawei Lagoon (Storage) Flood Pond	60	Projected 2021 fundamentally complete
17. Dilbao Creek Area D Detention Basin - Phase II	25	Projected 2022 fundamentally complete
18. Guangchang Stagnant Flood Pond	12.4	Planning Review

Figure 4-7 Distribution of Kaohsiung City Stagnant Ponds

Source: Kaohsiung City Water Resources Bureau



Source: Kaohsiung City Water Resources Bureau

Figure 4-8 Lagoon Benefits

Adaptation of Agricultural Production to Climate Change in Kaohsiung City

The Kaohsiung City Government's Bureau of Agriculture promotes the "110th Annual Facility-Based Agriculture Program" in hopes of guiding farmers to build structurally reinforced greenhouse facilities, improve disaster prevention and production efficiency, produce high-quality fruits and vegetables, flowers, specialty crops and seedling products, and lead the way to improving operational efficiency and stabilizing supply and demand in the marketplace. 36.66 hectares were approved for the first phase of the program, and 36.66 hectares were approved for the second phase.

Climate Change Induced Infectious Disease Adaptation Actions

Due to the effects of global warming, climate change, and the increase in urban population density, Kaohsiung is facing great challenges in dengue fever prevention and control, and has become the most favorable environment for vector mosquitoes to grow, and as the hub city of the new southward direction, and as an international port, Kaohsiung is subject to frequent international exchanges due to foreign marriages, importation of foreign laborers, tourism, and business exchanges. As the risk of importation of vector-borne infectious diseases is increasing, the prevention and control of these diseases will become more and more stringent. In the face of the challenge of new infectious diseases, the Kaohsiung City Government has been gradually revising its epidemic prevention measures and developing appropriate epidemic prevention strategies in response to the international migrant workers, tourist groups and new residents brought about by the New Southbound Policy.

In 2020, Kaohsiung City, faced with the threat of the COVID-19 international epidemic, successfully stopped the dengue virus from entering the country by strengthening environmental control and vector mosquito surveillance at centralized quarantine centers and quarantine hotels for international migrant workers and fishermen, as well as implementing the "Battle Outside the Country - Border Quarantine" strategy for rapid screening of incoming dengue NS1, which is a strategy for preventing dengue virus from entering the country. Thanks to the efforts of the city's epidemic prevention team and the implementation of the city's various epidemic prevention strategies and innovative behaviors, the city has achieved "zero" confirmed cases of local dengue fever for the first time in the past 22 years since 1998, when official statistics were released by the Department of Disease Control (DCD). This year (2021), the city government's epidemic prevention team will build on last year's success by formulating the "Kaohsiung Municipal Government 110 Annual Important Mosquito-borne Disease Prevention and Control Work Plan", breaking through and innovating the two major measures of "Medical Integration" and "Fighting Outside the Border", as well as continuing to carry out

Continuously strengthened new measures for dengue fever prevention and control through various prevention

strategies such as "education on the rule of law" and "community epidemic prevention".
In addition, we are actively working on strategies to prevent the influx of dengue fever from outside the country, to reduce the risk of dengue fever infection in the community, and to protect the health and safety of Kaohsiung citizens.

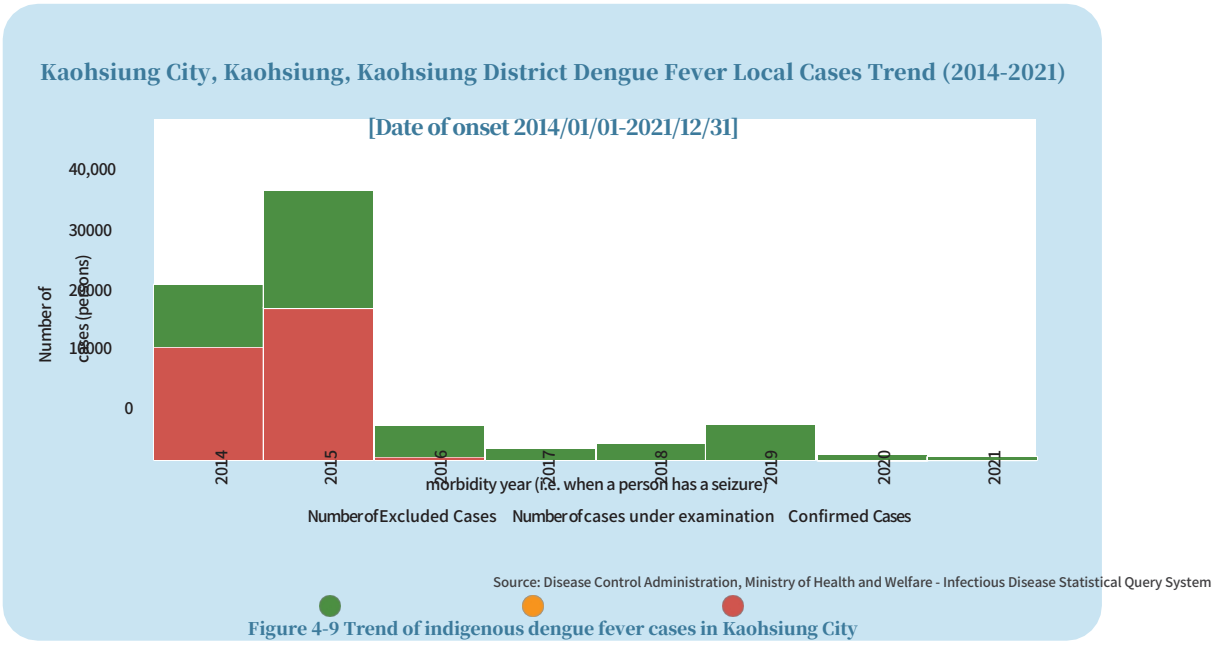


Figure 4-9 Trend of indigenous dengue fever cases in Kaohsiung City

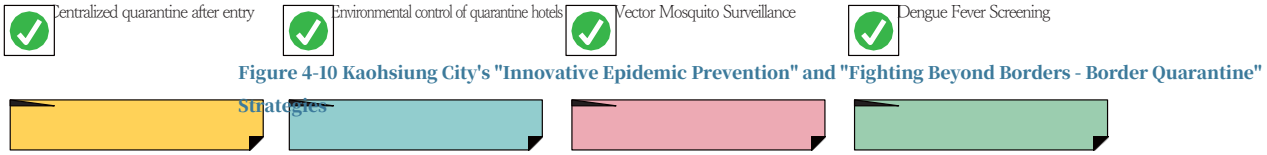


Figure 4-10 Kaohsiung City's "Innovative Epidemic Prevention" and "Fighting Beyond Borders - Border Quarantine" Strategies

Chapter V

Participation in International Affairs and Achievements in International Exchanges

In 2005, Kaohsiung completed the planning of its climate change action strategy, and has been actively participating in international conferences and international city exchanges since that year. The following year, in December 2006, Kaohsiung joined the Council of Local Governments for Sustainability (ICLEI) and became the first member city of ICLEI in Taiwan. ICLEI is currently the most widely recognized international alliance of cities on the issue of environmental sustainability. Its member cities cover more than 2,500 local governments in about 125 countries, and its main purpose is to promote international cooperation among local governments to advocate environmental protection and sustainable development.

After Kaohsiung became a member city of ICLEI, it actively participated in relevant conferences and activities, including the ICLEI-led Firmware Cities Conference (2010~2017, 2019), the triennial ICLEI World Congress, and the Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (e.g., COP21 to participate in the Global Alliance of Mayors Conference). of the Parties (COP) (e.g. COP21 for the Global Alliance of Mayors).
Kaohsiung attended the peripheral conferences organized by ICLEI (COP22 and COP23). Kaohsiung City shared its experience and results of climate adaptation actions, such as biodiversity and flood prevention, with cities from other countries in the world, so as to bring new international trends and technologies into the country and rethink local applicability to formulate better adaptation strategies.

In addition, Kaohsiung City cooperated with ICLEI in 2012 to establish the Capacity Training Center (ICLEI Kaohsiung Capacity Center, or ICLEI KCC) in Kaohsiung City, which became the only training center outside of ICLEI's headquarters in Germany. In addition to directly serving ICLEI's member cities in Taiwan, Kaohsiung City also fosters the sustainability of the cities in the East Asia region through a variety of ways, serving as a bridge between Taiwan and the world's cities. ICLEI is the only training center outside the German headquarters of ICLEI. Over the years, ICLEI and Kaohsiung have co-organized the "International Symposium on Disaster Reduction and Adaptation" and the "Kaohsiung Low-Carbon City 2.0 Professional Training Workshop",
"The Kaohsiung International Symposium on Mitigation Strategies for Transforming Green Cities" and other large-scale conferences provide member cities with opportunities for exchanges and learning.

Kaohsiung is also a member city of the United Cities and Local Governments (UCLG), which, like ICLEI, is a relatively large non-profit organization of local governments at the present stage, and was founded with the purpose of actively establishing a platform for global cooperation and information exchange, and promoting understanding of cultural differences and economic development of various countries through international exchanges and cooperation among local governments, as well as advocating democratic self-governance on many issues such as economy, society, gender and environmental protection. UCLG was founded to actively establish a platform for global cooperation and information exchange, and through international exchanges and cooperation among local governments, to promote understanding of cultural differences and economic development of various countries, and to advocate democracy and self-government for local governments, and to carry out and achieve results in many issues such as economy, society, gender, and environment.

Kaohsiung joined the UCLG in 2012 and actively participates in the meetings organized by the UCLG. Kaohsiung belongs to the Asia Pacific Chapter of UCLG, and is the most populous city and member city among the eight chapters, as well as a high economic development region. Representatives of the cities take advantage of the meetings to exchange and share their views on economic development, social welfare, and environmental protection issues.

In addition, Kaohsiung City applied to join the Compact of Mayors (COM) in 2015. The coalition was established in 2014 at the United Nations Climate Conference by the international network of three major cities, UCLG, ICLEI, and C40 (Cities Climate Leadership Group, or C40), which initiated the Global Alliance of Mayors initiative, with the vision of integrating the majority of the world's cities, and allowing cities to publicize their existing reduction targets, plans, and annual progress reports, in a joint effort to reduce greenhouse gas emissions. The vision of the Global Mayors' Coalition is to integrate most cities around the world so that they can publicize their existing reduction targets, plans and annual progress reports, and work together to reduce greenhouse gas emissions. Kaohsiung City applied to join the Alliance on October 27th of this year and became a Compliant city. On December 7th, Kaohsiung City was the only city to speak on behalf of the East Asia region at the COP21 meeting of the Global Alliance of Mayors, demonstrating Kaohsiung City's determination to promote climate change mitigation and adaptation. The Global Alliance of Mayors and the European Covenant of Mayors (Covenant of Mayors) announced their alliance on June 22, 2016, to form the larger "The Global Covenant of Mayors for Climate & Energy" (GCoM), which will continue to expand the city's influence in the area of The Global Covenant of Mayors for Climate & Energy (GCoM) will continue to expand the city's influence on global climate change.

Kaohsiung City also participated in the first Carbon Disclosure Project (CDP Cities) launched by the Carbon Disclosure Project (CDP) in 2011, and has so far submitted 11 annual carbon disclosure reports, revealing information on urban governance, climate hazards and vulnerability, adaptation, and mitigation, and has received the highest grade of A (Leadership City) three times in the years 2018, 2019, and 2021. In 2018, 2019 and 2021, it has received the highest rating of A Grade (Leadership Cities) for three times.

In order to proactively address the air pollution problem and implement the Sustainable City Strategy, Kaohsiung City applied to join the program at the end of 2019.

"The Powering Past Coal Alliance (PPCA), after a rigorous review process, officially announced Kaohsiung City as a member of the Alliance on September 17, 2020, at the United Nations Energy Transition Alliance High-Level Meeting, joining forces with the United Kingdom, Canada, and other members of the alliance to work together to convert coal-fired power generation into clean energy.

Because the impact of climate change is essentially a local issue with strong spatial characteristics, Kaohsiung City has also cooperated with the German Climate Service Center (GERICS) since 2019 to learn from the European Union's adaptation program, and under its guidance, selected demonstration sites for climate change adaptation, activated the interview mechanism, and designed, developed, and produced a local adaptation program with stakeholders through a bottom-up approach.

From the above, it can be seen that Kaohsiung City has spared no effort in participating in international climate change related conferences and events, and the results of the major conferences that Kaohsiung City has attended over the years are summarized in Table 5-1. The Kaohsiung City Government will continue to communicate with cities and their think tanks in the future, to look for possible cooperation and voice opportunities, and to demonstrate Kaohsiung's achievements in the promotion of climate change mitigation and adaptation.

In addition, we are actively striving for international recognition.

Table 5-1 Summary of Kaohsiung's Participation in International Conferences on Climate Change

time Time	land Points	Meeting Meeting	summarize summary
June 2005	San Francisco, USA (San Francisco, USA)		Participation in the United Nations Framework Convention on Climate Change (UNFCCC).
December 2005	Montreal, Canada (Montreal, Canada)	COP11	
November 2006	Kenya, Nairobi (Nairobi, Kenya)	COP12	
December 2006			Kaohsiung City officially became a member of ICLEI.
2007 December 8 to December 13	Bali, Indonesia (Bali, Indonesia)	COP13 ICLEI Local Government Climate Conference	Mr. Siu Yu-cheng, Secretary for Environmental Protection, led the relevant staff to participate in the meeting.
2008 December 6 to December 13	Poznan, Poland (Poznan, Poland)	COP14 ICLEI place Government Climate Conference	Mr. LAU Chun-ying, Undersecretary for Environmental Protection, led the relevant staff to participate in the meeting.
2009 December 7 to December 18	Copenhagen, Denmark (Copenhagen, Denmark)	COP15 ICLEI place Government Climate Conference	Mr. Li Musheng, Secretary for the Environment Bureau, led the relevant staff to participate in the meeting.
2010 May 28-May 30	Bourbon, Germany (Bonn, Germany)	ICLEI's First Firmware City Conference and World Mayors' Forum	Mr. Li Musheng, Secretary for the Environment Bureau, led the relevant staff to participate in the meeting.

time Time	land Points	Meeting Meeting	summarize summary
2010 October 5 to October 7	Incheon, Korea (Incheon, Korea)	ICLEI 20th Anniversary & Urban Future Conference	Vice Mayor of Kaohsiung City Government, Mr. Lee Wing-Tak, attended the event.
2011 November 29-December 10	Cancun, Mexico (Cancun, Mexico)	COP16	Mr. Lam Chan-ming, Section Chief of EPA, led the relevant staff to participate in the meeting.
2011 June 3 to June 5	German Boon (Bonn, Germany)	ICLEI 2nd Firmware City Conference	Vice Mayor Liu Shifang of Kaohsiung City Government led the relevant staff to participate in the meeting. On behalf of the Mayor, Vice Mayor Liu participated in the Mayor's Forum, signed the Declaration of Boão and joined the Local Action for Biodiversity (LAB program).
2011 October 22 to October 24	Changwon City, South Korea (South Korea, Changwan)	ICLEI Low Carbon Transportation (EcoMobility) Changwon 2011) Meetings	Vice Mayor of Kaohsiung City Government, Mr. Liu Shih-Fang, led the relevant staff to participate in the meeting and signed the EcoMobili- ty Alliance Declaration, which is the first city in Taiwan to sign the declaration.
2012 November 28-December 9	Durban, South Africa (Durban, South Africa)	COP17	Mr. Zhang Ruifen, Secretary of Environmental Protection Bureau, Kaohsiung City Government, led the participants.
2012 May 13-May 15	Bourbon, Germany (Bonn, Germany)	ICLEI 3rd Firmware City Conference	Mr. Liu Shih-Fang, Vice Mayor of Kaohsiung City Government, led the participants in the conference. In addition to the three presentations, a special presentation by Kaohsiung City was added to the conference.
2012 June 14-June 17	Lai King, Brazil (Belo Horizonte, Brazil)	ICLEI Eighth World Congress	Mr. Ming-Chun Hsu, Director of the Legal Affairs Bureau of Kaohsiung City Government, led the meeting.
2012 September 4 to September 6	Jeju Island, Korea (Jeju Island, Korea)	ICLEI World Local Government Summit Meeting (World Local Government Summit)	Mr. Rui-Hui Chang, Director Secretary of Environmental Protection Bureau of Kaohsiung City Government, led the participants to observe the results of other cities on climate change adaptation, which will serve as a reference for Kaohsiung City in its implementation.

time Time	land Points	Meeting Meeting	summarize summary
2012 October 1 to October 5	Jakarta, Indonesia (Jakarta, Indonesia)	UCLG's 4th Asia-Pacific Regional Membership Meeting	Vice Mayor of Kaohsiung City, Mr. Liu Shih-Fang, led the participation and was approved by all members without objection at the Asia-Pacific Regional Conference on the 4th, successfully joining the UCLG.
2012 November 30-December 8	Kadaduha (Qatar, Doha)	COP18 and the 8th Kyoto Protocol Members' Meeting	The Kaohsiung Environmental Protection Bureau (KEPB) participated as a representative of ICLEI and presented Kaohsiung's achievements and experiences in sustainability, energy saving and carbon reduction at the peripheral activities organized by ICLEI, so that its own carbon reduction and sustainability policies can be in line with international standards.
2013 May 31-June 2	Bourbon, Germany (Bonn, Germany)	ICLEI 4th Firmware City Conference	Ms. Linhua Chen, Deputy Director of Environmental Protection Bureau of Kaohsiung City Government, led the team to participate in the conference and promote the APCS Asia-Pacific Cities Summit to be held in Kaohsiung City in September 2013 at the same time. The meeting was organized by the Hong Kong Institute of Certified Public Accountants (HKICPA), and representatives of cities in the Asia-Pacific region were invited to attend the meeting on-site.
2013 June 9 to June 13	Maldives (Maldives, Male)	—	Kaohsiung City Vice Mayor Liu Shih-Fang led representatives from relevant bureaus and departments to Malé to share the city's experience of sustainable development with the city, put forward policy proposals to address the city's urgent needs, and established a sister city agreement.
2014 April 14-April 23	Copenhagen, Denmark Hamburg, Stockholm, Sweden	—	Mayor Chen Ju will lead the relevant bureaus and departments. In addition, the team went to three cities in Denmark (Copenhagen), Sweden (Stockholm), and Germany (Hamburg) for a 10-day study tour of green capitals in the hope that the study tour would capture important urban design concepts and serve as an important reference for Kaohsiung City's future move toward green urban design.

time Time	land Points	Meeting Meeting	summarize summary
2014 May 27-June 6	Bourbon, Germany (Bonn, Germany)	ICLEI The Fifth Firm City Conference	Mr. K.T. Chan, Director of EPA, led a team to participate in the conference, which focused on urban resilience and adaptation, and risk and vulnerability assessment and analysis of the impact of climate change on public health.
2015 April 8 to April 12	Seoul, Korea (Seoul, Korea)	ICLEI Ninth World Congress	Vice Mayor Wu Hongmou led the discussion and signed the Seoul Declaration on the topics of Low Carbon Cities, Sustainable Cities and Smart Cities.
2015 June 8 to June 11	Bourbon, Germany (Bonn, Germany)	ICLEI The 6th Firmware City Conference	At the conference, the Durban Agreement was signed, making it the first city in Taiwan to have a local government sign a commitment to biodiversity.
2015 December 4 to December 10	Paris, France (Paris, France)	COP21	The delegation was led by Vice Mayor Mr. Wu Hongmou, who was the only city representative from East Asia to speak at the Conference of the Global Alliance of Mayors (COM) as a city representative.
2016 March 2 to March 3	Malacca, Malaysia (Malacca, Malaysia)	ICLEI 2016 Asia-Pacific Firmware Cities Conference	The "Resilience and Biodiversity" session of the conference shared experiences in promoting flood prevention and control, and integrating biodiversity across sectors.
2016 July 6 to July 8	Bourbon, Germany (Bonn, Germany)	ICLEI The 7th Firmware City Conference	Invited to give a presentation after the Opening Ceremony, together with the National Oceanic and Atmospheric Administration (NOAA) of the United States of America, London, Pontin (France) on "Ecologically Based Adaptation Models: Front-End Studies, Partnerships and Urban Projects".
2016 September 1 to September 2	Seoul, Korea (Seoul, Korea)	2016 Seoul Mayors' Forum on Climate Change	Attended the Mayor's Forum on Climate Change organized by the city, and made a commitment to the Paris Agreement for future reduction and adaptation actions.

time Time	land Points	Meeting Meeting	summarize summary
2016 September 4 to September 9	KOREA KUN MOUNTAIN (Gunsan, Korea)	6th UCLG Asia-Pacific Regional Council	Participation in forums and seminars on urban development The meeting will include the "New Urban Agenda Region, Life and Culture", the Asia-Pacific Executive Board meeting, the Members' Meeting, and discussion with other cities on the nominees for the new Chairperson.
2016 October 11 to October 20	Colombia Bogota Ecuador Quito (Bogota & Quito)	2016 UCLG World Council & Habitat III	At the World Council, received the annual report of UCLG and witnessed the election of the President; at the Habitat III Conference, attended the Eco-Transportation Conference organized by the City of Quito, reported on the results of the City's promotion and promoted the 2017 Eco-Transportation Celebration.
2016 November 11 to November 18	Marrakech, Morocco (Marrakech, Morocco)	COP22	Participated in the COP22 Official Periphery Conference co-organized by ICLEI and the German Advisory Board on Global Change (WBGU), and was presented on stage by Chen Jinfu, Director of the Bureau of Transportation, making him the only city representative from Taiwan to appear on stage in an official capacity.
2017 May 2 to May 11	Bourbon, Germany (Bonn, Germany)	ICLEI The 8th Firmware City Conference	Mr. Tsai Po-Ying, Deputy Secretary General of Kaohsiung City Government, led the participants in the conference. This year, we have secured two presentation sessions and arranged city talks with the Danish Overseas Self-Governing Territories of the Faroe Islands, Oslo, Norway, Bologna, Italy, and Guimarães, Portugal.
2018 June 18-June 25	Montreal, Canada (Montreal, Canada)	ICLEI Tenth World Congress	Secretary for the Environment Tsai Meng-yu led the delegation and was invited to present at the "Participatory Urban Design for Eco-mobility" forum as the Chair of the Eco-mobility Alliance, and presented two reports at the Multi-City Dialogue, as well as having bilateral city exchanges with Barcelona, Spain and Honiara, Solomon Islands.

time Time	land Points	Meeting Meeting	summarize summary
2019 June 24-July 4	Bourbon, Germany (Bonn, Germany)	ICLEI The 10th Firmware City Conference	Mr. C.S. Yuen, Director of the Environmental Protection Bureau, led the delegation and gave presentations on "Creating Innovative Landscapes for Urban Firmware" and "Natural Infrastructure Firmware and Restoration", as well as a presentation on "Creating Compatible, Multi-stakeholder, and Financiable Flood Firmware". He was a panelist in two sessions: "Toward Climate Resilience in Northeast Asian Cities" and "Toward Climate Resilience in Northeast Asian Cities".
2019 October 14 to October 20	Valencia, Spain (Valencia, Spain)	Workshop on Urban Water Supply Challenges and Solutions under Climate Change	Prof. Chushi Ding, a member of Kaohsiung Sustainable Development and Climate Change Adaptation Council, and Yi-Chen Chen, a health inspector from Environmental Protection Bureau, attended the conference to share the water supply crisis of Kaohsiung under climate change, and to communicate with the INNOVA team in Valencia to learn about the use of System Dynamics and VENSIM software. This conference is one of a series of INNOVA project conferences organized by Valencia, Spain, one of the demonstration sites of the project.
2021 April 13-April 15	Malmö, Sweden (Malmö, Sweden)	ICLEI The Eleventh World Congress	Vice Mayor Luo Dasheng was invited to share Kaohsiung's experience in developing a circular economy and its future outlook through a video presentation at the session of "Towards a Sustainable City by Following the Way of Circular Development" on April 14th (local time). He also shared his experience with the Mayor of Finland Turku and other speakers to discuss the opportunities and challenges of localizing the circular economy.
2021 October 31-November 12	Glasgow, UK (Glasgow, UK)	COP26	Mr. Xu Jinchun, Director of the Environmental Protection Administration (EPA), shared Kaohsiung's experience in energy conservation and carbon reduction through video at the "Towards Net Zero Transformation Cities Action Forum" organized by the Environmental Protection Administration (EPA) of the Executive Yuan (Taiwan) on the morning of November 6, UK time, and exchanged views with representatives from the City of Edinburgh Council, the Institute for Global Environmental Strategies (IGES), and Taiwan's six cities in both physical and online modes.

11th ICLEI World Congress 2021

International Affairs in response to Climate Change

The World Congress is ICLEI's triennial event, originally scheduled for April 13-15, 2021 in Malmö, Sweden. The ICLEI World Congress 2021 in Malmö has been changed to an online conference due to the impact of the new Crown Pneumonia outbreak, and the conference has even launched a global online series of ICLEI's sustainable development activities with local governments, with "The Road to Malmö– Exploring Sustainable Urban Development" as the key theme. The key theme will be "The Road to Malmö", which will create the momentum for sustainability in 2022.

Kaohsiung Vice Mayor Mr. Dasheng Luo was invited to share his city's experience in the development of circular economy and its future outlook at the "Following the Circular Development Pathway Towards Sustainable Cities (《Following the Circular Development Pathway Towards Sustainable Cities》)" session. Vice Mayor Luo said that Kaohsiung City has promoted various sustainable policies in the area of "resource symbiosis and circular economy", including energy integration in industrial areas, greenhouse gas control, waste recycling and reuse, and the Southern District Green Energy Demonstration Plant.

Currently, 14 Kaohsiung manufacturers have joined the Regional Energy Integration Program, which aims to achieve the most efficient integration of regional energy resources, improve energy efficiency, reduce resource consumption, and minimize pollution emissions and greenhouse gas emissions in the region. The city has also set up a green power promotion group and joined the Coal Reduction Alliance. The early decommissioning of the coal-fired units at the Xingda Power Plant under the city's jurisdiction is estimated to reduce carbon emissions by 3.3 million tons. In addition, the city has begun planning for a green energy demonstration plant in the Southern District to promote community participation in public construction and rebuild a new plant that meets the requirements for renewable energy power generation equipment, which is expected to bring greater green energy benefits to the city of Kaohsiung.

Figure 5-1 Vice Mayor Tat-Sang Lo's Report at ICLEI World Congress

26th Conference of the Parties to the United Nations Framework Convention on Climate Change (COP26)

COP26 will be held in Glasgow, Scotland, from October 31 to November 12, 2021, and the pursuit of net-zero emissions is the main theme of the conference. The Environmental Protection Administration (EPA) of the Executive Yuan organized the "Towards Net Zero Transformation Cities Action Forum" at 10:00 a.m. local time on November 6, inviting representatives from the City of Edinburgh Council, the Institute for Global Environmental Strategies (IGES), and the six capitals of Taiwan to share their views both physically and online, with the hope that Taiwan and the world can work together to move towards net zero.

During the forum, Mr. Xu Jinchun of the Kaohsiung Environmental Protection Bureau shared that Kaohsiung City has been actively reducing the city's total carbon emissions through public-private partnerships, gradually removing the use of coal in the industrial sector, developing clean energy, strengthening waste recycling, creating zero-carbon communities, and planting trees. At present, Kaohsiung City is actively transforming its traditional heavy industries, and at the same time introducing various high-tech and emerging industries, including semiconductors, machinery, aerospace, and 5G, etc., linking up various industrial parks from north to south to build a high-tech industrial corridor, and transforming itself into a high-end manufacturing center, gradually moving towards a low-carbon city.

The host of the forum, Deputy Executive Director Lin Zilun of the Office of Energy and Carbon Reduction of the Executive Yuan,

said that through in-depth exchanges, the forum will be held at the same time.

In addition to presenting the results of Taiwan's urban net-zero transformation on the international stage and converging with the world trend, the program also lays a good foundation for the promotion of urban net-zero in Taiwan through healthy competition and common improvement among cities, and jointly moves towards Taiwan's vision of sustainability.

Figure 5-2 Kaohsiung EPA Shares Experience in Energy Saving and Carbon Reduction

Climate Change

The impact of climate change is essentially a local issue with strong spatial characteristics. Since 2018, the Kaohsiung City Government has had a preliminary link with the Climate Service Center Germany (hereinafter referred to as GERICS) established by the Ministry of Science and Technology of Germany in its work on climate adaptation and has started further cooperation in 2019. The two organizations will start further cooperation in 2019, which will include learning and application of climate change adaptation methodology, collection and analysis of overseas adaptation cases, signing of memorandum of understanding and exchange of visits between the two sides, as well as stakeholder interviews and analyses.
The delegation of Kaohsiung City Government also paid a visit and attended the 10th Anniversary of the establishment of GERICS on July 1, 2019, which was a great success.

Kaohsiung is the first GERICS city in Asia to collaborate in the development of climate adaptation services, and Dr. María Máñez Costa, a scientist at the Center and facilitator of the European Union's INNOVA project (INNOVA project), has included a case for collaboration between Kaohsiung and the city and the four INNOVA Hubs, namely Guadeloupe, French West Indies, representing small islands, and Kiel, a fishing port city in northern Germany, to learn from the collaboration. They are Guadeloupe (French West Indies), representing a small island; Kiel, a fishing port city in northern Germany; Valencia, a metropolis in Spain; and Nijmegen, a lowland city in the Netherlands.

The INNOVA program, known as Innovations in Climate Service Delivery, selects different types of cities
The climate adaptation process is based on a bottom-up approach at the scale of the region, enabling it to be applied to similar regions and sectors, and transforming the innovations into methodologies for developing business opportunities.

. Kaohsiung City's exchanges and cooperation with GERICS are organized as follows.

I. Visiting the Adaptation Demonstration Sites

Selection of demonstration sites for climate change adaptation is one of the key areas of cooperation between the two parties. In order to allow GERICS to have more assistance and participation, the EPA arranged for GERICS researchers Dr. Maria Màñez Costa, Dr. Class Teichmann, and Dr. Ruoting Huang to visit the Zhongdu Wetland (Kaohsiung Alcove 3.0 Zhongdu Demonstration Area) and the Kaohsiung Railway Undergrounding Parkway, through site visits and discussions and exchanges. Through site visits and discussions and exchanges, they evaluated and selected the most suitable demonstration sites.

Figure 5-3 "Kaohsiung Alcove 3.0 Midterm Demonstration Area" Discussion and Communication

II. Adaptation Demonstration Points

2. Kaohsiung Agricultural Adaptation Case: Jade Lotus Lychee

The Kaohsiung City Environmental Protection Bureau (KCEPB), through the recommendation of the Bureau of Agriculture (BAG), selected the Yuho Bao Lychee in Dashu, Qishan City, as a demonstration area for agricultural adaptation. The project team and GERICS consultant Dr. Huang Ruoting interviewed farmers, related personnel from the Bureau of Agriculture, researchers from the Agricultural Laboratory, insurance brokers, and the Big Tree Farmers' Association, etc., to synthesize the data from the interviews, draw a systematic power map, and then analyze the economic cost to find the most appropriate adaptation method.

In addition to being highly recognized by the European Commission when reporting at the INNOVA General Assembly, the INNOVA project also produced a short animated video to illustrate, through the example of the Innovation Base, how to use innovative business models to provide co-development and co-design of climate services; the video is available in six versions, including English, German, French, Spanish, Dutch, and traditional Chinese. The video is available in English, German, French, Spanish, Dutch, and Traditional Chinese. The video presentation will be published on March 26, 2021 on the JPI The video presentation was published on March 26, 2021 on the JPI EU website, and the link to the traditional Chinese version is h&#xfffd;ps://youtu.be/_jFxzURnNMs. In addition, the implementation process and research results of the INNOVA project have been published in the international journal Climate Services, and have been invited to be presented at the European Conference on Climate Change Adaptation 2021 (ECCA 2021). The results were also published in the international journal Climate Services.

Figure 5-4 Jade Lotus Bun Lychee Research Results Presented at ECCA 2021

2. Kaohsiung Alley 3.0 Climate Protect

Kaohsiung City released the Green Building Autonomy Ordinance in 2012, and actively promoted the green building "Kaohsiung Alley", which has now evolved to version 3.0. According to the Bureau of Public Works, the first stage of Kaohsiung Alley 3.0 is planned to take the Zhongdu Wetland and the Asian New Bay Area as the priority demonstration sites, combining the Wetland Park and the Aihe River, and introducing the wind corridor cooling, high green coverage, etc., to shape the benefits of the Kaohsiung Alley's site, so that in the future, the Kaohsiung Alley will no longer be a single building community, but will be clustered to become a regionalized trend of development.

Therefore, the Kaohsiung Environmental Protection Bureau project team and GERICS consultant Dr. Huang Ruoting interviewed architects, structural engineers, interior designers, landscape engineers, civil engineers, real estate developers, construction companies, and Kaohsiung Alcove residents who have been involved in Kaohsiung Alcove construction projects, to collect the professional opinions and experiences of experts and people on Kaohsiung Alcove and to find out the relevant factors for Kaohsiung Alcove 3.0. Climate, Disaster Prevention, Economy
In addition, the Kaohsiung City Government's Works Bureau has provided the Kaohsiung City Government's Works Bureau with information on energy conservation, social needs, and construction methods as a reference for the future planning and development of the Kaohsiung Alcove.

III. Urban exchanges with the INNOVA program

(i) Nijmegen, Netherlands

Kaohsiung Municipal Government Team Visits European Green Capital 2018 on June 29, 2019

"Mr. Michal Hustinx, Project Manager of Nijmegen, introduced the background of Nijmegen and the European Green Capital. During the visit, Mr. Michal Hustinx, Project Manager, introduced the background of Nijmegen and the European Green Capital; Mr. Maarten van Ginkel, Director of Urban Planning of Nijmegen Municipality, introduced the city's climate adaptation work; Mr. Ginkel, host of the INNOVA program in Nijmegen, introduced the climate adaptation work of the city; and Mr. Ginkel, Director of the Research Centre for Climate Adaptation of the Wageningen University and Research Centre, introduced the climate adaptation work of Nijmegen. Dr. Wim Timmermans from the climate adaptation team of Wageningen University and Research Centre, the host of the INNOVA project in Nijmegen, introduced the city's nature-based climate adaptation program with soil and geology and climate modeling. This was followed by an outdoor tour led by the Nijmegen Municipality staff, who visited the climate adaptation plan for the Waal River and examined the urban plan and the residential area.

Figure 5-5 Nijmegen Municipality representatives and Dr. Huang Ruoting report on the "Return Land to the River" project.

Half of the Netherlands is below 1 meter above sea level, and 26% is below sea level, making it known as a lowland country. The city of Nijmegen is located on the eastern edge of the Netherlands, and is the oldest city in the country. The city of Nijmegen is located on the eastern side of the Netherlands, and its city center is built along the River Waal, a tributary of the Rhine River, making it the oldest city in the Netherlands.

The Municipality of Nijmegen started a large-scale flood control program in 1995 with the idea of urban renewal by transforming the riverbank. After a topographic and geological survey and a hydrological analysis, the Vaal project team decided to move 350 meters inland from the north side of the Vaal river across the existing Vaal dam, and to convert the east side of the new channel across the Vaal dam into a controllable gate for snowmelt in winter and the mechanized diversion of floodwaters during summer storms.

Nijmegen's insistence that the Dutch central government value the ideas and opinions of the local authorities.

The project has enabled the Municipality of Nijmegen to take the lead in the "Returning Land to the River" program and to successfully transform the flood protection project into an opportunity for urban rezoning and regeneration of the cityscape.

Figure 5-6 Implementation of Nature-based Climate Adaptation Programs for the Ware River in the City of Nijmegen

Source: Nijmegen City Council

(ii) Valencia, Spain

The Valencia, Spain executive team, which is also part of the INNOVA program, is organizing a "Workshop on Urban Water Supply Challenges and Solutions in the Face of Climate Change" in October 2019, inviting national

/In Kaohsiung City, Prof. Chushi Ding, a member of the Council for Sustainable Development and Climate Change Adaptation, and the team from the Environmental Protection Bureau attended the meeting. Prof. Ding cited his research on the artificial lake in Dachaozhou as an example, sharing how rainwater can be collected during the rainy season and diverted to recharge the groundwater, which can not only slow down the rate of subsidence caused by over-pumping of groundwater downstream, but also provide additional water sources for water supply.

。 In addition, in order to solve the problem of high turbidity of raw water from Gao Ping Creek during the rainy season and water shortage during the dry season, the Greater Kaohsiung area has set up a water intake project along the Gao Ping Creek, and the water obtained from the water intake project is cleaner than that obtained from Gao Ping Creek due to the filtration of water through layers of filtration, and the turbidity is superior to that obtained from Gao Ping Creek, which makes the cost of the subsequent treatment of the tap water less expensive, and eliminates the need to dosage water vigorously in order to purify the water, which was hotly debated by the participants. This was enthusiastically discussed by the participants.

We also arranged an exchange with the INNOVA team in Valencia to learn how to use system dynamics and VENSIM software to bring in relevant climate information, cost-effectiveness, and important parameters for stakeholder consideration in a scientific way, in order to create localized adaptation solutions through local adaptation and knowledge integration.

Figure 5-7 Prof. Ding Chushi's Report on Flooding and Water Scarcity Problems in Kaohsiung

Chapter
VI

Urb ow Carbon Sustainable Future

Kaohsiung has a major international air and container port, and is home to heavy industry, petrochemicals, and traditional industries. In addition, the city's three coal-fired power plants have resulted in some of the highest emissions of stationary pollutants and energy use in the country. In addition, the city's metropolitan, industrial, and port areas are heavily congested with trucks and motorcycles, resulting in one of the worst pollution burdens in the country.

The Paris agreement (PA) starts this year (2021), according to which countries have put forward legislation and commitments on net-zero emissions or carbon neutrality, and at the same time, carbon pricing strategies (carbon tax/fee, emission trading mechanism) are also used as an important tool to achieve the goal. At this stage, the Carbon Marginal Adjustment Mechanism (CMA) is the most important tool to achieve the target.
The Border Adjustment Mechanism (CBAM) will definitely cause an impact on Kaohsiung's industries. Therefore, it is an urgent responsibility to help Kaohsiung's industries internalize the external costs of carbon emissions, and the city government team will work together with the industries in the hope of opening up new opportunities.

In order to enhance the environment and quality of life, Kaohsiung City has strengthened various environmental protection control measures, utilized comprehensive land planning, adjusted the main axes of industries, and improved various environmental protection and infrastructure measures during the development of the park.
In addition, the city government will continue to promote various green industries such as tourism, culture and technology to create job opportunities, so that young people can stay in their hometowns and live in an environmentally sustainable and socially fair manner. In addition, the city government team will continue to promote various green industries such as tourism, culture, and technology, create job opportunities so that the younger generation can stay in their hometowns, and create environmentally sustainable and socially fair industrial development, so that economic development and environmental protection can be taken into account.

Kaohsiung City, in order to accelerate the achievement of the goal of real air quality improvement, in order to enhance air quality, reduce the odor of the home environment, and protect the health of the public and other three major aspects, to promote a number of air pollution improvement and carbon reduction measures, in line with the implementation of the green city carbon reduction, and synchronized with the United Nations Sustainable Development Goals (Sustainable Development Goals).

The concept of "SDGs" is integrated into municipal planning.
In addition to the four priorities of "industrial restructuring", "increasing employment", "transportation construction" and "improving air pollution", the company has declared "coal reduction" and "green power",
Adjusting the city's sustainable development strategy in all aspects to ensure that the SDGs17 goals can be realized, based on the five major energy transformation principles of "gas enhancement", "anti-nuclear" and "balanced".
The city has made every effort to promote municipal construction to keep up with the pace of international cities. The city is fully committed to promoting municipal construction, keeping pace with international cities, placing knowledge and technology at the core of future development, and creating an attractive and comfortable environment, in the hope of upgrading and transforming the city and laying a solid foundation for Kaohsiung's next 100 years of development.

Chapter VII

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