2025-2026

高雄市碳預算報告書

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I. Preamble

In 2022, Kaohsiung City will emit 53,532,600 metric tons of CO_2e in total and 52,348,800 metric tons of CO_2e in net after deducting the carbon reduction absorbed by the carbon sinks in the forest.
Article 4 of the "Kaohsiung City Net Zero City Development Self-Governance Ordinance" states that in order to achieve the goal of a net zero emission and sustainable livable city, the City shall reduce greenhouse gas emissions by 30% by 2030 compared to 2005 (66,147,000 million metric tons of CO_2e), and achieve net zero emissions by 2050.

In 2008, the UK established the Committee on Climate Change (CCC) and took the lead in proposing a Carbon Budget system, with a long-term goal of reducing greenhouse gas emissions to 80% below 1990 levels by 2050. "Carbon Budget" means that a cap on carbon emissions must be established and implemented. The cap is set for a period of five years, and each department proposes a strategy to achieve the cap. The competent authorities will announce the carbon budget for each period in accordance with the law and regulations, and continue planning until 2050.

In order to achieve the city's net-zero greenhouse gas target, the Kaohsiung City Government has made reference to the UK's carbon budgeting system, and through a bottom-up planning approach, it has completely assessed the medium- and long-term reduction potentials of various departments, and taken into account the city's natural environment, industrial characteristics, and social structure in order to plan for the city's GHG reduction pathway, and establish a carbon budgeting system.

Carbon budget refers to the maximum amount of greenhouse gas emissions for each period, which is set in two-year periods, and the next carbon budget is proposed one year before the expiration of each period. The city shall invite relevant authorities, scholars, experts, and private organizations to hold seminars or use other appropriate methods to solicit opinions before drafting the carbon budget, and submit it to the Kaohsiung City Council for consideration after the Kaohsiung City Council on Sustainable Development and Response to Climate Change has reviewed it.

In order to smoothly combine economic growth and GHG emissions reduction, we will regularly track and evaluate the achievement of the reduction targets and immediately adjust the direction of the net-zero policy. Under the vision of decoupling economic growth and GHG emissions, we will gradually move towards the net-zero goal and develop a carbon budgeting system for Kaohsiung City.

Kaohsiung City Carbon Budget Meeting Progress

The Kaohsiung City Net Zero City Development Autonomy Ordinance was passed by the City Council last year, and the city government has been actively promoting the carbon budget system. Recently, a carbon budget (draft) has been prepared for the year 2025~ 2026, which will introduce six major departments (industry, residential and commercial, transportation, environment, agriculture, and forestry) as the upper limit of the emission control. Experts and scholars, city government bureaus and departments, civil organizations, city councilors, representatives of industry alliances, and citizens were invited to participate in the meeting. The schedule of the Kaohsiung City and Departmental (2025~ 2026) Carbon Budget Planning Meeting is shown **Table 1**, and the results of the related process are shown **Figure 1**.

Table 1: Summary of Carbon Budget Meeting Progress

Date of meeting	Name of Meeting	Meeting Highlights
2024.04.18	Specialist Consultation Meetings	1. View GHG Emissions Baseline 2. The formulae to be included in the reduction measures
2024.04.25	Cross-bureaux meetings	Strategies for future advancement in each department
2024.04.26	Meetings of community organizations	1. Report on Review of Carbon Budgeting 2. Suggested to be combined with official budget
2024.05.24	Sustainable Development and Climate Change Pre-meeting should be promoted	Presented to the Second Seventh General Meeting for Confirmation
2024.06.06	Public Briefing Sessions	1. Advocating Openness of Information 2. Consultation with the community
2024.07.03	Industry Net Zero Alliance Conference	1. Sharing with the industry on future trends and planning 2. Consultation with the industry
2024.08.09	Sustainable Development and Climate Change In response to the meeting	Considered and approved at the Second Session of the Seventh Congress
2024.08.27	Municipal Councils	City Council deliberated and approved

Specialist Consultation Meetings

Cross-bureaux meetings

Civil Society Organizations Meeting

Public Briefing Sessions

Industry Net Zero Alliance Conference

Sustainable Development and Climate Change Promotion Conference

Figure 1: Results of Carbon Budget Meetings

GHG emission baseline for Kaohsiung City 2026

As the world transforms and builds a sustainable global village in this century, it is necessary to maintain the security of primary energy supply, infrastructure, and energy consumption along with economic development and improved quality of life, and at the same time mitigate and adapt to the environmental quality and global warming problems caused by the use of energy. In planning the direction of Kaohsiung's governance in line with the vision of sustainable development and in predicting the city's GHG emission structure, the project team has taken into account the general direction of city management and the international climate convention to provide a net-zero strategy proposal, and has also taken into account the national planning of countries with better carbon budgeting systems; the United Kingdom is the world's first country to implement the reduction target in the form of a law, and Kaohsiung can effectively implement the carbon reduction management and the corresponding measures in the future if it follows suit. If Kaohsiung can follow suit, it will be able to effectively implement carbon reduction management and corresponding fiscal policies in the future. Moreover, an independent Climate Change Committee (CCC) has been established to study and propose carbon budgets, and monitor the implementation of carbon budgets every year and submit progress reports to the Parliament. The UK carbon budget is set for a five-year period.

According to the National Development Council's 2050 Net Zero Emission Plan, using the National Development Council's national population growth rate as a variable, and compiling the cases approved by the Environmental Impact Assessment (EIA) as an important reference factor for the city's economic growth to estimate the future path of GHG emissions, including the incremental amount of parks, new construction, and transportation system installation for future economic development, and the Kaohsiung City's first carbon budget with reference to the United Kingdom's carbon budgeting system, the city will take into consideration the EIA cases that have been approved within the period from 2022 to June 2024 as an assessment of the future incremental amount of GHG emissions. The first phase of Kaohsiung City's carbon budget is based on the UK's carbon budgeting system, which takes into account the environmental impact assessment cases that have been reviewed and approved during the period from 2022 to 2024 as an assessment of the future incremental greenhouse gas emissions. The following is a description of Kaohsiung's future industrial and demographic development and the increase in emissions.

i. economic projections

Due to the promotion of Kaohsiung City's industrial development and transformation policy, emissions from the industrial sector will inevitably be affected by the industrial parks, and therefore, the development projects of the environmental impact assessment are used as a factor for estimating the economic growth. The team has compiled the development projects that have passed the environmental impact assessment from 2022 to 2024, and has set the principles of the environmental impact assessment as follows:

1. The Environmental Impact Statement (EIS) or Environmental Impact Difference Statement (EID) is the audited and approved EIS or EID.
2. Construction or operation will begin on January 1, 2023.

In total, 20 cases will be recognized, and it is estimated that in 2026, Kaohsiung City will have an increase of 2,421,100 tons of greenhouse gases (industrial and commercial).

The total number of tons of industrial, commercial, residential, and environmental products (1,963,100 tons, 407,900 tons, 49,100 tons, and 0.1 million tons, respectively), compared with the total number of tons of industrial and commercial products (1,963,100 tons, 407,900 tons, and 0.1

million tons, respectively), is as follows

The information is summarized **Tables 2** to **4**.

Table 2: Kaohsiung City Environmental Impact Statement (EIS) Construction Period Summary for Recognized Development Projects 2023~2026 (million tons of CO2e)

During construction (million tons)	Industrial	Industrial	Industrial	Industrial	Industrial	Industrial	Industrial	Industrial	Industry	Industry	Industry	housekeeper	housekeeper	housekeeper	housekeeper	housekeeper	housekeeper	Transportation	Transportation	Transportation
EIA Case	Qiaotou Park, Southern Science Park	Environmental Impact Statement for the New Semiconductor Plant on Former PetroChina Kaohsiung Refinery Site	Nanzi Industrial Park (Wan Chai)	North Kaohsiung Industrial Park (Okayama Kugaku)	Agongdian Reservoir Renewal and Improvement Program	Kennedy Road Bamboo Technology Park	Longan Fastener Industrial Park	Class B Waste Treatment Facility Development Program of Da Cheng Cycle Co.	High-pressure brick-making factory on land in Wo Shan Section, Da Shu District, Kaohsiung City, Taiwan	Environmental Impact Statement for Yeh Minh Industrial Co., Ltd. Heat Treatment Plant First Environmental Impact Difference Analysis	Daelim Power Plant Gas Generating Unit Renewal and Reconstruction Program	Kaohsiung International Airport New Terminal	Ex-Township Hing Pong Section 119-50 New construction of the Ground Floor Building	1232, etc., Hakata-ku, Maejin-gu 5 New construction of Penland Signal	Cedar Grove District Cemetery No. 4 Phase II Renewal Project	Daliao Urban Plan (Land of National Army Dependents' Village west of Fenglin 4th Road) Detailed Plan	Environmental Impact Statement for Fubon Life's Kaohsiung MRT Au Zi Di Station Commercial Area Development Project	Public Rapid Transit System Okayama Road Takeshi Extension Line	National Highway 7 Kaohsiung Project	Environmental Impacts of the Kaohsiung Metropolitan Area Mass Rapid Transit System Metro Line (Yellow Line) Construction Project
2023	0.4803		7.417263158	0.44			0.0878	0.0318	0.0013		0.0731		2.6434			0.0084	1.0189			
2024	0.4803	0.7467	14.83452633		0.0989	0.1395	0.1170	0.0318	0.0004		0.0798		3.5245	0.0221	0.0116	0.0140	1.0189	0.402		0.416
2025	0.4803	1.4935	14.83452632			0.1395					0.0798	9.8129	3.5245	0.0221			1.0189	0.402		0.416
2026		0.7467	9.889684211								0.0798	9.8129	3.5245	0.0221				0.402	1.2545	0.416

Note: The team has compiled environmental impact statements for each of the parks.

Table 3: Kaohsiung City Environmental Impact Statement (EIS) Operating Period Summary for Recognized Development Projects 2023 to 2026 (million tons of

Operating Period (million tons)	Industry	Industry	Industry	Industry	Industrial	Industrial	Industrial	Industrial	Industrial	Industrial	Industrial	housekeeper	housekeeper	housekeeper	housekeeper	housekeeper	housekeeper	Transportation	Transportation	Transportation
EIA Case	Qiaotou Park, Southern Science Park	Environmental Impact Statement for the New Semiconductor Plant on Former PetroChina Kaohsiung Refinery Site	Nanzi Industrial Park (Wan Chai)	North Kaohsiung Industrial Park (Okayama Kugaku)	Agongdian Reservoir Renewal and Improvement Program	Kennedy Road Bamboo Technology Park	Longan Fastener Industrial Park	Class B Waste Treatment Facility Development Program of Da Cheng Cycle Co.	High-pressure brick-making factory on land in Wo Shan Section, Da Shu District, Kaohsiung City, Taiwan	Yeh Minh Industrial Co., Ltd. Heat Treatment Plant Environmental Impact Statement First Environmental Impact Difference analyze	Daelim Power Plant Gas Generating Unit Renewal and Reconstruction Program	Kaohsiung International Airport New Terminal	Ex-Township Hing Pong Section 119-50 New construction of the Ground Floor Building	1232, etc., Hakata-ku, Maejin-gu 5 New construction of Penland Signal	Cedar Grove District Cemetery No. 4 Phase II Renewal Project	Daliao Urban Plan (Land of National Army Dependents' Village west of Fenglin 4th Road) Detailed Plan	Environmental Impact Statement for Fubon Life's Kaohsiung MRT Au Zi Di Station Commercial Area Development Project	Public Rapid Transit System Okayama a Road Takeshi Extension Line	National Highway 7 Kaohsiung Project	Environmental Impacts of the Kaohsiung Metropolitan Area Mass Rapid Transit System Metro Line (Yellow Line) Construction Project
2023																				
2024				6.12					0.0056	0.7315										
2025				5.84			1.8177	1.5193	0.0134	0.7315					0.0058					
2026	50.73	33.37	49.41	5.73													3.3337			

Note: The team has compiled environmental impact statements for each of the parks.

Table 4: Kaohsiung City Development Project Estimated Future GHG Increase (10,000 tons CO_2e)

Period Year	During construction			Operating Period			Total
	Industry	housekeeper	Transportation	Industry	housekeeper	Transportation	
2023	8.53	3.67	-	-	-	-	12.20
2024	16.53	4.59	0.82	6.86	-	-	28.79
2025	17.03	14.38	0.82	9.92	0.01	-	42.15
2026	10.72	15.36	2.07	143.50	3.54	-	172.99

Note: The team compiled the environmental impact statements of each park, the annual emissions during construction, and the emissions during operation have been deducted from the direct reduction measures.

II. Population projections

Kaohsiung City population projections are based on the National Development Council's "Population Projections for the Republic of China".

(The national population growth rate 2023 to 2050 in "2020 to 2070" is based on the national population growth rate of Kaohsiung, Taiwan.

To analyze the actual population growth rate of Kaohsiung City 2021 to 2023, the NDC population projection has three assumption modes: high, medium, and low. In order to analyze the total fertility rate [1] (the number of children born to each woman during her lifetime), which represents the three trends of rebound, slight increase, and continuous decline, the NDC population projection has three assumption modes: high, medium, and low, which represents the three trends of rebound, slight increase, and continuous decline, and the NDC population projection has three assumptions, namely, the total fertility rate [1] (the number of children born to each woman during her lifetime), which represents the three trends of rebound, slight increase, and continuous decline: Considering that the population growth of Kaohsiung City has gradually changed from negative growth to positive growth in the past three years (2021: -0.79%; 2022: -0.47%; 2023: 0.06%), and that it is expected that the newly established industrial parks and technology parks will drive the population growth of Kaohsiung City, the "Medium Estimate" scenario is used to simulate the future population growth rate, as shown in **Table 5**.

Table 5: Estimated Growth Rate of Kaohsiung City Population (%)

a year's interval	Population growth rate
2021	-0.79%
2022	-0.47%
2023	0.06%
2024	0.60%
2025	-0.17%
2026	-0.19%

[1] The Total Fertility Rate (TFR) assumes that a woman's age-specific fertility level at that time is such that she would have survived her childbearing years without dying.

Average lifetime number of babies born during reproductive age (15-49 years).

III. Baseline Estimates

The baseline scenario for Kaohsiung City assumes that the future technology is maintained in , and the estimated GHG emissions in Kaohsiung City in 2026 are 54,769900 tons of CO_2e. The calculation of the baseline for each department is described below:

The EIA (11 industrial, 6 residential, 6 commercial, 6 transportation, and 6 commercial) were reviewed and approved for economic growth.

The projections of economic growth are based on 3 cases (20 cases in total) and population growth is based on the national development plan.

The projected population growth rate of -0.19% in was used as the projection of population growth, and the baseline projections for each sector are summarized as follows:

Industry: Kaohsiung's industrial sector emissions of 43,779400 tons by 2022+ Economic Growth (In 2026, there are 11 EIA development cases reviewed and approved by the industrial sector, with construction emissions of 528.0 thousand tons+ operating emissions of 1,435.1 thousand tons) totaling 45,742.5 thousand tons.

Residential: Using the 2022 residential sector emissions of 4,941,000 tons× year-on-year to 2026 NDC projected population growth rate (-0.19%) + 5 cases of EIA development approved by the residential sector in 2026 totaling 167,000 tons, the projected emissions are as follows

Discharged 5,348800 tons.

×Transportation: Based on the projected population growth rate (-0.19%) in the NDC projections from year-on-year to 2026 + the total of 20.07 million tons of EIA development projects approved by the Transportation Department in 2026, projected 2026 emissions are 4,023,500 tons.

Discharged 4,072600 tons.

Environment: 348700 tons by 2022 Environment Sector× Year by to 2026 NDC

The projected population growth rate (-0.19%) and projected emissions are included in the projections.

34.97 million tons.

Agriculture: Maintain 2022 emissions of 44.00

million tons. Forestry: Maintain emissions at -118.46

million tons.

Combining the six major departments (Industrial: 4574.25 + Residential: 534.88 + Transportation: 407.26 + Environmental: 34.97 + Agricultural: 44.00 + Forestry: -118.46), the City's baseline (net) emissions were 54.7690 million tons, which is a reduction of -17.20% compared to the baseline year (2005).

Kaohsiung City Specific Measures

In the face of the climate crisis, Kaohsiung's response is to actively take the lead in carbon reduction. In 2022, Kaohsiung's net emissions will be 52.35 million tons, a reduction of 20.8% compared to the base year, with a carbon reduction of more than 13.79 million tons. In accordance with the six major departments (energy, industry, housing and commerce, transportation, agriculture, and environment), Kaohsiung City has compiled the second phase of the greenhouse gas reduction implementation plan, the National Electricity Emission Carbon Coefficient, and measures for the industrial sector to reduce emissions on their own. The specific measures are those that can directly show the effect of reduction, such as the electrification of motor vehicles (directly reducing the use of fuel) and the popularization of sewage (reducing the fugitive emissions of methane), which are summarized in **Table** 6. The future improvement is the measures to promote or construct the environment, and the direction of thinking is to consider how to integrate the urban plan with the net-zero goal for the overall development of the city, how to cultivate a culture of public transportation, and how to enhance civic participation and environmental protection. The direction of thinking is to consider how the overall urban development should integrate the urban plan with the net-zero goal, how to cultivate a culture of public transportation, and how to enhance civic participation and environmental awareness. For example, the promotion of shared transportation, the area of green space in parks, the promotion of local ingredients, and the reuse of incineration residue, etc., the results of the reductions could not be directly presented in the "Kaohsiung Municipal Administration Area GHG Inventory Report", as shown in **Table** 7.

Table 6: Kaohsiung City Carbon Budget Specific Measures Compendium

Departments	Specific measures	Departments	Specific measures
renewable energy	1. Coefficient of Carbon Emission	housekeeper	1. Power Carbon Emission Factor Amortization 2. Replacement of old air-conditioning equipment 3. Energy and Technology Services (ESCO) Reduction Projects 4. Public Sector Power Saving 5. Promoting Water, Energy and Energy Conservation in Buildings and Energy Creation Programs
Industrial	1. Power Carbon Emission Factor Amortization 2. Enterprise-owned reduction targets 3. Incremental recycling of waste in industrial areas	Agriculture	1. Incentive Fishing Program
Transportation	1. Low Carbon Public Transportation 2. Replacement of old diesel vehicles 3. Power Carbon Emission Factor Amortization 4. 15% share of electric motorcycles by 2030 5. Introducing electric or low-carbon energy buses to promote low-carbon transportation. 6. Vehicle and Motorcycle Sharing Promotion 7. Increase total metro capacity in Kaohsiung	Environment	1. Universal Sewerage 2. Resource Recovery Rate

Table 7: Kaohsiung City's Carbon Budget Refinement Practice Summary

Departments	refined approach	Departments	refined approach
renewable energy	1. Coal Reduction Policy-Power Plants 2. Renewable Energy Certificate Program 3. Citizen Power Plant Promotion Program 4. Renewable Energy Power Generation Equipment Certification and Inspection Operations	housekeeper	1. Electricity saving volunteers 2. Green space in parks 3. Greening of Unused Vacant Land 4. Promoting three-dimensional greening in buildings 5. Energy users set 1% savings 6. Environmental Education Counseling Group Program 7. Expansion of seedlings for community greening planting 8. Promotion of ESCO Model in the Commercial Sector 9. Installation of Smart Meters in New Social Housing Cases 10. Designated Energy Users meet 3 energy conservation requirements 11. Promote the installation of charging facilities in residential buildings. 12. Power System Improvement and Air Conditioning Installation Project - Kaohsiung City Campus Energy Management System (EMS) Commissioning Project 13. Assisting local enterprises in organizing carbon inventories, carbon reduction and other supportive measures 14. Net-Zero Building Label 15. Rooftop Solar Photovoltaic Bill 16. Involvement in Urban Program Green Space Specifications 17. Environmental Improvement of Coastal Areas
Industry	1. Reduction quota development 2. Promoting the Industry Net Zero Alliance 3. Emission Source Ownership Program 4. Energy Saving and Carbon Reduction Technology Counseling Group 5. Green Factory Labeling System 6. Coal Reduction Policy-Vehicle-Electricity Symbiosis Operators 7. Interdepartmental Cooperation on Greenhouse Gas Reduction 8. Citizens Power Plant Integration Enterprises 9. Carbon Budgeting for Planning Industry Development Trends	Agriculture	1. Incentives for afforestation 2. Promotion of local ingredients 3. Vegetable Lunch on Campus 4. Reuse of biogas and digestate 5. Livestock Farm Energy Efficiency Program 6. Organic Agriculture Production Counseling 7. Fishing Vessel/Raft Acquisition and Disposal Program 8. Creating Kaohsiung Ecological Corridors to Connect Wetland Park Networks 9. Subsidy for farmers to purchase electric farm machinery 10. Livestock Manure Resource Utilization
Transportation	1. Provide regional shuttle bus service 2. Public Bicycle Rides 3. Additional Public Bicycle Rental Stations 4. Development and Marketing of Kaohsiung's Specialty Tourism 5. Implementation of Social Welfare Cards (Senior	Environment	1. Emission source verification 2. Environmental Volunteer Training 3. Retention pond green area 4. Landfill revitalization project 5. Measures to reuse incineration slag 6. Livestock Manure and Urine Resource Treatment

In order to facilitate the allocation of carbon budgets among different departments, the carbon reduction from the reduction of the power emission factor of the Energy Sector will be proportionally allocated to the Industrial, Commercial, and Transportation Sectors. Based on the allocation of the emissions of the Industrial Energy Sector 2 (deducting the reportable emissions), the Commercial, Agriculture, Forestry, Fisheries, and Livestock Energy Sector 2, and the Transportation Energy Sector 2 for the year of 2022 , the reduction measures are expected to provide a carbon reduction of 3,831700 tons of $CO_{(2)e}$ 2026, which are 2,528,700 tons of industry, 671,700 tons of commercial, 422,700 tons of transportation, 132,200 tons of environment, and 76,400 tons of agriculture.)e in 2026, which are 2,528700 tons for industry, 671700 tons for residential and commercial, 422,700 tons for transportation, 132200 tons for environment and 76,400 tons for agriculture. A summary of the carbon reduction amount of the specific measures adopted by various departments is shown in **Table 8**.

Table 8: Kaohsiung's Carbon Budget and Specific Measures by Departments (million tons

Departments	Authorities in charge of	Specific measures	Scope	Carbon reduction in 2026	Total
renewable energy	—	Coefficient of Carbon Emission	Scope II	132.16	-
Industry	Environment Bureau	Enterprise-owned reduction targets	Areas I & II	134.00	252.87
	Environment Bureau	Incremental recycling of waste in industrial areas	Scope I	54.00	
	—	DOE Sectoral Allocation (49%)	Scope II	64.87	
housekeeper	—	DOE Sectoral Allocation (50%)	Scope II	66.11	67.17
	Economic Development and Labour Bureau	Energy Technology Services ESCO Reduction	Scope II	0.06	
	Hsing Kuo Office	Replacement of old air-conditioning equipment	Scope II	0.01	
	Development Bureau (Hong Kong)	Public Sector Power Saving	Scope II	0.87	
	Works Bureau	Promoting water and electricity conservation in buildings and energy creation program - energy-saving light fixtures installation wattage	Scope II	0.12	
Transportation	Co-promotion	15% electric motorcycle share by 2030	Scope I	4.40	42.273
	Environment Bureau	Replacement of old diesel vehicles	Scope I	34.79	
	Hsing Kuo Office	Low-carbon buses (100% by 2040)	Scope I	0.01	
	Transport Bureau	Introducing electric or low-carbon energy buses to promote low-carbon transportation.	Scope I	0.86	
	—	DOE Sectoral Allocation (1%)	Scope II	1.18	
	Transport Bureau	Shared Vehicles and Motorcycles	Scope I	0.002	
	Transport Bureau	Enhancement of total MRT capacity	Scope I	1.05	
Agriculture	oceanographic office	Incentive Fishing Program	Scope I	7.64	7.64
Environment	water authority	Universal sewerage (57% by 2030, 77% by 2050)	Scope I	1.45	13.22
	Environment Bureau	Resource Recovery Rate	Scope I	11.77	
		Total			383.173

1. The carbon dioxide emission factor for electricity is adopted from the announcement of the Ministry of Economic Affairs (2022.07.22), which sets the baseline of the carbon dioxide emission factor for electricity at 0.424kg $_{CO2}$ e/kWh the coming 2025 and 2030.

Based on Kaohsiung City's 2022 Area 2 emissions less the reportable emissions (excluding the three power plants), Kaohsiung City's 2022 electricity consumption emissions will be 0.376kg $_{CO2}$ e/kWh.

The carbon dioxide emissions from electricity are 8.116 million tons (about 16.4 billion kWh, and the carbon dioxide emissions factor of electricity in 2022 is 0.495 $_{kg/CO2}$ e), so the carbon dioxide emissions factor of electricity is reduced to 0.414 kg/CO2 e. The carbon dioxide emissions factor of electricity in 2022 is 0.495 kg/CO2 e.

In addition, the carbon in is estimated to be 1.32 million tons of $_{CO2}$ e (interpolated).

2. The reduction target for enterprises is derived from target set by 29 industrial questionnaires compiled by our team.

3. The incremental amount of waste recycled in the industrial area is the target amount as feedback from the inter-bureau meeting on April 25, 2024, and amount of industrial waste recycled in 2026 is the target amount.

Utilization of 1.5 million tons.

4. ESCO reduction in the energy technology services sector, the Bureau returned the indicators after the inter-bureau meeting and estimated the annual savings per case by making reference to the previous counseling cases.
   150 tonnes, with a target of replacing two cases per year in 2025-2026, which will result in a reduction of about 6 million tonnes, and 2030, 12 chilled water hosts will be replaced.
5. Replacement of old air-conditioning equipment, with 2 chilled water mainframes expected to be completed in 2025 for the purpose of cross-bureaux meeting backhaul target, [(power consumption before replacement)]. (590,000 kWh/year))-(Post-phase-out power consumption (396,000 kWh/year))]* Calculated based on the carbon dioxide emission factor of 0.495 $_{kgCO2}$ e/kWh for electricity announced by the Ministry of Economic Affairs in 2022.
6. The Public Sector Electricity Conservation Program for Kaohsiung City's Phase II Greenhouse Gas Reduction Implementation Plan measures, based on the total electricity consumption of 209.14 million kWh in 2015, with a target of 1,000 kWh per year. Annual electricity savings of 10%, calculated using the electricity emission factor of 0.414 $_{kgCO2}$ e/kWh.
7. The wattage of energy-saving light fixtures is a subsection of Kaohsiung City's Phase II Greenhouse Gas Reduction Implementation Program measures to promote water and electricity conservation in buildings and the Energy Creation Program, with a target of 900,000 watts per year, calculated as [Wattage of energy-saving light fixtures for green buildings]/1000*[Energy Conservation Technical Manual for Office Buildings - Office Buildings Lighting Hours per Year Approx. 2,600])*[Emission Factor for Electricity](0.502kg $_{CO2}$ e/kWh). Calculation.

8. The target proportion of electric motorcycles is 15% in 2030, and the proportion of electric motorcycles in Kaohsiung City is 4.6% at the end of 2023 (Ministry of Transportation and Communications Highway Administration Statistical Inquiries). Appendix I of the Administrative Measures for Incremental Greenhouse Gas Emission Offsets, [Average gasoline motorcycle emissions (0.1056kg CO_2 e/km) - Average electric motorcycle power consumption (0.024 kWh/km) * Electricity Emission Factor] * Average annual mileage (3,527km) Calculated.
9. Transportation department old diesel vehicles replacement, low carbon buses, the introduction of electric or low carbon energy buses to promote low carbon transportation tools for Kaohsiung City, the second phase of the Greenhouse Gas Reduction Implementation Plan indicator measures, target to cumulative 1-3 old diesel vehicles out of 3,500 vehicles, low carbon buses 82, electric buses 320 vehicles.
10. Car and motorcycle sharing is a measure of Kaohsiung City's Phase II Greenhouse Gas Reduction Implementation Program, with a target of 24,000 rentals per year, calculated by [target annual number of rentals - base annual number of rentals]*[proportion of alternative car use 0.5]*[carbon footprint of unused motorcycle units (carbon footprint of owner-occupied minibuses) 0.115*average kilometers/day 10 km] + [annual increase in rentals]*[proportion of alternative motorcycle use]*[carbon footprint of unused motorcycle units 0.0951*average kilometers/day 10 km]. Percentage of alternative motorcycle use]*[Carbon footprint of motorcycle unused 0.0951*average kilometer/day 10 km] + [Increase in the number of renters in the following year] *[Percentage of alternative motorcycle use]*[Carbon footprint of motorcycle unused 0.0951*average kilometer/day 10 km].
11. Increasing the total metro transportation capacity is a measure of Kaohsiung City's Phase II Greenhouse Gas Reduction Implementation Plan, with a target of 9.8 million passenger trips per year, calculated by [annual increase in metro ridership]*[(percentage of alternative car use)*(carbon reduction of unused unit cars) + (percentage of alternative motorcycle use)*(carbon reduction of unused unit motorcycles)].
12. The incentive fishing moratorium program is the second phase of Kaohsiung City's greenhouse gas reduction implementation plan measures, and in the inter-bureau meeting confirmed the target value of reducing 950 vessels per year, it is estimated that the number of operating vessels will be reduced by 5,700 vessels by 2026, calculated by the [reduction in the number of vessels] * [reduction in oil consumption per incentive fishing vessel] (estimated to be 5 metric pounds of oil/vessel), and [oil consumption to CO2e/kilogram of oil] (0.268 million tons of CO2e/kilogram of oil). (0.268 million tons of CO_2 e/thousand kilograms of oil).
13. Universal sewerage is the second phase of Kaohsiung City's greenhouse gas reduction implementation program measures, the goal of 52% in 2026 and 57% in 2030, based on Kaohsiung City's total methane emissions from domestic wastewater treatment in the current year (the current year's sewerage connection increase ratio) * maximum methane production of 0.6 (kgCH_4/kgBOD) * methane modification factor of 0.8 * the city's population (2,765,932 people in 2020) * BOD value of wastewater generated per person per day (40*365g/person/day) * methane GWP value. Methane Correction Factor 0.8*City Population (2,765,932 in 2020)*BOD per person per day (40*365g/person/day)*Methane GWP calculation.
14. The resource recovery rate is a measure of Kaohsiung City's Phase II Greenhouse Gas Reduction Implementation Program, which is targeted to increase by 0.3% per year based on the baseline (59.05%).

annual average of waste volume from 2021 to 2023 was used to derive the extrapolated resource recovery quantity, and the emission from incineration was calculated at 0.89 tonne/tonne per unit of waste recovered.

Kaohsiung City Carbon Budget Planning

I. Carbon Budgets of Departments

In order to achieve the net-zero goal of 2050, Kaohsiung's "Kaohsiung Net-Zero City Development Autonomy Ordinance" regulates the carbon budgeting system. Kaohsiung has taken stock of the carbon reduction measures taken by various departments to maximize the amount of carbon reduction and to share the responsibility of carbon reduction, and has concurrently required the development of environmental impact assessment projects for the implementation of carbon reduction, as well as continued to require the industries to set specific reduction targets, and to gradually increase the reduction targets of the carbon budget by introducing carbon-negative technologies and the development of carbon sinks. Kaohsiung City will continue to establish a medium- and long-term reduction path, enhance the transparency of the reduction policy, and fully consider the cost-effectiveness and the relevant principles, in order to ensure the feasibility of the medium- and long-term reduction planning, and move towards a 30% reduction in 2030 . The baseline of GHG emissions for the year 2026 minus the effectiveness of the reduction of the existing measures, which is the carbon budget of each department, and the summary of the projected emissions and the carbon budget, are as shown in **Table 8**.

The EIA incremental volume is estimated as a factor of economic growth. 2,421,100 tons of incremental volume is assumed in 2026.

The total carbon reduction from the existing direct reduction measures amounted to 3.8316 million tons of $CO_{(2)}e$, and it is proposed to increase the carbon reduction 2026 to a level higher than that of the existing direct reduction measures.

The carbon budget of Xiong City is 50,937,300 tons of CO_2e, which is 43,213,800 tons for industry and 467,771 tons for residential and commercial.

million tons, transportation 3,649900 tons, environment 217,500 tons, agriculture 363,600 tons, and forestry - 1,184,600 tons.

The reduction is -23.00% compared to the base year, as in **the table** 9 and **the figure** 2. In the future, we expect to promote economic growth and reduce greenhouse gases, and propose Kaohsiung City's corresponding reduction strategy and recommendations based on the allocation of the carbon budget.

Table 9: Kaohsiung City Carbon Budget by Departments in 2026 (million tons of

	Industry	housekeeper	Transportation	Environment	Agriculture	Forestry	Total Emissions	Net emissions	Compared to the base year
2026 Baseline (A)	4574.25	534.88	407.26	34.97	44.00	-118.46	5,595.36	5476.90	-17.20%
Specific measures (B)	252.87	67.17	42.27	13.22	7.64	-	-	-	-
Carbon budget (C)	4,321.38	467.71	364.99	21.75	36.36	-118.46	5,212.19	5,093.73	-23.00%

Remarks: Carbon Budget (C) = 2026 Baseline (A) - Specific Measures (B)

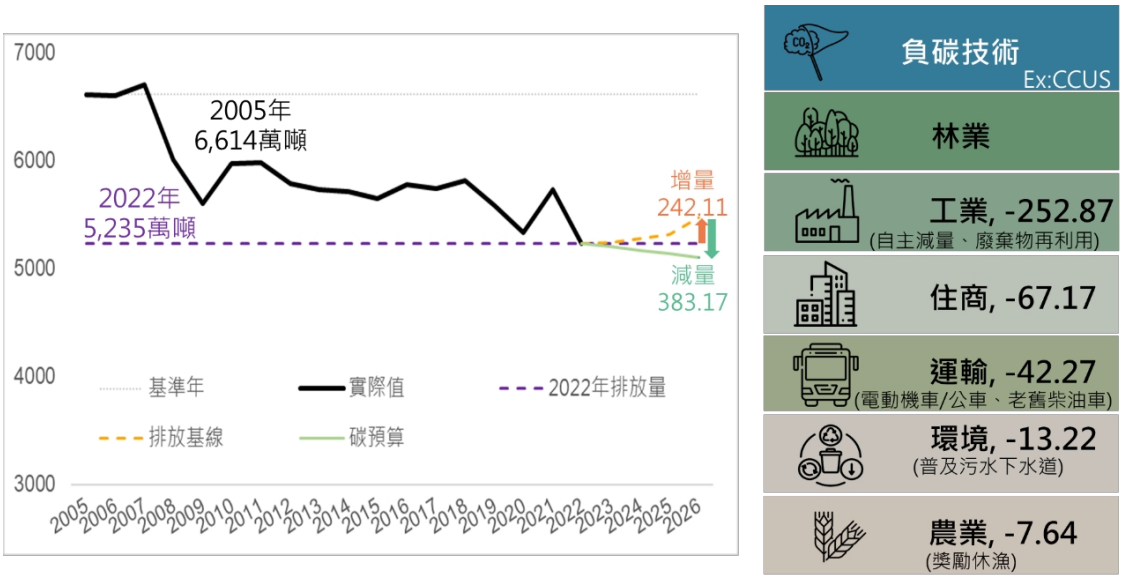


Figure 2: Kaohsiung City Carbon Budget

Carbon Budgeting and Management Mechanisms

In order to achieve the reduction target, the Climate Change Response Division, Environmental Protection Bureau, Kaohsiung City Government.

A total of seven seminars, public hearings, meetings with experts and scholars, and one public hearing with the City Council, through a wide range of suggestions from various parties to develop the city's "Net Zero City Development Autonomy Ordinance", which has become the first local net-zero regulations in the country since the publication of the "Climate Change Response Act"; in order to make the city's carbon budgeting system better, the establishment of a PDCA to carry out the management of the examination as shown in **Figure 3**, the following is described separately. The following is a description of each:

(i) Plan

Through the "Net Zero City Development Autonomy Ordinance", the division of authority and responsibility among various organizations is clearly defined, and control targets are set in two-year periods. In addition to promoting carbon budgeting through the Carbon Reduction Action Plan, the "White Paper on Net Zero Policy" combined with the carbon budgeting system also serves as the framework for net-zero governance, and the results are tracked through the "Net Zero Voluntary Inspection Report".

(ii) Execution (Do)

The authorities in charge of each purpose-built business are required to write their own "Net Zero Sustainability Report", so that carbon reduction actions can be implemented into the administration of the bureau; in terms of the industry, relevant planning will be carried out for the autonomous reduction of enterprises, and will mainly focus on counseling and auxiliary measures, and will strengthen the capacity of industrial inventory and climate risk assessment.

(iii) Checks

Kaohsiung City's carbon budget will be sent to the Kaohsiung Sustainable Development and Climate Change Council for consideration.

(iv) Action

With the establishment of a sound legal basis for net zero, the City will work together with the City Council, industries, organizations, and the general public to move towards net zero emissions by 2050.

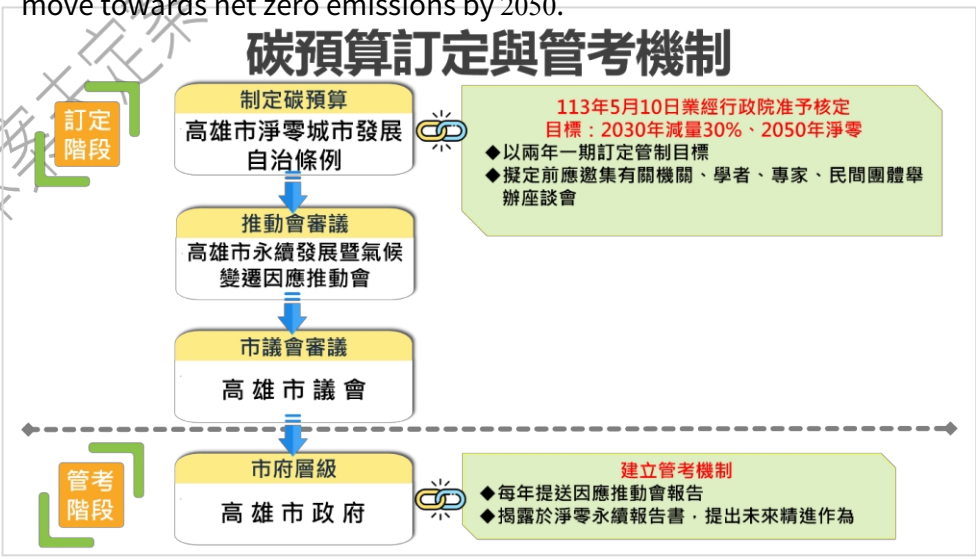


Figure 3: Kaohsiung City's Carbon Budgeting, Management and Evaluation Mechanisms

Negative Carbon Technology and Development of Carbon Sinks

(I) Overview of Carbon Pool Development in China

Carbon sink (carbonsink) refers to the earth can absorb and store a large amount of carbon compounds in the ecological or artificial system, as in life will not be used in the same concept of the goods into the warehouse, carbon sink can be imagined as a storehouse of carbon dioxide, in order to reduce the concentration of greenhouse gases in the atmosphere, to help slow down climate change; the National Sustainable Development Council of the Executive Yuan of our country put forward a zero zero twelve key strategies, one of which is the natural carbon sink. The National Sustainable Development Council of the Executive Yuan of China has proposed 12 key strategies for net zero, one of which is natural carbon sinks, which shows that it is an extremely important part of the strategy.

In line with Taiwan's 2050 Net Zero Transformation Key Strategic Plan, natural carbon sinks are divided into three major pathways, focusing on the natural environment, soil, ocean and forests that can absorb and store carbon sinks, research and development, and the establishment of scientific research and technology to enhance the efficiency of carbon sinks, and is expected to increase the amount of carbon sinks by 10 million metric tons by 2040, and the country's estimated increase in sinks by 2026, as well as the increase in carbon sinks and the increase of carbon sinks by 2026.

The development of scientific research on carbon exchange is summarized in **Table 10** and **Figure 4** below:

1. Soil Carbon Pool (Source: National Sustainable Development Council, Executive Yuan)

   By establishing MRV for soil carbon sequestration and developing resources or methods to optimize soil sequestration, strengthening soil carbon sequestration technology and promoting herbaceous cultivation, greenhouse cultivation, green manure planting, and no-tillage farming, it is expected that 2030, we will be able to promote the development of soil carbon sequestration technology in all areas.
   It is estimated that by , the area will reach 300,000 hectares and the amount of $CO_{(2)}e$ will increase by 60,000 tonnes, by cutting and burying the remaining rice straw and promoting the use of organic fertilizers and microbial fertilizers.

2. Ocean Carbon Pool (Source: National Sustainable Development Council, Executive Yuan)

   The development of intercoastal macrophyte quantification and assessment technology, the establishment of marine and wetland carbon measurement technology and methodology, and the development of incremental marine ecosystem carbon potential technology and benefit assessment, etc., the three strategies to achieve the baseline survey of marine carbon sinks, and then management and maintenance, wetland soils and vegetation rich in carbon content in addition to the maintenance of its non-destructive should be increased in the area of the projected increase of 5 hectares in , 2050, 2050, 2050, 2050, 2050, 2050, 2050, 2050, 2050, 2050, 2050, 2050, 2050, 2050, 2050.
   The goal is to increase the number of hectares to 10 hectares; develop multi-trophic fishery-electricity symbiosis freshwater and seawater aquaculture modes, promote industrial promotion and counseling, and develop complex aquaculture modes; and rehabilitate mangrove forests, seagrass beds, and wetland areas to increase carbon sequestration. It is estimated that by 2030, Taiwan's total

area of rehabilitation and conservation will be 6,325 hectares, with an annual capacity of 340,000 metric tons of CO_2e (seagrass beds: 270,000 metric tons/year, mangrove forests: 64,000 metric tons/year, salt marshes: 0.6 metric tons/year). (seagrass beds: 270,000 tons/year, mangroves: 64,000 tons/year, salt marshes: 0.6 million tons/year).

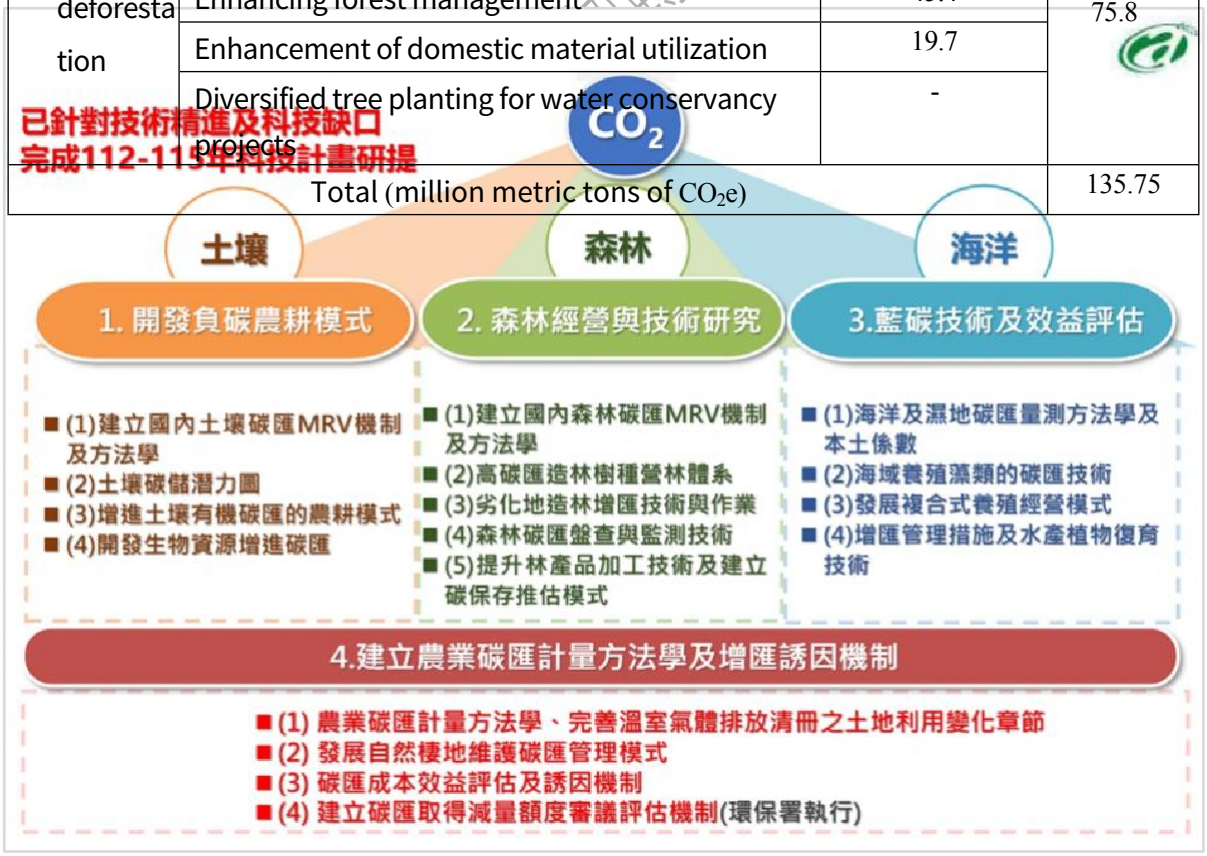
3. Forest Carbon Pool (Source: National Sustainable Development Council, Executive Yuan)

Strengthening forest management and actively restoring, nurturing, and managing forests is expected to achieve annual carbon sequestration of 454,000 metric tons of CO_2e in 2030, with the promotion of mixed agriculture forestry and urban forestry,

By increasing the forest area through afforestation of hillsides and marginal farmland, carbon sequestration is expected to reach 107,000 tons of CO_2e/year by 2030; and the use of domestic timber will be increased to reduce carbon emissions and energy consumption in the long-distance transportation of timber.

Table 10: Estimated Carbon Credits from Carbon Credits Refinement Measures in Taiwan 2026 (million

Carbon Gateway	step	Estimated Carbon Credits	Total
ground	Promoting negative carbon technologies and crop cultivation	9.6	25.95
	Constructing Carbon Negative Farming	10.32	
	Reuse of Agricultural Surplus Resources and Applicable Microorganisms	6.03	
oceans	Mangrove and seagrass bed rehabilitation operation	34.0	34.0
	Increase wet floor area	-	
	Establishment of Oceanic Carbon Sequestration Coefficients and Measurement Methodology.	-	
deforestation	Increase in forest area	10.7	75.8
	Enhancing forest management	45.4	
	Enhancement of domestic material utilization	19.7	
	Diversified tree planting for water conservancy projects	-	
Total (million metric tons of CO_2e)			135.75



Source: Council of Agriculture, Executive Yuan

Fig. 4: Development of Carbon Exchange Scientific Research in China

4. Methodology Progress (Source: Department of Climate Change, Ministry of the Environment)

The Ministry of the Environment, in accordance with Article 12 of the "Administrative Measures for Greenhouse Gas Voluntary Reduction Projects", has completed the review and approval of the greenhouse gas reduction methods for the voluntary reduction projects, and a total of 13 categories and 143 items have been published on the "Greenhouse Gas Voluntary Reduction and Offsetting Information Platform", which provides diversified and feasible reduction measures for use by enterprises or various levels of governments that are willing to carry out the reduction projects to obtain the reduction credits in Taiwan, so as to jointly accelerate the achievement of the effectiveness of the reduction. The information platform provides a variety of feasible reduction measures for use by organizations or governments at all levels that are willing to implement reduction projects in Taiwan to obtain "reduction credits", so as to jointly accelerate the effectiveness of reduction.

The methodological progress of the voluntary reduction program for domestic carbon credits is summarized in **Table 11**. Currently, only the Afforestation and Forest Plantation Carbon Credits Project Activity (AR-TMS0001) has been announced, while the Forest Operation Carbon Credits Project Activity (T-VNM-0001), Bamboo Forest Operation Carbon Credits Project Activity (T-VNM-0002), and the Low-growth Forest Credits Enhancement Project (T-VNM-0007) are currently under review. Currently under review.

For the part of ocean carbon sinks, seagrass restoration (T-VNM-0005) and mangrove forest plantation (T-VNM-0006), the Oceanic Commission has submitted the standardized operational procedures for measuring blue carbon sinks and the methodology for GHG reduction to the Ministry of the Environment together with the Ministry of Agriculture on January 29, 2024, after completing the consultation with experts and academics and meeting with the authorities.

Soil carbon sequestration component, Improvement of Agricultural Land Management Methodology (T-VNM-0004), Organic Farming with Herbaceous Cultivation to Enhance Soil Carbon Sequestration (T-VNM-0004), and Soil Carbon Sequestration in Organic Farming (T-VNM-0004). 0008) has been proposed by the Ministry of Agriculture and New Life Sustainability Consultants and is now being submitted to the Ministry of the Environment for review.

Table 11: Progress of methodologies for reducing domestic carbon credits under the VER

order	Carbon Pool Type	Case Number	Case Name	request unit (in Chinese text)	Current Progress
1	deforestation	T-VNM-0001	Forest Management Carbon Pool Project Activities	Ministry of Agriculture	audit
2	deforestation	T-VNM-0002	Bamboo Forest Management Carbon Pool Project Activities	Ministry of Agriculture	audit
3	ground	T-VNM-0004	Improving Agricultural Land Management Methodology	Ministry of Agriculture	audit
4	oceans	T-VNM-0005	Seagrass restoration	Ministry of Agriculture, MSC	audit
5	oceans	T-VNM-0006	Mangrove Planting	Ministry of Agriculture, MSC	audit
6	deforestation	T-VNM-0007	Low-growth Forestry Exchange Enhancement Project	Nikki Environmental Sustainability Foundation	audit

Source: Climate Change Department, Ministry of the Environment.

(II) Current Development of Negative Carbon Technology in China

~CCUS technology has become an important application technology to reduce carbon dioxide emissions in energy, chemical, steel, cement and other high-carbon emission industries in Europe and the United States. The application of CCUS technology in the crude oil extraction industry has also formed a cooperation between manufacturers in energy, steel, cement and other high-carbon emission industries and crude oil extraction manufacturers to reduce the cost of commercial application of CCUS technology, especially in countries with a large number of oil wells and gas wells, which is developing rapidly. Countries with a large number of oil and gas wells are especially developing rapidly.

The development of carbon capture technology in Taiwan is currently at the pilot stage, which means that the feasibility of the technology is being tested and analyzed, and only in the next stage will it be able to move into the stage of expanding mass production, which is still a long way from the stage of commercialization and practical application. Furthermore, unlike oil and gas producing countries, Taiwan has a large number of empty oil and gas wells or oil wells that are still being exploited for the purpose of injecting captured CO_2, and transporting captured CO_2 from Taiwan to the deep saline layer in the western ocean for storage appears to be a more feasible mode of operation, but the technology is not yet mature, and there is no example of commercial application, so it may take a longer period of time before it can be applied in practice. It may take a longer period of time for the actual application of the technology to be realized after the completion of the technical reliability test.

According to the Ministry of Economic Affairs (MOEA), Taiwan's current carbon capture technology has made its presence felt in the four major carbon emission industries, which are summarized below:

1. Energy:

-ITRI/TEPCO Carbon Reduction Technology Park for Thermal Power Plant in Taichung

Started at the end of 2019, applying alcoholamine capture agent to capture CO_2 from flue gas, already operated

Over 9,500 hours and 7 tons of CO_2 capture per year; currently planning 2,000 tons of CO_2 capture per year Technology and Reuse Validation (EIA in 110, expected to be operational in 112).

2. Chemical Industry

ITRI/FTPL/CNU Collaboration on Kaohsiung Renwu Auto-electric Co-generation Plant

The "Flue Gasification Carbon Sequestration Process and Application Technology R&D Program" supported by the Ministry of Economic Affairs' A+ Enterprise Innovation R&D Program applies Potassium Acetate capture agent, with CO_2 capture capacity of >30 tons/year, and is currently planning to capture tons of CO_2 per day at the Mailiao Plant and to verify the technology and reuse.

3. Steel Industry

-ITRI/China Steel Co.

Carbon dioxide capture from converter gas in China Steel's manufacturing process, CO_2 capture >15 tons/year, future plans to expand a large-scale CO_2/CO capture plant

4. cement industry

-TCC promotes the research and development of Calcium Loop Carbon Capture (CLCC) technology and the construction of a pilot plant.

TCC and the Industrial Technology Research Institute (ITRI) have cooperated to establish a new generation capture pilot plant using calcium oxide as a capture agent, with a daily capture capacity of about 9 tons of CO_2, which can be used for carbon sequestration by microalgae culture and conversion to high-value astaxanthin. TCC is currently planning for a scale-up demonstration. It is estimated that by 2025, the plant will be able to capture approximately 30,000 tons of CO(2) per year.

5. CO_2 Sequestration to Depleted Oil and Gas Fields Technology

In 2010, CNOOC Taiwan conducted a study on carbon sequestration in old gas fields and completed the feasibility assessment of increasing production from the Yonghe Mountain gas field, environmental background monitoring and ground equipment testing.

6. CO_2 Sequestration to deep brine layers

(1) In 2022, PetroChina will launch a three-year research program entitled "Research on Carbon Dioxide Sequestration Technology" to evaluate and select suitable carbon sequestration sites and to develop monitoring technologies. In addition, PetroChina is planning to utilize the deep brine layer of oil and gas reservoirs to conduct sequestration tests.

(2) In , TEPCO completed a 3-kilometer deep geological exploration well in Changbin, confirming that there is a deep saline layer in the Taisi Basin in the Taiwan Strait that can be used for carbon dioxide storage, and it is planning to conduct carbon capture and storage tests at the Taichung Power Plant.

7. CO_2 Chemical Conversion Technology

(1) Changchun Petrochemical's CO_2 to acetic acid plant mainly converts the tail gas of high-concentration CO_2 from the Dalian Chemical and Nanya plants into CO, which is then synthesized into acetic acid with methanol, with an annual production capacity of 800,000 tons, and can depolymerize 160,000 tons of CO_2 annually.

(2) China Steel and PetroChina are planning to cooperate on a steel cogeneration project. In the future, China Steel will supply high purity CO_2 to PetroChina for the development of methanol and methane applications.

(3) Laboratory-scale CO_2 to methanol conversion at ITRI's Institute of Materials Science and Technology (IMSC), mainly using captured CO_2 to methanol conversion, reaction temperature≦220°C (lower than the current international technology), methanol production capacity 1 ton/year.

(4) Chi Mei's CO_2 to Carbonate (DRC) technology is mainly developed in cooperation with ITRI's Institute of Materials Science and Technology (IMST) to synthesize carbonate (DRC) from chemical process off-gas CO_2 and alcohols, and in the future it plans to synthesize and produce polycarbonate (PC), and to establish a carbon dioxide capture technology and system when its production capacity expands.

8. CO_2 Conversion Technology

Formosa Plastics CO_2 to methane small-scale field verification, mainly using nickel-based catalyst to convert CO_2

Become methane, production capacity of about 10 tons / year.

(iii) Current Development of Negative Carbon Technology in Kaohsiung[2]

China Steel Group built a pilot "steel-chemical cogeneration" plant in China Steel's Xiaogang factory and started the steel cogeneration process in the first half of 2012. 2022 12 Conversion of steelmaking by-product gas to chemicals expected by 2023 can reduce carbon emissions by 4,900 tons per year, and is expected to work with local petrochemical industry partners in the future.

The annual carbon reduction will be 2.9 million tons.

CNPC has set up a Carbon Capture, Utilization and Storage (CCUS) team to assist the company's major carbon-emitting plants in implementing its carbon reduction policy. It follows three major R&D strategies, namely, "development of carbon dioxide catalysts," "construction of pilot test equipment for CCUs," and "evaluation of the commercialization of the CCU process," for carbon capture and utilization, and is planning to set up a plant for capturing millions of tons of carbon dioxide annually by 2030.

Formosa Plastics Corporation (FPC) has applied to the Department of Technology of the Ministry of Economic Affairs (MOEA) for the "Flue Gas Chemistry Carbon Sequestration Process and Application Technology Research and Development Program", which is a forward-looking technology research and development program, and has cooperated with National Cheng Kung University (NCKU), Industrial Technology Research Institute (ITRI), and other academic institutes, to use the steam-electricity co-generation plant of Formosa Plastics Corporation (FPC)'s Renwu plant as a test site to research the innovative process technology for capturing $CO2_2$ from flue gases and transforming it into alkanes; while NANYA Corporations EG plant at Mailiao is utilizing the carbon capture technology to produce raw materials for chemicals. The EG plant in Mailiao, NAN YA uses carbon capture technology to turn carbon dioxide generated during the production process into raw materials for chemicals, which can reduce carbon emissions by 100,000 tons per year, and is planned to be expanded in the future.
The construction of electronic and industrial grade liquid carbon dioxide will reduce carbon emissions by another 280,000 tons per year.

In order to respond to the global goal of zero carbon emissions, the Evergreen Group is committed to the development of Carbon Capture Utilization (CCU) technology, which recovers $CO_{(2)e}$ from pipelines and manufacturing processes, and then purifies it to be reused as products and raw materials. The Group has already the CO_2e emitted from Kaohsiung's Dafa plant and Dashe plant and used it as raw materials for the development and production of semiconductor and electronic chemical products. The $CO_{(2)}$ emitted from the Kaohsiung Dafa Plant and Dashe Plant has been captured and used as a source of raw materials for the development and production of semiconductor electronic chemicals. The Group's carbon capture and reuse will reach a total of 161,922 tons of CO_2e in 2022, and the Group's greenhouse gas reduction target for 2030 has been revised to 30% in accordance with the Kaohsiung City Net Zero City Development Autonomy Ordinance.

[2] Kaohsiung Industrial Net Zero Alliance Workshop by Enterprise Group

Conclusion

The City's GHG emission baseline, taking into account future urban development, is estimated to be 54,769,900 in 2026.

tons of CO_2e, which are 45,742,500 tons for industry, 5,348,800 tons for residential and commercial, and 4,072600 tons for transportation,

Environment - 349.7 thousand tons, Agriculture - 44.0 thousand tons, Forestry - 1,184.6 thousand tons.

Deducting the total reduction of specific measures

After the 3.8316 million tons of carbon, there were 2.5287 million tons for industry, 671,700 tons for residential and commercial, and 422,700 tons for transportation.

The city's carbon budget for the first phase is based on the United Kingdom's carbon budget system, using a bottom-up approach to estimate the baseline and deducting the amount of carbon reduction from specific measures. The first phase of Kaohsiung City's carbon budget is based on the UK's carbon budgeting system, which utilizes a bottom-up approach to estimate the baseline and deducts the amount of carbon reduction from the specific measures, and then sets it as the city's carbon budget, and all departments should endeavor not to emit more than the city's set GHG emission limit, and the city's planning for the six major departments for the year of 2026 is as shown in **Table 12**.

Each carbon budget will be presented at the City's Climate Change Conference and will be reviewed on a rolling basis according to the City's annual net emissions to ensure that the reduction targets are met and to propose refined practices. In addition, the City will continue to track the development trends of carbon negative technologies and carbon sinks (e.g., CNOOC's Carbon Capture, Utilization, and Sequestration (CCS) or Sinosteel's Steel and Chemistry Cogeneration (SCCP)) in the future, and will evaluate the inclusion of medium- and long-term carbon reduction measures for consideration.

Table 12: Kaohsiung's Future Planning of Six Major Departments 2026 (1/2)

Departments	Baseline (million tons)	Specific measures (million tons)	Carbon Budget (million tons)	refined approach
Industrial	4,574.25	252.87	4,321.38	Development of emission reduction credits/Industry Net Zero Alliance/Emission Source Management/Energy Saving and Carbon Reduction Counseling Mission / Green Factory Labeling System / Coal Reduction Policy - Co-generation Industry / Interdepartmental Greenhouse Gas Reduction / Citizen's Power Plant Integration Enterprises / Carbon Budgeting Planning for Industry Development Trends
housekeeper	534.88	67.17	467.71	Electricity saving volunteers/ green space parks/ greening of vacant land/ three-dimensional greening of buildings Subscription to electricity saving by energy users / Environmental education counseling groups / Expansion of community greening plantings ESCO Model / Installation of Smart Meters in New Residential Buildings / Compliance of Designated Energy Users with 3 Energy Conservation Items / Installation of Charging Facilities in Collective Housing Buildings / Improvement of Electricity System and Installation of Air Conditioners / Campus Energy Management System (EMS) / Net Zero Building Label / Rooftop Solar / Urban Programs

Table 12: Kaohsiung's Future Planning of Six Major Departments 2026 (2/2)

Departments	Baseline (million tons)	Specific measures (million tons)	Carbon Budget (million tons)	refined approach
Environment	34.97	13.22	21.75	Emission source verification/Eco-volunteers/Storage pond green area/landfill revitalization/incineration residue reuse/livestock manure and urine recycling/recycled water supply/Environmental impact assessment greenhouse gas review and reduction/civic power plant/integration of net-zero demonstration community
Agriculture	44.00	7.64	36.36	Incentives for afforestation / Promotion of local ingredients / Vegetable lunch on campus / Reuse of methane and digestate / Energy saving in livestock farms / Counseling on organic farming / Fishing boats and rafts acquisition and disposal / Ecological corridors linking wetland parks / Subsidies for farmers to purchase electric farm machinery / Livestock husbandry Acquisition and processing of rafts/Ecological corridors connecting wetland parks/subsidizing farmers to purchase electric farm machinery/livestock farming Fecal Resourcefulness
Forestry	-118.46	—	-118.46	—
Total	5,476.90	383.17	5,093.73	—

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