



CDP Cities 2016 Information Request Kaohsiung City Government

Module: Introduction

Page: Introduction

0.1
Please give a general description and introduction to your city including your city's boundary in the text box below.

Administrative boundary	Description of city
City/Municipality	<p>Facing Taiwan Strait on the west and Bashi Channel on the south, Kaohsiung is a beautiful and modern metropolis located in southern Taiwan as well as the second largest city of this island. Kaohsiung has various landscapes: the lush Chai Mountain and Banping Mountain, the clear and serene Lotus Pond, and the Love River flowing across the city. This subtropical city is often full of sunshine and gentle breeze from the sea. Sitting between Cijin Island and downtown, Port of Kaohsiung is a world-class port in Taiwan as well as an international trading hub. The ceaseless ships and containers from the world represent the energy and vitality of the business in Kaohsiung. □ Population : approx. 2,778,992 □ Area : approx. 2947.6159 km2 □ Population density : 943 people/ km2 □ Climate : Tropical Monsoon climate □ The average month temperature : 25.1°C □ The average annual rainfall : 2119.3mm □ Co-ordinates : 120°10'29"~121°02'55 East longitude and 22°28'32"~23°28'17" N latitude. An International Metropolis On December 25, 2010, Kaohsiung City merged with Kaohsiung County as the Greater Kaohsiung, a metropolis occupying an area of 2,947 km2 extending from the Central Mountains to the Taiwan Strait. The total population is approximately 2.77 million. Possessing diverse of natural landscapes and living facilities, this metropolis has developed as a new international city. Kaohsiung City is an important hub for Taiwan to the world. The transportation network includes air and marine, which serves industries of logistics, financial insurance and technology R&D. After the merge of the city and the county, a variety of agricultural resources as well as industrial and high-technology parks has created many advantages and benefits. In the great Kaohsiung, immediate services and comprehensive social welfare to each citizen are ensured. The resources of the city and the county also better facilitates the government's administration. With all the features and advantages, Greater Kaohsiung's competitiveness will be greatly enhanced as promised. Climate Kaohsiung City is located in the southwestern part of the island of Taiwan. The city, which lies almost entirely in the south of the Tropic of Cancer, has a tropical monsoon climate. It is dry in the winter, hot and wet in the summer and autumn. The climatic changes are not dramatic due to the moderating effect of the Taiwan Strait. The lowest temperature is usually in January and February ranging from 19.9 to 21.5°C, and the hottest months are from June to August, with averages from 28.3 to 29.5°C. The average temperature in 2010 was 25.1°C. 11 months out of 12 the temperature exceeds 20°C. The lowest temperature reported in January of 2011 in low-elevation areas was 10.9°C, which is exceptionally cold. The sunshine duration of Kaohsiung City is about 200 hours per month, which is higher than any other place in Taiwan. Due to the effects of the southwest monsoon, the rainy season is concentrated from May to September. From October through March, because the northeast monsoon is blocked by mountains, the dry season lasts for six months. Summer and autumn are typhoon seasons. According to Central Weather Bureau statistics, an average of three to four typhoons hit Taiwan annually, mainly from July to September. These have always brought heavy rains. With the increasing frequency of extreme weather events in recent years, precipitations exceeding 500 millimeters in a single day have been reported. For example, during Typhoon Morakot in 2009 and Typhoon Fanapi in 2010, Kaohsiung City experienced record-breaking rainfall.</p>

0.2 Emissions Accounting Choice

Reporting emissions is optional for all cities. By checking the boxes below you are indicating that you have fuel and/or greenhouse gas (GHG) emissions data to report at this time.

Select 'Government' to report emissions from your local government operations (sometimes referred to as 'corporate' or 'municipal' emissions).

Select 'Community' to report emissions from the entire city area over which the city government can exercise a degree of influence through the policies and regulations they implement (sometimes referred to as 'geographic' or 'city-wide' emissions).

Select both boxes to report fuel and/or emissions for both inventories.

IF YOU HAVE NO FUEL AND/OR GREENHOUSE GAS EMISSIONS TO REPORT DO NOT CHECK EITHER BOX.

Government
Community

Module: Governance

Page: City Details

0.3

Please provide information about your city's Mayor in the table below.

Leader title	Leader name	Current term start	Current term end	Total time in office (years)
Mayor	Chu Chen	2014	2018	12

0.4

Please provide details of your city's annual operating budget.

Annual operating budget	Currency	Budget year start	Budget year end
123425220000	TWD New Taiwan Dollar	Thu 01 Jan 2015	Thu 31 Dec 2015

0.5

Please provide details of your city's current and projected population.

Current population	Current population year	Projected population	Projected population year
2778729	2015	2798485	2020

0.6

Please provide details of your city's GDP.

GDP	Currency	Year of GDP	Source
524493000000	USD US Dollar	2015	http://Orz.tw/mT92O

0.7

Please provide further details about the geography of your city.

Average annual temperature (in Celsius)	Land area (in square km)	Average altitude (m)	Longitude (e.g. -120.9762)	Latitude (e.g. 41.25)
25.1	2947	50	120.1747	22.47

Page: Governance

1.0

Please describe the impact of national and/or regional climate change activities on your city's own climate change activities.

1. Provide Kaohsiung city the guidelines for climate change policy-making.
2. The central government help with the establishment of local environmental database, it has contributed to the development plans and disaster planning of Kaohsiung city since the database contains abundant environmental information. The potential disaster figure of Taiwan has been completed currently. It may help identify high vulnerability areas in order to take adaptation action and avoid the impact of climate change.
3. Kaohsiung city got national subsidies for "(NT\$)80 billion plan for flood-prone areas within 8 years". As for water conservancy projects, we are focused on the establishment of detention pond recently. We did it to enhance capabilities in response to the impact and threat of floods.

1.1

Does your city incorporate desired sustainability goals and targets (e.g. GHG reductions) into the master planning for the city?

Response	Description
Yes	Before Paris Agreements, Kaohsiung City had already set up its GHG reduction target, that decreasing 20% GHG emissions in 2020 compared with 2005, and announced "Kaohsiung City Environmental Maintaining and Management Regulations" to indicate how does city respond to climate change impacts. Furthermore, from policies to actions, city actively promoted industries to reduce emissions voluntarily, that companies which were grouped by regulations should establish their reduction targets, set up GHG reduction schedule. This kind of action can help government in management and also reach city GHG management vision. In practical actions, after GHG regulations was announced, city was under process of several main promotion actions, such as business

reduction (High-emissions industry greening transit and Industrial areas energy combination), energy-saved constructions (green building design and retrofit & green roof), low-carbon transportation (promoting electricity bus and low-carbon vehicles), continuously city will follow central government's strategies and set up related reduction actions. In the future, city will establish climate change adaptation commission, promote complete local adaptation system to decrease threats from climate change. Besides, city will continuously cooperate with international, by every possible way to communicate with others in order to lead city into low-carbon and sustainable city.

1.2

Please describe how your city collaborates with businesses in your city on sustainability issues or projects?

1. Establishing an Industrial GHG Emissions Reduction and Control Autonomous Regulations is seen as a feasible measure to reduce GHG emissions in Kaohsiung. The city plan to regulate industries to reduce total emissions or enhance energy using efficiency.
2. Kaohsiung city government has successfully promoted the Project of Energy and Resources in LinHai industrial park, taking China Steel Company (CSC) as the core selling waste heat and steam to surrounding factories.
3. Kaohsiung City Government largely introduced energy saving companies (ESCOs) to the city. It can not only integrate power from private companies to update energy-saving equipments, but also stimulate the development of green economy in Kaohsiung.

Module: Risks & Adaptation

Page: Climate Hazards

2.0

Has a climate change risk or vulnerability assessment been undertaken for your local government area?

Yes

2.0a

Please attach and provide details on your climate change risk or vulnerability assessment.

Publication title	Year of publication	Attach the document	Boundary of assessment	Primary author of assessment	Web link
Project of Climate Change Adaptation and Ecological City Arrangement in Kaohsiung City	2014	https://www.cdp.net/sites/2016/12/31112/CDP Cities 2016/Shared Documents/Attachments/Cities-2.0a-C3-AttachtheDocument/01附件一-高雄市氣候變遷調適及生態城市規劃計畫-CH3.pdf	City/Municipality	Consultant	

2.0b

Please select the primary process or methodology used to undertake the risk or vulnerability assessment of your city.

Primary methodology	Description
Agency specific vulnerability and risk assessment methodology	There are three natural disasters in Kaohsiung city, including flood, landslide and coastal disaster, caused by climate change. Therefore, Kaohsiung government refers the vulnerability assessment methodology of National Science and Technology Center for Disaster Reduction(NCDR) to evaluate the vulnerabilities with environmental vulnerability and social vulnerability, and the detailed assessment of factors, calculation and grading method as shown as below. 1. Assessment of factors for three disasters of climate change 2. Calculation steps 3. Grading matrix

2.1

Do the current and/or anticipated effects of climate change present a significant risk to your city?

Yes

2.1a

Please list the most significant climate hazards currently faced by your city and indicate the probability and consequence of these hazards.

Climate hazards	Probability of hazard	Consequence of hazard
Rain storm	High	Medium High

Cyclone (Hurricane/Typhoon)	High	High
Extreme cold days	Medium Low	Medium
Extreme hot days	Medium High	Medium
Drought	Medium High	Medium High
Flash/surface flood	Medium High	High
Coastal flood	Medium Low	Medium High
Salt water intrusion	Medium Low	Medium High
Landslide	High	High

2.1c
Please identify how you expect climate change to affect the frequency and intensity of the hazards faced by your city and when you expect to experience those changes.

Climate hazards	Change in frequency	Change in intensity	Anticipated timescale
Rain storm	Increasing	Increasing	Current
Cyclone (Hurricane/Typhoon)	Increasing	Increasing	Current
Extreme cold days	Increasing	Increasing	Current
Extreme hot days	Increasing	Increasing	Current
Drought	Increasing	Increasing	Current
Flash/surface flood	Increasing	Increasing	Current
Coastal flood	Increasing	Increasing	Long-term
Salt water intrusion	Increasing	Increasing	Long-term
Landslide	Increasing	Increasing	Current

Page: Climate Hazards II

2.1d
Please describe the magnitude of the impact of these hazards and identify three critical assets or services that may be most impacted.

Climate hazards	Magnitude of impact	Impact description	Asset or service	Asset or service	Asset or service
Rain storm	Serious	Rainfall intensity brings more flooding and water-soil complex disasters	Transport		Emergency services
Cyclone (Hurricane/Typhoon)	Extremely serious	The increase in both frequency and intensity of typhoons attacking Taiwan poses challenges to the contingency and recovery capabilities of disaster prevention system	Transport	Residential	Emergency services
Extreme cold days	Less serious	Under the situation of extreme temperatures, cardiovascular disease is a more possible cause of death than respiratory disease	Food and agriculture	Health and community	Other:
Extreme hot days	Less serious	Aggravate the spread of insect-borne diseases such as Dengue Fever, Scrub Typhus, Japanese encephalitis, etc. High temperature may also extend the spreading period or area of these diseases	Health and community	Energy	Water
Drought	Serious	The continuous non-raining days increases in Kaohsiung and the overall rainfall reduces in the past years. As such, the water inflow decreases during the flood season and weakens its water supply to dry seasons	Water	Food and agriculture	Other:
Flash/surface flood	Serious	Torrential rain which exceeds the capacity of the drainage system or protection standard of levee will increase the risk of flooding	Transport	Emergency services	Residential
Coastal flood	Serious	Rising sea level is likely to cause drainage problems in low-lying coastal areas	Transport	Emergency services	Residential
Salt water intrusion	Serious	The increased chance of storm surge occurrences leads to increased	Transport	Emergency services	Residential

Project of Climate Change Adaptation and Ecological City Arrangement in Kaohsiung City	2014	https://www.cdp.net/sites/2016/12/31112/CDP Cities 2016/Shared Documents/Attachments/Cities-3.2a-C3-Attachment/01附件一-高雄市氣候變遷調適及生態城市規劃計畫-CH3.pdf	City/Municipality	Administrative boundary of city governance	Consultant
--	------	---	-------------------	--	------------

3.3

The Compact of Mayors requires cities to complete [these additional questions](#) on the climate hazards affecting your city and your city's plans to adapt to these hazards. Other cities wishing to disclose further detail about their adaptation efforts are also encouraged to fill out the download.

[https://www.cdp.net/sites/2016/12/31112/CDP Cities 2016/Shared Documents/Attachments/Cities-3.3-Adaptation/04附件四 CRAFT_Questionnaire_CDP-SGS.xlsm](https://www.cdp.net/sites/2016/12/31112/CDP%20Cities%202016/Shared%20Documents/Attachments/Cities-3.3-Adaptation/04附件四-CRAFT_Questionnaire_CDP-SGS.xlsm)

3.4

Please describe the actions you are taking to reduce the risk to, or vulnerability of, your city's infrastructure, citizens, and businesses from climate change as identified on the previous page.

Climate hazards	Action	Action description
Rain storm	Other: Improve the drainage system and strengthen the management, Establish water resource conservation and disaster prevention system	KCG is committing to the effective integrated drainage system management. The comprehensive soil and water conservation strategies have been established to avoid landslide caused by intense rainfall. Standard operation process of disaster response has been established. The SOP content includes disaster warning system, emergency rescue system, refugee resettlement system and disaster obviation system.
Cyclone (Hurricane/Typhoon)	Other: Improve the drainage system and strengthen the management, Establish water resource conservation and disaster prevention system	KCG is committing to the effective integrated drainage system management. The comprehensive soil and water conservation strategies have been established to avoid landslide caused by intense rainfall. Standard operation process of disaster response has been established. The SOP content includes disaster warning system, emergency rescue system, refugee resettlement system and disaster obviation system.
Extreme cold days	Other: Promoting chronic disease care program	Confronted with the temperature difference caused by climate change, KCG has promoted health care education programs that empower seniors to manage their chronic conditions.
Extreme hot days	Projects and policies targeted at those most vulnerable	KCG has further established the surveillance and preventive measures that target communicable diseases due to climate change, as well as arranging the related propaganda to raise public
Drought	Other: Study and develop diversified water supply program	KCG has developed alternate water supply, such as reservoir and underground water. Multi water resource management in Kaohsiung can also decrease
Flash/surface flood	Other: Flood disaster prevention and relief projects	To maintain and to expand the center of each regimen, to implement the management of mobile flood pumping machine equipment, to strengthen local flood tubes and strain dispatching function
Coastal flood	Other: The plan of sustainable regeneration in coastal environment	To improve the coastal environment t, to advance disaster prevention function of seawall, to activate the utilization of seawall space
Salt water intrusion	Other: The plan of sustainable regeneration in coastal environment	To improve the coastal environment t, to advance disaster prevention function of seawall, to activate the utilization of seawall space
Landslide	Other: Strengthen environmental geology in slope and application of disaster prevention	Investigation in potential Large-scale landslide mechanism and activity observation

Page: Social Risks**4.0****Does your city face any social risks as a result of climate change?**

Yes

4.0a**Please complete the table**

Social risks	Anticipated timescale in years	Impact description
Increased incidence and prevalence of disease	Short-term	Dust storms from China drifted across Taiwan, making the increase in respiratory diseases. Studies also found that heavy rain and flooding during the typhoon period substantially increased the risk of diseases caused by the exposure to unclean water and soil, such as leptospirosis and melioidosis infections. Of these, the outbreak of melioidosis was particularly significant. Diversified infectious disease surveillance performed by the Centers for Disease Control of the Executive Yuan's Department of Health found that over the years melioidosis epidemics have repeatedly occurred in the aftermath of typhoon disasters in southern Taiwan. During Typhoon Morakot's attack in August 2009, a cluster of ten melioidosis cases and one death appeared in the Zuoying and Nanzih Districts in Kaohsiung City. After Typhoon Fanapi's hit in September 2010, seven melioidosis cases appeared and were confirmed in Kaohsiung, eventually leading to one death. The possible cause of infection may be the scour of pathogens from deep soil to the surface by heavy rains. In addition, the strong typhoon wind may facilitate inhalation of contaminated dust and lead to subsequent infection. These phenomena indicate that if extreme weather incidents occur frequently in the future, it is necessary to pay closer attention to epidemic prevention before and after the flood disaster.
Increased incidence and prevalence of disease	Long-term	The impact of extremely hot summer on human health may worsen due to the rise of humidity. Increased frequency and severity of heat waves may lead to an increase in the number of diseases and deaths. According to the study 'The Effects of Climatic Variability and Abnormal Weather Condition on the Occurrence of Selected Diseases in Taiwan', if the annual monthly average temperature rises 1°C, areas with the potential risk of dengue fever will expand; the population threatened by potential dengue fever epidemic will triple. The long-term warming trend in southern Taiwan is very likely to facilitate the severity of regional spread of dengue fever in the metropolitan area.
Increased demand for public services (including health)	Long-term	Climate change led to the increase of chronically ill and more medical resources and public services.
Increased risk to already vulnerable populations	Short-term	People live in vulnerable areas need to be evacuated due to the threat of typhoon and flooding, some villages even have to be relocated. Typhoon Morakot in 2009 and Typhoon Fanapi in 2010 are examples of Kaohsiung City under severe attack by extreme events. During both rainstorm catastrophes, the 24-hour maximum accumulated rainfall was over 500 mm (the average monthly average precipitation of Kaohsiung is about 188 mm), causing severe flooding and landslides as well as nearly 600 casualties. They also had a considerable subsequent influence on the ecological environment and public health.
Increased risk to already vulnerable populations	Long-term	From the viewpoint of social vulnerability, like low social status, low incomes, or elderly residents, are the populations highly vulnerable to climate change cannot afford the financial losses and affect the efficiency of reconstruction. According to the estimation of population growth by the Kaohsiung City Government's Department of Budget, Accounting and Statistics, the percentage of elderly population will grow from 10% in 2010 to 24% in 2031; as a result, the populations sensitive to climate change will also increase correspondingly.

Module: Opportunities**Page: Opportunities****5.0****Does climate change present any economic opportunities for your city?**

Yes

5.0a

Please indicate the opportunities and describe how the city is positioning itself to take advantage of them.

Economic opportunity	Describe how the city is maximizing this opportunity
Development of new business industries (e.g. clean tech)	KCG is encouraging and promoting the Energy Service Company (ESCO) and trying to create a niche market for those innovative industries. Also, KCG has developed subsidy mechanisms and projects to support the development of renewable energy industries, especially on solar and wind power.
Increased energy security	Since the renewable energy is developing, the energy diversity is increasing. KCG is developing the renewable energy and promoting the energy conservation. Thus, the less dependence on import fossil fuel is expectable, the energy security is increasing.
Other: Green Jobs	As the clean tech industries are developing, the green job opportunities will be increasing at the same time.

5.1

List any climate change-related projects for which you hope to attract private sector involvement, and provide any details on the estimated cost of the project

Project area	Project description	Cost of project (USD\$)
Energy efficiency/retrofit	Kaohsiung city government has successfully promoted the Project of Energy and Resources in LinHai industrial park, taking China Steel Company (CSC) as the core selling waste heat and steam to surrounding factories.	1884875
Renewable energy	Kaohsiung city government encouraged the public to install solar panels on buildings. Depending on different setting scale, citizens can apply for subsidy from NT\$12,000(US\$400) to NT\$600,000(US\$20,065).	500000

Module: Emissions - Local Government Operations

Page: Local Government - Methodology

LGO1.0

Please state the dates of the accounting year or 12-month period for which you are reporting a GHG measurement inventory for your local government operations.

Wed 01 Jan 2014 - Wed 31 Dec 2014

LGO1.1

Please indicate the category that best describes the boundary of your municipal GHG emissions inventory.

Departments, entities or companies over which operational control is exercised

LGO1.2

Please indicate which of the following major sources of emissions are included in your municipal GHG emissions inventory.

Source of emissions	Status
Airport(s)	Not applicable
Buildings	Included
Buses	Not included
Electricity generation	Not applicable
Electricity transmission and distribution	Not applicable
Employee commuting	Not included
Incineration of waste	Included
Landfills	Included
Local trains	Not included
Maritime port	Not included
Municipal vehicle fleet	Included
Regional trains	Not included
Roads / highways	Not included
Street lighting and traffic signals	Included
Subway / underground	Not included
Thermal energy	Not included
Waste collection	Not applicable
Wastewater treatment	Included
Water supply	Not included
Unknown source	Not applicable

Total

Included

LGO1.3

Please give the name of the primary protocol, standard or methodology you have used to calculate GHG emissions.

Primary protocol	Comment
Other: GHG Inventory Accounting Guideline for Local City (EPA)	Our country in order to assist local cities to handle emissions baseline, and make sure it follows the standard of MRV, so referring to related international GHG inventory guidelines for local cities, including IEAP published in 2009, to develop our city GHG inventory guideline.

LGO1.4

Which gases are included in your emissions inventory? Tick all that apply.

CO2
CH4
N2O
HFCs

Further Information**Page: Local Government - Energy Data****LGO1.5**

Please give the total amount of fuel (refers to Scope 1 emissions) that your local government has consumed this year.

Source	Fuel	Amount	Units
Buildings	Natural gas	1273462.9	m3 (cubic meters)
Buildings	Liquefied Petroleum Gas (LPG)	274798.23	L
Buildings	Diesel/Gas oil	996594.94	L
Buildings	Biodiesel	20338.67	L
Incineration of waste	Diesel/Gas oil	557773	L
Incineration of waste	Biodiesel	324.61	L
Incineration of waste	Waste (municipal)	423896.06	Metric tonnes
Municipal vehicle fleet	Diesel/Gas oil	4485016.44	L
Municipal vehicle fleet	Biodiesel	4533.2	L
Municipal vehicle fleet	Motor gasoline (petrol)	7550319.25	L
Wastewater treatment	Diesel/Gas oil	13045.23	L
Wastewater treatment	Biodiesel	131.77	L
Other: Fire extinguisher	Other: CO2	2.08	Metric tonnes
Other: Fire extinguisher	Other: NaHCO3	11.7	Metric tonnes
Other: Fire extinguisher	Other: KHCO3	0.72	Metric tonnes
Other: Refrigerant Fugitive	Other: R-134a	0.45	Metric tonnes
Other: Refrigerant Fugitive	Other: R-410a	0.10	Metric tonnes
Other: Septic Tank	Other: CH4	48.64	Metric tonnes
Other: Composting	Other: CH4	21.01	Metric tonnes
Other: Composting	Other: N2O	1.58	Metric tonnes

LGO1.6

How much electricity, heat, steam, and cooling (refers to Scope 2 emissions) has your local government purchased for its own consumption during the reporting year?

Source	Type	Amount	Units
Buildings	Electricity	229163.49	MWh
Street lighting and traffic signals	Electricity	342633.64	MWh
Wastewater treatment	Electricity	0.05	MWh

Page: Local Government - GHG Emissions Data**LGO1.7**

Please provide total (Scope 1 +Scope 2) GHG emissions for your local government's operations, in metric tonnes CO2e.

760867.88

LGO1.8

If applicable, please provide the following GHG emissions.

Scope 1: All direct GHG emissions

Scope 2: Indirect GHG emissions associated with the consumption of purchased or acquired electricity, steam, heating, or cooling.

Total Scope 1 activity in metric tonnes CO2e emitted	Total Scope 2 activity in metric tonnes CO2e emitted
436149.24	324718.63

LGO1.9

Do you measure Scope 3 emissions?

No

LGO1.9b

Please explain why not and detail your plans to do so in the future, if any.

Currently the city has not arranged for scope 3 emissions, due to right now Kaohsiung City government only gets data resource in waste, and other sections the city does not have any data to quantify.

LGO1.11

Where it will facilitate a greater understanding of your government emissions, please provide a breakdown of these emissions by department, facility, source, or by any other classification system used in your city.

Department / Facility / Source / Other	Scope	Emissions (metric tonnes CO2e)
Building and Facility Energy used	Total figure	123859.74
Street Light and Traffic Light Energy used	Scope 2	178512.13
Waste and Waste Water (collection and distribution) Energy used	Total figure	26846.44
Transportation Energy used	Scope 1	20395.17
Energy Fugitive	Scope 1	764.10
Waste	Scope 1	410490.31
Forestry	Scope 1	4388.83

LGO1.12

Please indicate if your emissions have increased, decreased, or stayed the same from the previous year, and please describe why.

Change in emissions	Reason for change
Increased	Although the emissions of "Street Light and Traffic Light Energy used" and "Transportation Energy used" sections is decreased, but in other section, like "Building and Facility Energy used" and "Waste", emission is increased, even more than previous number. The main reason due to the electricity used in public buildings increases 30 million kWh, and the number sent into incineration increases near 50 thousand metric tonnes.

Page: Local Government - External Verification

LGO1.13

Has the GHG emissions data you are currently reporting been externally verified or audited in part or in whole?

No

LGO1.13b

Please describe your plans to verify your emissions in the future.

There is no any verification plan arrangement for current emissions data, will be arranged in the end of this year.

Module: Emissions - Community

Page: Community - Date and Boundary

C1.0

Please state the dates of the accounting year or 12-month period for which you are reporting a GHG measurement inventory for your community.

Other	Other: Electricity only used in power station	Scope 2	3502.86
Other	Other: Live and Business constructions	Total figure	4643914.04
Other	Road	Scope 1	4041524.51
Other	Rail	Total figure	127689.24
Other	Other: Aviation	Scope 1	30395.56
Other	Other: Shipping	Scope 1	33335.35
Other	Other: Industrial energy and production process	Total figure	48705569.21
Other	Other: Farming	Scope 1	3613.19
Other	Other: Live Stock	Scope 1	47798.06
Other	Other: Landfill	Scope 1	94032.44
Other	Other: Waste Incineration	Scope 1	770242
Other	Other: Composting	Scope 1	929.78
Other	Other: Live and Business waste water management	Scope 1	252107.84
Other	Other: Industry waste water management	Scope 1	1109.69

C1.7

Please give the total amount of fuel (referring to Scope 1 emissions) consumed in your city during the reporting year.

Fuel	Amount	Units	End user / Economic sector / IPCC sector / Other	Sector
Liquefied Petroleum Gas (LPG)	206480309.53	L	Other	Other: Live and Business construction
Natural gas	200097122.71	m3 (cubic meters)	Other	Other: Live and Business construction
Kerosene	589507.33	L	Other	Other: Live and Business construction
Diesel/Gas oil	48098746.47	L	Other	Other: Live and Business construction
Biodiesels	480987.46	L	Other	Other: Live and Business construction
Residual fuel oil	45379256.99	L	Other	Other: Live and Business construction
Residual fuel oil	3796906129.43	L	Other	Other: Industrial Energy and Production Process
Other: Methanol	269.69	Metric tonnes	Other	Other: Industrial Energy and Production Process
Peat	1786.23	Metric tonnes	Other	Other: Industrial Energy and Production Process
Other: Blast Furnace Gas	14521605400	m3 (cubic meters)	Other	Other: Industrial Energy and Production Process
Liquefied Petroleum Gas (LPG)	19257176.64	L	Other	Other: Industrial Energy and Production Process
Other: Anthracite	738557.72	Metric tonnes	Other	Other: Industrial Energy and Production Process
Waste (municipal)	12.3	Metric tonnes	Other	Other: Industrial Energy and Production Process
Other: Ethylene	17.35	Metric tonnes	Other	Other: Industrial Energy and Production Process
Other: Butadiene	131.69	Metric tonnes	Other	Other: Industrial Energy and Production Process
Natural gas	3237943438	m3 (cubic meters)	Other	Other: Industrial Energy and Production Process

Wood or wood waste	24574.06	Metric tonnes	Other	Other: Industrial Energy and Production Process
Other: propylene	27.7	Metric tonnes	Other	Other: Industrial Energy and Production Process
Propane	2121.58	Metric tonnes	Other	Other: Industrial Energy and Production Process
Other: progress gas	204393700	m3 (cubic meters)	Other	Other: Industrial Energy and Production Process
Diesel/Gas oil	31659984.84	L	Other	Other: Industrial Energy and Production Process
Biodiesels	86990.94	L	Other	Other: Industrial Energy and Production Process
Lignite coke	3786066.77	Metric tonnes	Other	Other: Industrial Energy and Production Process
Other: Coke Oven Gas	2121787760	m3 (cubic meters)	Other	Other: Industrial Energy and Production Process
Refinery gas	1096197892	m3 (cubic meters)	Other	Other: Industrial Energy and Production Process
Coal (Bituminous or Black coal)	9293011.44	Metric tonnes	Other	Other: Industrial Energy and Production Process
Other: Lignite	242711.3	Metric tonnes	Other	Other: Industrial Energy and Production Process
Motor gasoline (petrol)	1060570563.93	L	Other	Road
Diesel/Gas oil	579865540	L	Other	Road
Biodiesels	4725457.48	L	Other	Road
Motor gasoline (petrol)	49612	L	Other	Rail
Diesel/Gas oil	1546917.99	L	Other	Rail
Biodiesels	54647.01	L	Other	Rail
Jet kerosene	111251000	L	Other	Other: Aviation
Diesel/Gas oil	12575117.28		Other	Other: Shipping
Biodiesels	379356.11	L	Other	Other: Shipping
Waste (municipal)	641781.05	Metric tonnes	Other	Other: waste incineration
Diesel/Gas oil	1489193.2	L	Other	Other: waste incineration
Biodiesels	12883.8	L	Other	Other: waste incineration
Liquefied Petroleum Gas (LPG)	161.86	L	Other	Other: waste incineration

C1.8
How much electricity, heat, steam, and cooling (referring to Scope 2) has been consumed by your city during the reporting year?

Type	Amount	Units	End user / Economic sector / IPCC sector / Other	Sector
Electricity	6723343	kWh	Other	Other: Electricity only used in power station
Electricity	6982145982	kWh	Other	Other: Live and Business construction
Electricity	236980852.53	kWh	Other	Rail
Electricity	22042151476.12	kWh	Other	Other: Industrial Energy and Production Process

C1.11
Do you measure Scope 3 emissions?

No

C1.11b
Please explain why not and detail your plans to do so in the future, if any.

Currently the city GHG inventory is under progress by national inventory guideline, but this year the city will commence to quantify the data in accordance with GPC guideline to get emissions.

C1.12

Please indicate if your emissions have increased, decreased, or stayed the same since your last emissions inventory, and please describe why.

Reason for change	Please describe why
Stayed the same	The city administrative area emissions is gently decreasing, and total emissions reduction range is 0.11%.

Further Information

the information of Kaohsiung GHG community inventory is happened in 2014

Page: Community - External Verification

C1.13

Has the GHG emissions data you are currently reporting been externally verified or audited in part or in whole?

Yes

C1.13a

Please provide the following information about the emissions verification process.

Name of verifier	Year of verification	Attach verification certificate	Comments
Bsi	2014	https://www.cdp.net/sites/2016/12/31112/CDP Cities 2016/Shared Documents/Attachments/Cities-C1.13a-C3-AttachVerification/06附件六 Bsi高雄市政府GHG聲明書.pdf	

Module: Strategy

Page: GHG Emissions Reduction - Local Government Operations

6.0

Do you have a GHG emissions reduction target in place for your local government operations?

Yes

6.0a

Please provide details of your local government operations emissions reduction target.

Sector	Define target boundary	Baseline year	Baseline emissions (metric tonnes CO2e)	Percentage reduction target	Target date	Comment
Buildings	Kaohsiung city government department	2007		10%	2016	According to the project published in 2011 and revised in 2013 from Executive Yuan, R.O.C. (Taiwan). The bottom line is to limit the growth of the electricity usage for public sectors.
Transport	Kaohsiung city government department	2007		14%	2016	According to the project published in 2011 and revised in 2013 from Executive Yuan, R.O.C. (Taiwan). The bottom line is to limit the growth of the electricity usage for public sectors.

6.1

What actions are you undertaking to reduce your emissions in your local government operations?

Emissions reduction activity	Anticipated emissions reduction – cumulative over the lifetime of the action (metric tonnes CO2e)	Action description

On-site renewable energy generation	4000	Public roof rentals have been completed 5.64MW and rented by private vendors. The annual power generation is about 7.62 million degrees, and the annual carbon reduction is 4,000 metric tonnes.
Energy efficiency/ retrofit measures		Kaohsiung city government planned to execute old public buildings renewal and replace energy-consuming equipments with energy-saving equipments to reduce energy consumption and GHG emissions caused by public buildings.
Developing the green economy		In order to encourage green businesses in Kaohsiung, the city government promotes green purchase, purchasing goods with green labels and using green products, in public sectors.
Low or zero carbon energy supply generation		Kaohsiung city government purchases vehicles using clean fuel as official cars and public buses to reduce GHG emissions and promote low-carbon vehicles in the city.
Building performance rating and reporting		To approach a low-carbon city, Kaohsiung city government implements water, electricity, fuel oil and paper reduction in public sector to be a model for citizens and private sectors.

Page: GHG Emissions Reduction - Community

7.0

Please describe the process by which the city reviews its progress and manages overall responsibility for emissions reduction.

Kaohsiung City is a heavy industrial city in southern Taiwan, making its average GHG emissions higher than that of the world and Taiwan. Hence the Kaohsiung Environmental Protection Bureau (EPB) to establish regulations on GHG reduction and carbon assets management since 2009, as the basis for promoting GHG reduction and managing carbon assets, as well as promoting government, industry, academia, and the public to jointly take part in GHG reduction efforts to reduce GHG emissions, in order to move Kaohsiung City towards a low-carbon, green energy city. Started in 2012, city had collected all bureaus' plans or strategies, and invited them into discussion in 2013, in order to draft and make Kaohsiung City GHG reduction strategy and action plan, inside the project there were 64 reduction strategies but turned into 48 after 2 years meeting, total reduction number was 861 million metric tonnes. With the goal of involving industries and the public in GHG reduction and carbon assets management, and continued to review the city's GHG reduction strategy and action plans. Base on the features specific to Kaohsiung, it also help set up the legal works of GHG management and carbon assets management. It seeks to set up GHG reduction and market mechanism based mandatory regulations, in order to accelerate the development of climate change strategy of Kaohsiung City. In addition, in order to implant the idea of carbon reduction in industries, city also organized the "Energy Saving and Carbon Reduction Technical Advisory Group", with onsite consultation services to increase willingness of industries to reduce GHG emissions. On raising awareness and promotion, this project assisted industries develop early action and offset projects, promoted the carbon footprint/carbon label, and assess the feasibility of Kaohsiung City infrastructure projects to apply for GHG offsets. It also organized many meetings to promote domestic and international exchange, as well as GHG reduction/ carbon assets-related promotional activities, thus increasing public participation and elevating the international status of Kaohsiung City, and contributing to climate change mitigation.

7.1

Does your city have a climate change action plan for reducing GHG emissions?

Yes

7.1a

Please attach your city's climate change action plan below.

Publication title	Year of publication	Attach	Web link
2014 Kaohsiung City Low-Carbon and Sustainable Homeland Operation and Assessment Plan	2015	https://www.cdp.net/sites/2016/12/31112/CDP-Cities-2016/Shared-Documents/Attachments/Cities-7.1a-C3-AttachPlan/07附件七_103年度高雄市低碳永續家園運作及成效管考計畫.pdf	http://www.ksepb.gov.tw/
2014 Kaohsiung City GHG Reduction and Carbon Management Plan	2015	https://www.cdp.net/sites/2016/12/31112/CDP-Cities-2016/Shared-Documents/Attachments/Cities-7.1a-C3-AttachPlan/08附件八_103年度高雄市溫室氣體減量及碳資產管理計畫-CH3.pdf	http://www.ksepb.gov.tw/
Kaohsiung City Low-Carbon Homeland	2014	https://www.cdp.net/sites/2016/12/31112/CDP-Cities-2016/Shared-Documents/Attachments/Cities-7.1a-C3-	http://www.ksepb.gov.tw/

Office Plan		AttachPlan/09附件九 高雄市低碳永續家園專案辦公室計畫.pdf	
2013 Kaohsiung City GHG Reduction and Carbon Management Plan	2014	https://www.cdp.net/sites/2016/12/31112/CDP Cities 2016/Shared Documents/Attachments/Cities-7.1a-C3-AttachPlan/10附件十 102年度高雄市溫室氣體減量及碳資產管理計畫_CH2.pdf	http://www.ksepb.gov.tw/

7.2

Do you have a GHG emissions reduction target in place for your community?

Yes

7.2a

Please provide details of your total city-wide emissions reduction target. In addition you may provide details of your sector-specific targets, by providing the baseline emissions specific to that target.

Sector	Define target boundary	Baseline year	Baseline emissions (metric tonnes CO ₂ e)	Percentage reduction target	Target date	Comment
Total	Kaohsiung City	2005	64339200	20%	2020	Chu Chen, Mayor of Kaohsiung City had set up short term GHG reduction target, decreasing 20% by 2020 compared with the emissions in 2005. Therefore, city has to build up its future BAU for comparison with baseline emissions, to estimate how many should city reduce in order to reach the target.

7.3

What actions are you undertaking to reduce emissions city-wide?

Emissions reduction activity	Anticipated emissions reduction – cumulative over the lifetime of the action (metric tonnes CO ₂ e)	Action description
Optimize traditional power/ energy production	363000	Kaohsiung city government has successfully promoted the Integration of resources and energy in LinHai industrial park, taking China Steel Company (CSC) as the core selling waste heat and steam to surrounding factories. In 2015, due to decreasing market in industry, compared with 18.9 million metric tonnes steam sold in 2014, only 15.8 million metric tonnes steam sold in demand, which would be equal to reducing emissions 363 thousand metric tonnes CO ₂ e produced by burning fossil fuels.
Eco-district development strategy		According to the Kaohsiung's Environmental Maintenance and Management Autonomy Regulations, the Environmental Protection Administration or central competent authority shall declare public and private spaces for stationary sources of GHG emissions, which should set a self-management plan, setting greenhouse gas reduction targets of the process.
Energy efficiency/ retrofit measures	71808	Kaohsiung City Environmental Protection Bureau actively promotes energy-efficiency and reduction of greenhouse gas emissions of the project. According to the ISO14064 standard, the plants should be assisted by the task of inventory, reduction of counselling and log in. Since 2009, Kaohsiung City Environmental Protection Bureau has investigated all of the plant located in Kaohsiung in accordance with the ISO14064-1 and counselled over 51 plants. Furthermore, Kaohsiung City Environmental Protection Bureau has made a survey to know how many plants located in Kaohsiung is willing to cooperate with the plan of voluntary reduction of carbon reduction. It was estimated that there are reduction amount on Carbon reduction by 71,808 metric tonnes in the seven years ,which resulted from 6 times assistance on 2012.
Energy efficiency/	4366.3	Carbon Reduction Technique Foundation's counselling founded on 2014 aims to provide both on diagnosis, analysis on the energy usage of general plants' production or relevant facility and on assistance for factory owners to set up an improvement to realize the practically using situation ,which can be seen as a reference of level-up efficiency and up-graded information. Take the example on 2015. if cooperated with the project. five plants on the plan were improved

retrofit measures		their overall carbon reduction benefits, saving total energy consumption of 18,560,000 degrees of the total electrify amount and 68.5 million cubic meters of natural gas per year, saving energy costs total 54.4 million NTD, representing a decrease of approximately 9,803 metric tonnes of carbon dioxide equivalent emissions per year.
Building codes and standards		In order to promote green building for fulfilling the vision of low-carbon city, Kaohsiung City government impletented Green Building autonomous regulations in Jun., 2012 and revised in Jan., 2013. It forces that new building construction and old building with different scales; need to fulfil certain levels of green building standards. In regulations, it defines different types of buildings and related standards to be followed, such as solar system, water-saving devices and greening areas.
Green space and/ or biodiversity preservation and expansion	6962	Since 1st July, 1995, the EPA commenced promoting the program called "Air quality purifying areas" to build green spaces to make better air quality. And Kaohsiung City also strongly supported and promoted this plan, Up to 2015, green space reached to 562 places, 228.3 ha in public place. 5,250.7 GHG reduction is anticipated per year.
On-site renewable energy generation		Kaohsiung City actively undergoes amending construction related regulations to promote solar photovoltaic system. According to 2015 analysis, city's application occupied 13.78% of total applicants, and with 28.486 MW capacity , creating 2.8 billion benefit, total capacity occupied 8.81% in whole country. This year, 2016, city will continuously make compensation for encouraging setting up system, each subsidy is limited NT\$300,000(US\$9,375).
Building performance rating and reporting		Kaohsiung city government provides subsidy to private buildings to improve its energy efficiency. The subsidy covers LED lights, water-saving taps and is up to NT\$20000 (USD\$ 666).
Infrastructure for non motorized transport		Kaohsiung continuously set up new public bike rental stations. Until 2015, 183 stations have been set up, which can provide 220 ,000 citizens to use each month, and totally reduce 2,206 metric tonnes CO2e emissions.
Improve bus infrastructure, services, and operations		Adding shuttle buses for KMRT (Kaohsiung Metro Rapid Transit) users, and providing privilege for people transferring between KMRT and public buses, aiming to double public transportation users.
Improve rail, metro, and tram infrastructure, services and operations		Kaohsiung is building a light rail system. The project with 22.1 km long, includes two stages. So far, the first stage is completed, and temporally operated and commenced on 16th October, 2015, while the whole stage would be operated in 2019.
Improve fuel economy and reduce CO2 from motorized vehicles		The city government provides subsidies to replace two-stroke scooters with electronic scooters. The maximum subsidy is NT\$ 20,500 (USD\$ 640). After analyzing data base (until February, 2016), replaced stroke scooters number is over 345,181, and more than 6,841 electronic scooters has been registered. More green transportation used, less pollution and GHG emissions will be made, which will bring benefit to our environment.
Green space and/ or biodiversity preservation and expansion		Kaohsiung city government puts lots of efforts in the issue of wetland conservation because of its abilities of carbon fixing, urban flood detention, and ecological and recreational value. Until 2015, the city has successfully created 21 wetland parks in Kaohsiung with total area about 986 ha.
Green space and/ or biodiversity preservation and expansion		Many actions have been taken between 2005 and 2009 to advocate green campus, and the impressive results are in 6 aspects including illumination, energy conservation, planting, water conservation, recycling and thermal insulation.
Developing the green economy		In order to stimulate the development of green economy in Kaohsiung, the city government promotes goods with green labels, including energy-saving label and water-saving label, to citizens. According to analysis in 2015, total green procurement number is NT\$ 1,504,710,000 (USD\$ 50,157,000) including 204 units (companies, schools and public groups). And for Kaohsiung City government, total green procurement is NT\$ 326,853,413 (USD\$ 10,214,169).
Building performance rating and reporting		The green energy environmental concept of the building: Kaohsiung Main Public Library is integrated into every floor; the design of the third to eighth floors on the southwest side is a five-meter-deep green turf landscape balcony providing a cool place to hide from the burning rays of Kaohsiung's summer, and also allowing citizens to lie on a lawn, or read under a tree, thus providing an excellent green space for reading.

<p>Building codes and standards</p>	<p>In response to the impact of climate change and the advent of an aging society, Kaohsiung city government imposed Kaohsiung house designing and feedback project in September,2014. The estimation base is 20% of 5829 buildings constructed in 2013: The setting of three-dimensional green roof increases the total green area of 11 football fields, and total power generation is about 18 National Stadiums. All green building practices create 16,619 metric tonnes carbon reduction, equivalent to about 1.66 million trees planted in carbon sequestration.</p>
-------------------------------------	---

Page: Renewable Energy

8.0
Please indicate the energy mix of your electricity at the city-wide scale.

Energy source	Percent
Coal	
Gas	
Oil	
Nuclear	
Hydro	
Biomass	
Wind	
Geothermal	
Solar	

8.1
Does your city have a renewable energy or electricity target?

No - my city does not have any renewable energy or electricity target

8.1c
Please explain why you do not have a renewable energy target or a renewable electricity target and any plans to introduce one in the future.

Kaohsiung City Government has various plans for renewable electricity, yet does not set targets. The solar energy plans are: 1) Kaohsiung main stadium—the stadium is a green building with solar panels on the roof. The capacity of the system is 1MW. Annual electricity generation is 1.1 million KWh and the annual GHG reduction is 701 metric tonnes per year. 2) Da Ping Ding Green Solar project—The Da Ping Ding area accounts for 2,214 ha. The city government constructed a photovoltaic system of 1 MW. The annual power generation is 1.2 million kWh. The generated power is also used for soil remediation. After the completion of remediation, the power will supply local residence. 3) Gang-shan Landfill—The photovoltaic system in Gang-shan Landfill accounts for 2 ha. It is connected to grid of Taiwan Power Company and provides 456 KW to the centre. 4) Xing-da solar power plant—operated since October 2011. The system occupies 9.45 ha and equipped with 16 thousand panels. The capacity goes to 6 million kWh. 5) Developed by Public Affair Bureau, the project named " Hundreds Stadiums-Solar PV plan" will collect related PV plans from all bureaus and departments, and expect to reach 150 MW capacity in 4 years and complete 3 PV demonstrations set up, in order to increase occupied percentage of renewable energy used.

Page: Water Supply Risks

9.0
Do you foresee substantive risks to your city's water supply in the short or long term?

Yes

9.0a
Please identify the risks to your city's water supply as well as the timescale and level of risk.

Risks	Timescale	Level	Risk description
Increased water stress or scarcity	Short-term	Serious	Kaohsiung city's water supply relies on river flow and rainwater. The rain falls into the river catchment area. If these areas are not able to have rain for one season or even longer, it would cause water supply crunch.

Page: Water Supply Management

9.1
Please describe the actions you are taking to reduce the risks to your city's water supply.

Risks	Adaptation action	Action description
Increased water stress or scarcity	Diversifying water supply (including new sources)	For the purpose of the stability supply for water resources in Kaohsiung Region, the riverbank filtration as water intake works nearby the Kaoping River is to be accessed and acted as backup and supplement water resources to increase the reaction capacity of the water allocations. Develop interflow resources and riverbank water intake works evaluation near the Kaoping River(Weng park and Jhuliao area). Promote the construction of a desalination plant, given the high value industries without water will cause serious losses due to high water bills are more affordable to obtain a stable supply of incentives, short-term high-value industries will be set as the main objective to promote. Desalination of seawater: Kaohsiung area planning assessment on the daily processing capacity of 100,000 CMD desalination plant.

CDP: [W][-,][4C0][AQ][Pu][E2]