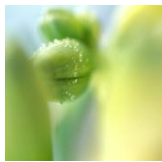
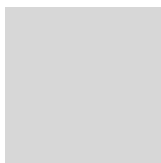
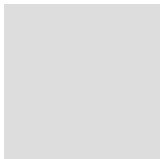
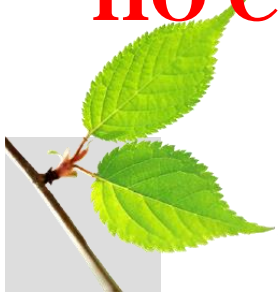


# GREENHOUSE GASES (GHGS) EMISSION INVENTORY AND MANAGEMENT MEASURES IN HO CHI MINH CITY, VIETNAM TOWARD A LOW- CARBON CITY



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# OVERVIEW OF HO CHI MINH CITY



- Hochiminh City is one of the socio-economic centers of Vietnam
- City profiles:
  - ✓ Area: 2.000 km<sup>2</sup>
  - ✓ Populations: 7.750.900, accounted for 8% of whole country
  - ✓ The contribution for whole country
    - ✓ 8% of inhabitants
    - ✓ 40% and 25% for industrial production and industrial capacity, respectively.
    - ✓ 40% of vehicle's quantity



Fig 1: Map of Ho Chi Minh City



# SOURCES OF GHG EMISSIONS HCMC



- Greenhouse gas emission and removal estimates are divided into main sectors, which are groupings of related processes, sources and sinks. Each sector comprises individual categories (e.g., transport) and sub-categories (e.g., cars).
  - **Energy:** mainly use of fossil fuel which combustion generates CO<sub>2</sub>, water and thermal energy. This energy is used to produce electricity or transport.
  - Industrial processes and product use: main sources are incinerators of production of steels, cements, bricks, glasses, etc. Besides, GHG emissions from fridges, foaming materials.
  - **Agriculture:** rice production, livestock, etc.
  - **Forestry and other land use:** depends on land use purpose, includes: forestry land, garden land, grassland, wetland, etc.
  - **Waste:** wastewater and solid waste removal and treatment, waste burning.
  - **Other** (e.g., indirect emissions from nitrogen deposition from non-agriculture sources)



# CLIMATE CHANGE IN HO CHI MINH CITY



## 1. Temperature change

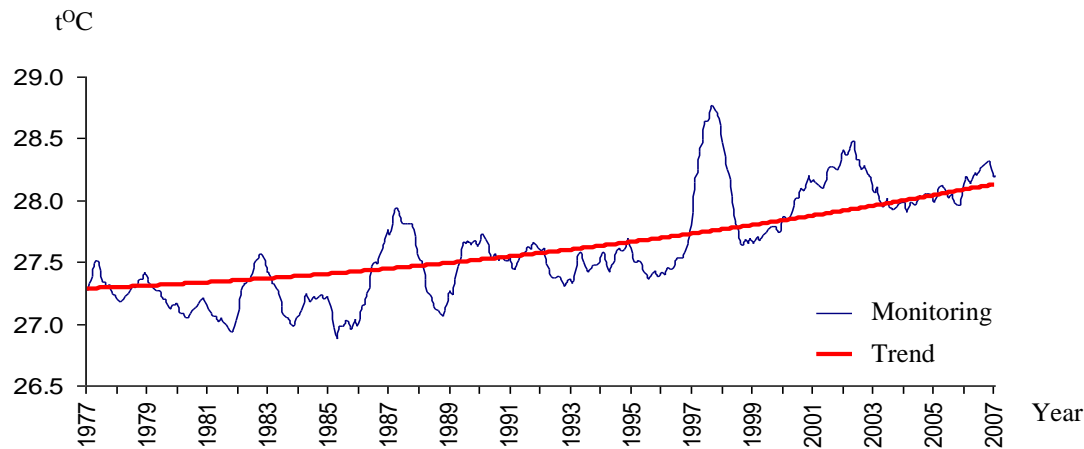


Fig 2 . Average annual temperature changes in HCMC in period 1977-2007

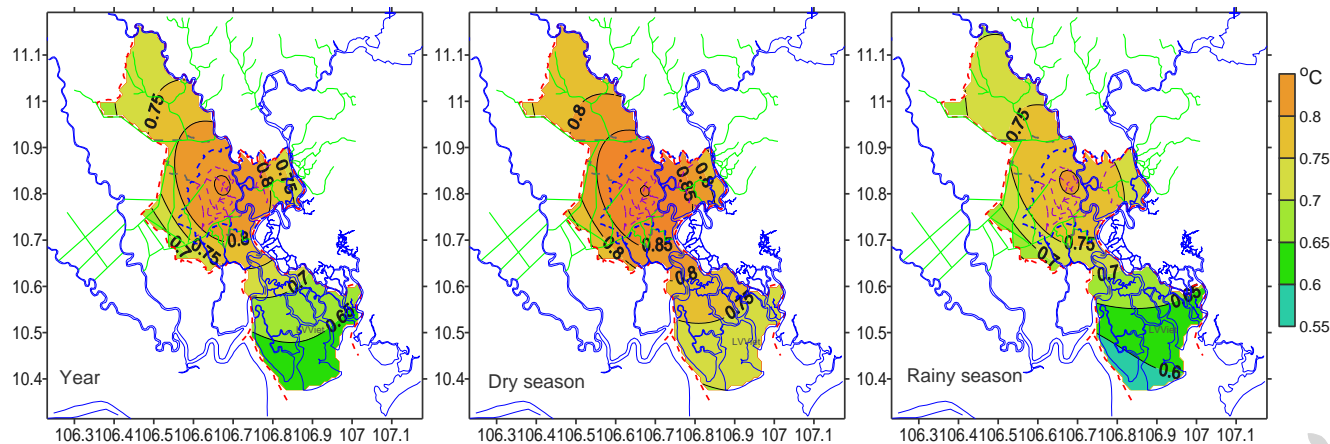


Fig 3 . Spatial distribution of annual average temperature in HCMC in period 1977-2007

These figures in the period 1978-2007, average temperature in HCMC increased about  $0,7^{\circ}\text{C}$ . This temperature in HCMC is higher than in Southern area is  $0,3^{\circ}\text{C}$ . This shows that under global climate change impacts and urbanization cause temperature increase.



# CLIMATE CHANGE IN HO CHI MINH CITY



## 2. Rainfall

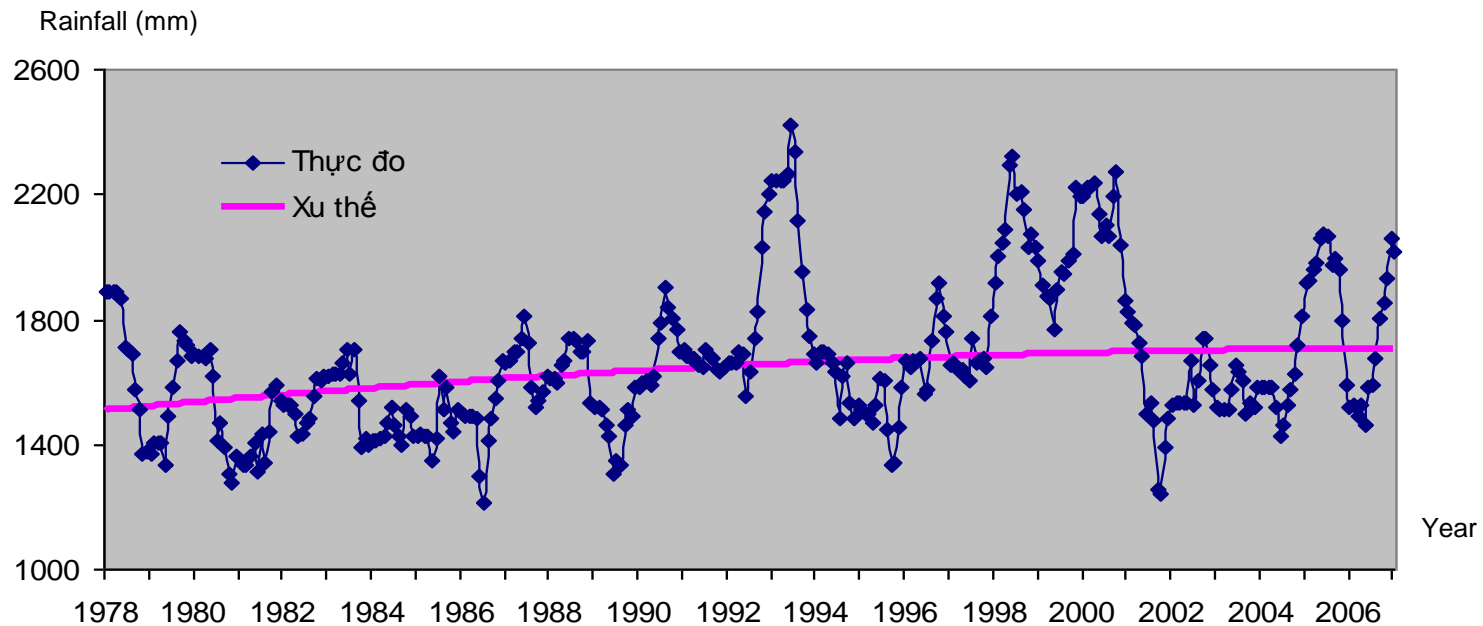


Fig 3 . Rainfall changes in HCMC in period 1977-2007

Fig. 3 shows that in the period of 1978-2007, average rainfall increases 98 mm/year in HCMC.



# GHG EMISSION INVENTORY HCMC



## \* Thermoelectric production:

In HCMC, there are only one thermoelectric power plant which is operating is Thu Duc Thermoelectric Company with total of capacity 592,539 MWh/yr. This plant uses 100% of fossil fuels (DO, FO) for combusting. The amount of CO<sub>2eq</sub> emitted in this plant is 572,510 tons.

## \* Industry:

Until 31 Dec, 2011, there were 1214 enterprises in 15 industrial parks with 3,521.37 ha. 1.200.000 tons CO<sub>2eq</sub>/yr is emitted in industry sector in HCMC.

## \* Transport:

Ho Chi Minh City is an important transport gate of Vietnam and ASEAN area. Road system accounts for 44% of commodity transport and 85.6% of passenger transport. There are 6 bus stations with 1,200 buses/day and transport 41,000 passengers/day. The average total amount of CO<sub>2eq</sub> emitted from transport sector in 2011 was 3,018,189 tons CO<sub>2eq</sub>/yr.

# GHG EMISSION INVENTORY HCMC



## 2. Industrial processes and product use:

In the field of industrial processes and product use of HCMC, there are sectors: non-metallic mineral (brick and glass production) and electrical & electronics engineering (semiconductor electronics, electricity transmission systems and air-conditioning systems).

The amount of CO<sub>2eq</sub> emitted from non-metallic mineral sector is 17,738.7 tons, with 89,2% of brick production and 10,8% of glass production.

Moreover, CO<sub>2eq</sub> emission from electrical & electronics engineering is 144,102.5 tons, with 1.9% of electricity transmission systems, 98.1% of air-conditioning systems and a negligible quantity of semiconductor electronics.

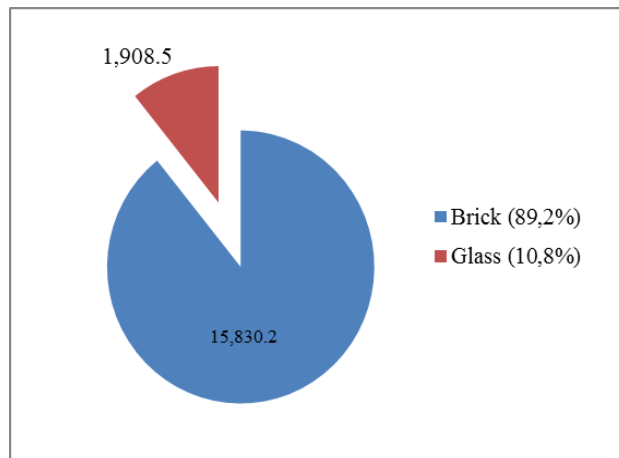


Fig 4: the amount of CO<sub>2eq</sub> emitted from non-metallic mineral

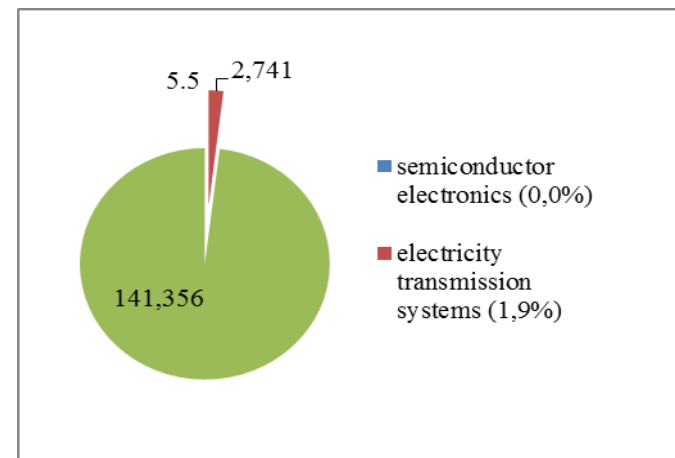


Fig 5: the amount of CO<sub>2eq</sub> emitted from electrical & electronics engineering [6]



# GHG EMISSION INVENTORY HCMC



## 3. Agriculture and waste

- GHG emission from agriculture activities is 951,912 tons CO<sub>2eq</sub>/yr which is mainly emitted from farming, husbandry and aquaculture.
- Through solid waste treatment (burial, burning and composting), water treatment (domestic or industrial treatment systems), the amount of CO<sub>2eq</sub> emitted is 1,328,415 tons/yr.
- Therefore, the highest percentage of GHG emissions is from energy use, with 79.2%. This is followed by Industrial processes and product use (11.3%) and Agriculture (8.1%). The smallest percentage of GHG emissions is waste, account for 11.3%.

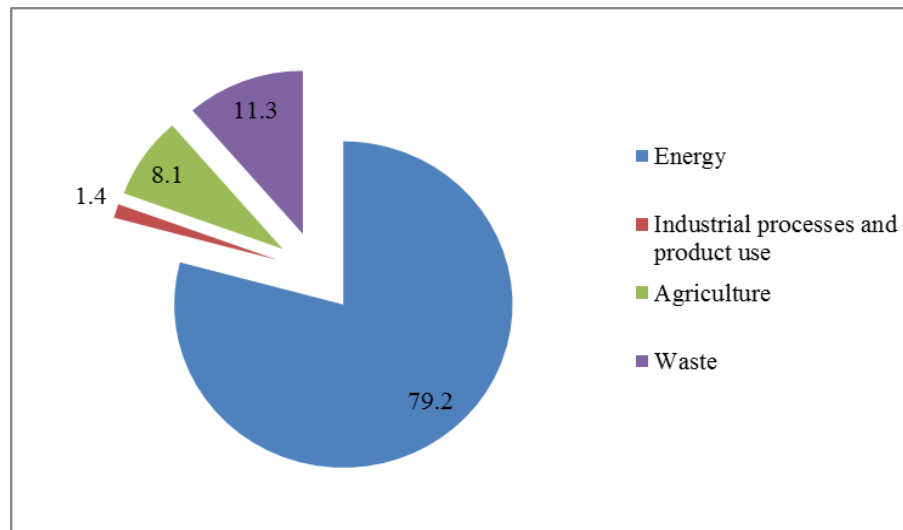


Fig 6: The percentage of GHG emissions from four main sectors in HCMC

Source: Ho Chi Minh City Energy Conservation Centre, 20



# Proposing the AIM model project to assess GHG emission sources in HCMC



# OBJECTIVES OF THE PROPOSED PROJECT



This proposed project aims to obtain 2 following objectives:

- To conduct surveys and assess current status of GHG emission sources of Ho Chi Minh City (in term of types and volumes) including CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, HFCs, PFCs and SF<sub>6</sub>.
- To propose measures of mitigation as well as policies and solutions toward a low-carbon city for Ho Chi Minh City.



# METHODOLOGY



- Methods of calculating and forecasting GHG emissions based on GHG emission factors of IPCC and other relevant local and regional studies will be used.
- Combining collection of data and literature review, surveyed data with consulting experts to assess emissions in industrial areas of Ho Chi Minh City....
- Data mining and statistic methods.
- Expert method
- **Methods to be used:**
  - Statistical methods and field surveys to collect and process data on the production activities of HCMC.
  - Method of rapid assessment of the IPCC and of Japan (AIM model).
  - The method used to compare the emissions.
  - Application software SPSS statistics processing.
  - Method of making listing to listing the production of greenhouse gas emissions.
  - Expert method: consult researchers and managers of scientific institutions, research institutes, environmental agencies...



# TENTATIVE ACTIVITIES



1. *Survey and assessment of the status of industries and areas of businesses that emissions of greenhouse gases in Ho Chi Minh City:* include 5 main sectors:

- Agriculture and rural development;
- Handling and disposal of wastes;
- Urban traffic activity exterior of HCMC;
- Power generation – transmission - distribution and use of products;
- Emissions of greenhouse gases from industrial activities in the city;



# TENTATIVE ACTIVITIES



- **Agriculture and rural development:** The main object of study for rural households will include:
  - The objects related to livestock (most importantly pig) - animal wastes;
  - The operation of aquaculture (freshwater and brackish, saline) – wetlands;
  - Activities related to agriculture (cropland);
  - The use of products containing greenhouse gases.
- **Handling and disposal of wastes:** All landfill of municipal waste has been active in the city:
  - The system of urban sewage, industrial.
  - The system of waste incinerators (urban, industrial, medical)
  - The activities related to the collection system, storage, transshipment and transport solid waste and industrial market in HCM City.
- **Urban traffic activity exterior of HCMC:** This group of energy groups, the main object of study will include: All motorized vehicles are road traffic on the city (all types of motor vehicles from the 2 wheels or more: motorcycles, cars, trucks and buses).



# TENTATIVE ACTIVITIES



- **Power generation – transmission - distribution and use of products:** industrial processes, use of products and energy.
  - The main object of study will include:
  - The thermal power plants – energy
  - The power transmission project - product use
  - The use of products containing greenhouse gases in the urban areas (residential, commercial area...): The air conditioning systems, air conditioning use HFCs, ...
- **Emissions of greenhouse gases from industrial activities** Industry non-metallic minerals (cement manufacturing, glass, brick, lime...)
  - Industrial metallurgy (steel, aluminum, magnesium...)
  - Electronic - Electric Industry
  - Food and beverage industry
  - Manufacturing of paper, pulp
  - Chemical industry (soda production, carbon production...).
  - Processing industry of petroleum products
  - Other industries such as apparel, textiles, fisheries, etc ...



# TENTATIVE ACTIVITIES



*2. Statistic and assess the current state (emission source and load) and forecast greenhouse gas emissions in HCMC;*

*3. Propose solutions to prevent and reduce greenhouse gas emissions in HCMC towards low carbon cities;*

*4. Short-term study in Japan.*





L/O/G/O



**THANK YOU FOR YOUR ATTENTION**

