

# Guangzhou Low Carbon Society 2030

A win-win strategy for global climate change and  
sustainable development of regional economy

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# Content

- **The importance & motivation of building Guangzhou into a low carbon society**
- **Socio-Economic Assumption in 2030**
- **Energy demand and GHG emissions in 2030**
- **Actions towards LCS**

Note: This is just a stage achievement of academic research, it does not represent the view of our government.



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# Importance & Motivation

## Causes and consequences of climate change:

- Global climate is warming
- Climate warming causes extreme weather disasters, glaciers melting, sea level rising, crops failures, pests and diseases increasing, et al.
- Climate warming is caused by the increase of greenhouse gases, which is mainly due to the increase of human activities.
- Delay the actions means to pay the economic and environmental costs. Immediate action is the most economical. The research shows that, if we start to take strong actions now, we can avoid to lose 5%-20% of global GDP with 1% of global GDP investment.

Resource: IPCC Fourth Assessment Report; The Economics of Climate Change: The Stern Review





# Importance & Motivation

## National emission reduction targets

[USA] Emission in 2020 reduce by 14- 17% compared with 2005

[ EU ] Emission in 2020 reduce by 20- 30% compared with 1990

[RUSS] Emission in 2020 reduce by 15- 25% compared with 1990

[JP] Emission in 2020 reduce by 25% compared with 1990

[AUS] Emission in 2020 reduce by 25% compared with 2000



## China's Position

Chinese Premier Wen Jiabao promises: the CO<sub>2</sub> emissions per unit GDP in 2020 will reduce 40%- 45% compared with 2005.

In August 2010, The National Development and Reform Commission(NDRC) launched the pilot program on national low-carbon provinces and cities in Beijing, which include 5 provinces and 8 cities.





# Importance & Motivation

-Why Guangzhou?



## 1. Location

Guangzhou is the capital of Guangdong province in the southern part of China. It is a port on the Pearl River, navigable to the South China Sea, and is located about 120km (75miles) northwest of Hong Kong.

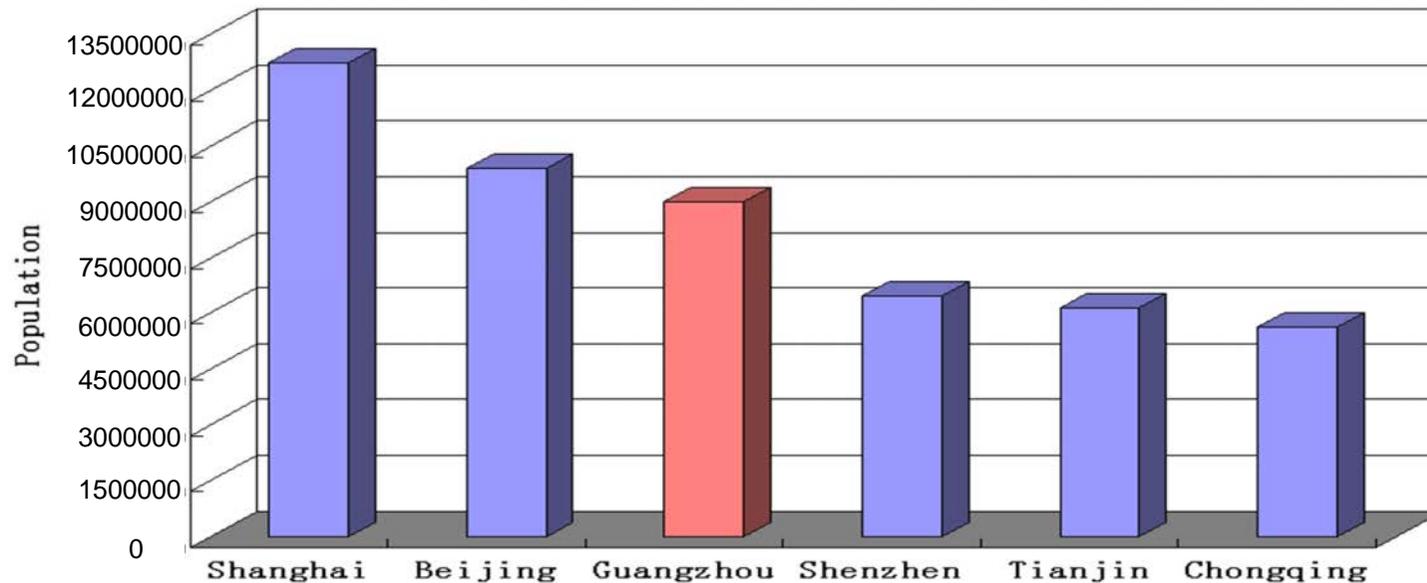


# Importance & Motivation

## -Why Guangzhou?

### 2. Population

The city has a population of 10.3 million in 2009. It is the most populous city in Guangdong province, and **the third most populous** metropolitan area in China.



Data source: China Statistical Yearbook

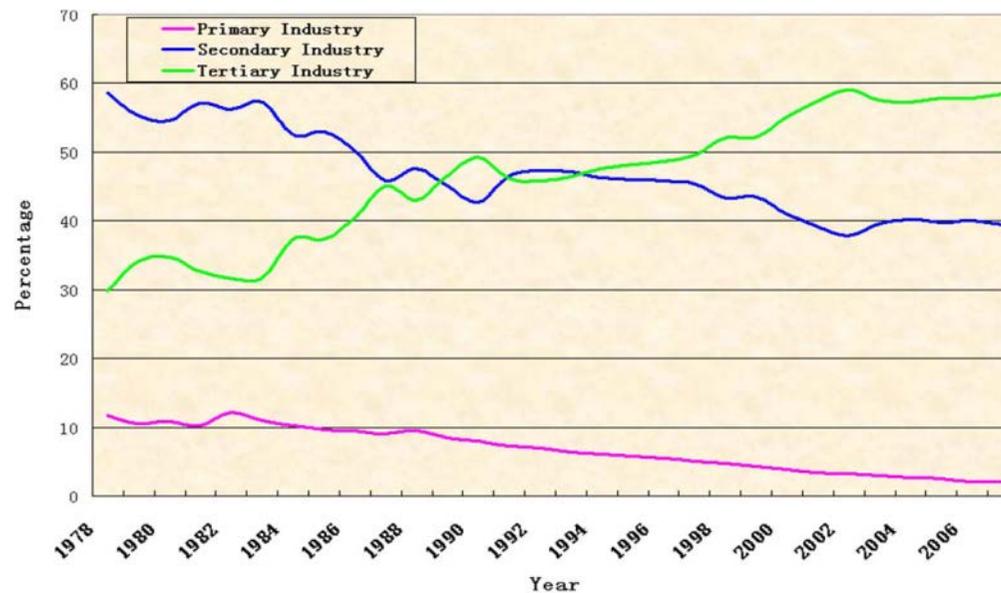


# Importance & Motivation

## -Why Guangzhou?

### 3. Economy

Guangzhou is the main manufacturing hub of the Pearl River Delta, one of mainland China's leading commercial and manufacturing regions. In 2009, the GDP reached ¥913.8 billion (US \$138 billion), accounted for 2.7% of the country, the tertiary industry has become the focus of economic growth.



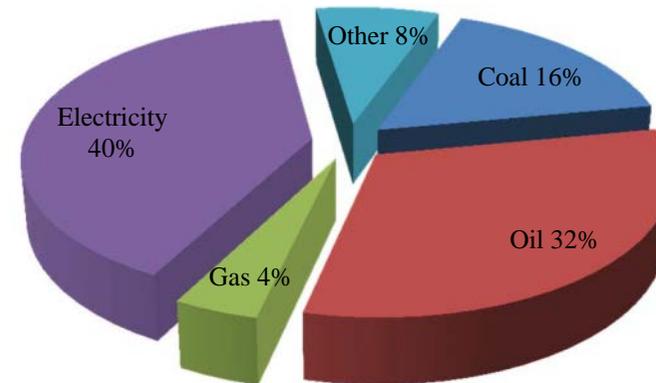
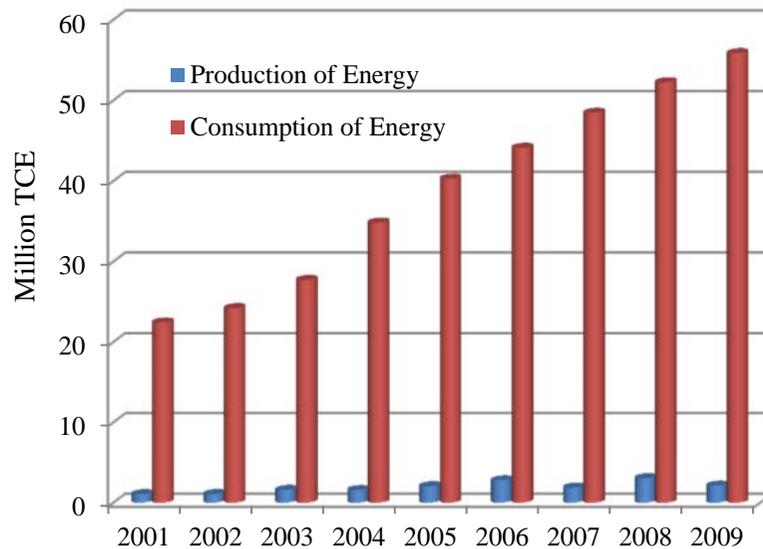
Data source: Guangdong Statistical Yearbook



# Importance & Motivation

## -Why Guangzhou?

### 4. Energy



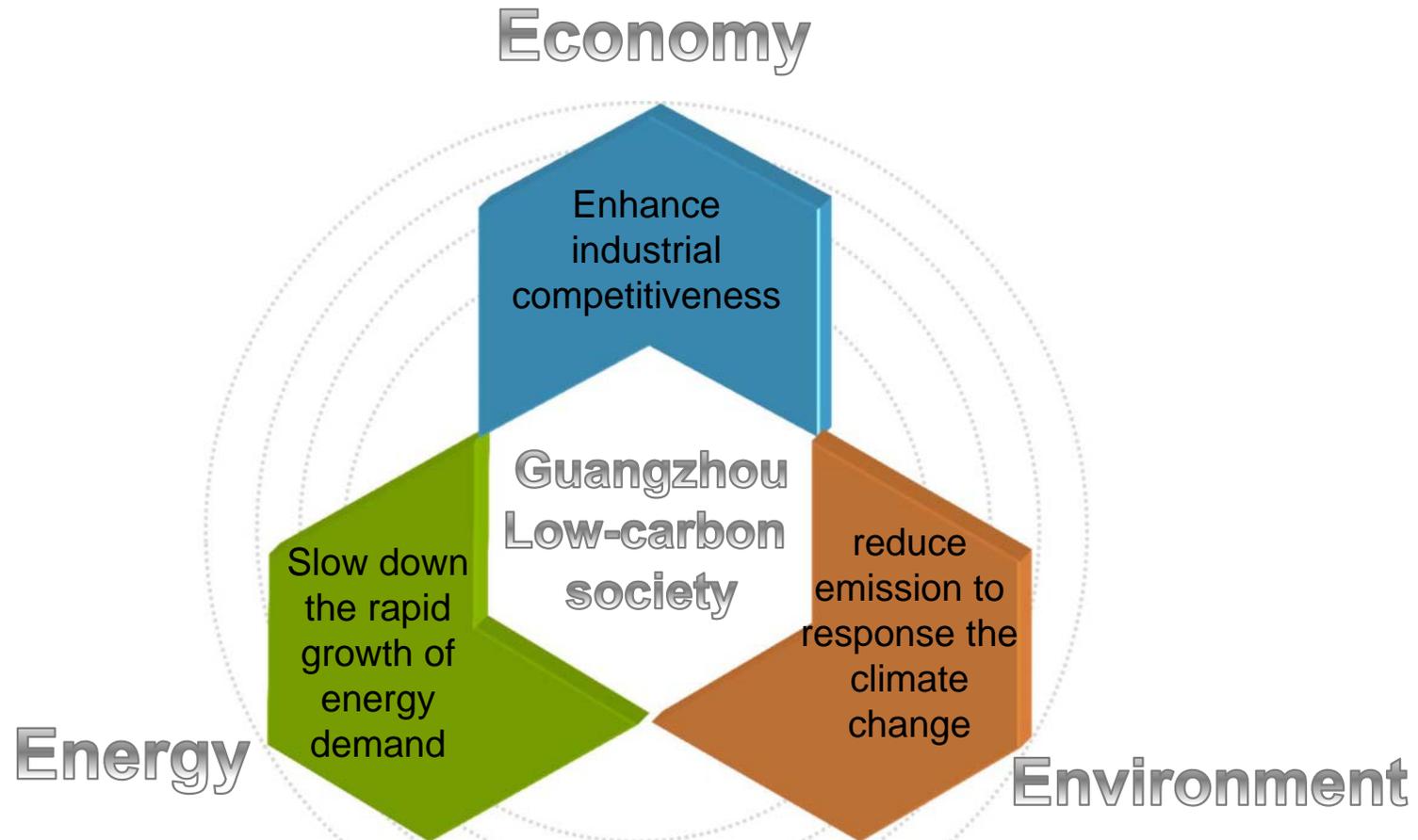
Energy consumption structure in 2009

- Rapid growth in energy demand, large energy consumption
- Lack of domestic energy resource, great dependency on import
- To be further optimized energy consumption structure
- The obvious contradiction between energy development and environmental protection



# Importance & Motivation

-Why Guangzhou?

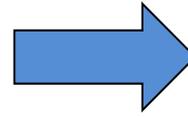


Guangdong is one of the five Low-carbon pilot provinces. As the capital of Guangdong, Guangzhou should explore the low-carbon development path actively to play a leader role.



# Building Guangzhou into a low carbon society

✓ **Setting Framework**

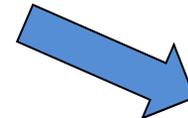


✓ **Collection of base year data**

✓ **Assumptions of socio-economic situations  
in 2030**

✓ **Estimation of GHG emission in 2030**

✓ **Proposal of policies**



target area: Guangzhou  
base year: 2005  
target year: 2030  
Tool: ExSS model

BAU: Business As Usual  
CM: with Mitigation Counter  
measures



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# Socio-Economic Assumption in 2030

## Quantitative socio-economic assumption in 2030

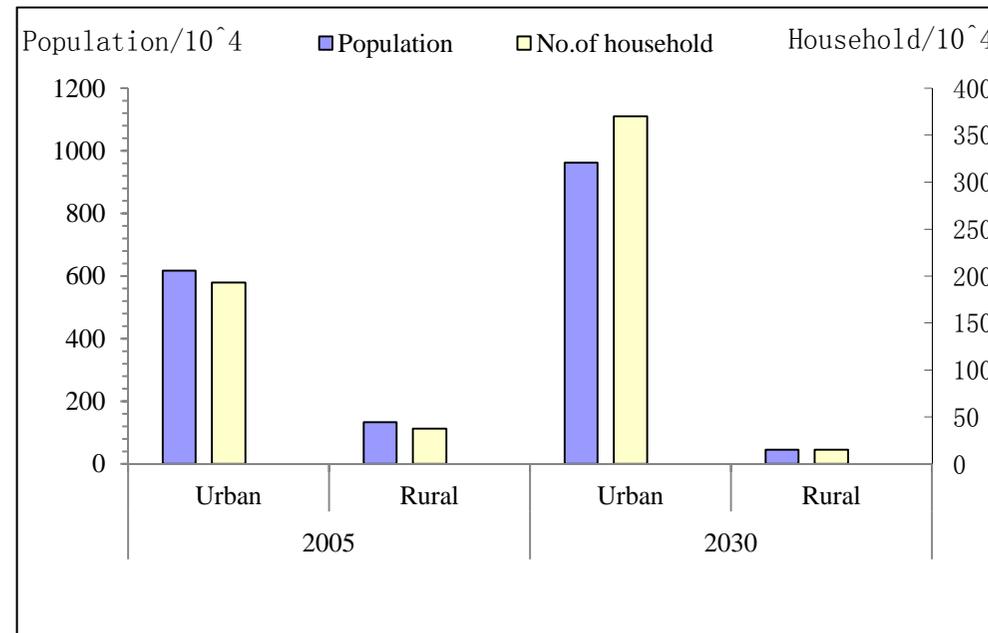
Indicator	Set Value (2030)	2030 Tendency
Population	Estimates based on "The Eleventh Five-Year Plan of Guangzhou National Economy and Social Development"	Growth rate at 1.2% per annum
Demographic composition	0-14: 8% (14.8% in 2005) 15-64: 80.5% (77.6%) 65 and over: 11.5% (7.6)	Birth and death rate are declined
Population distribution	Urbanization rate is 95% ( 82% in 2005)	Urbanization increases
Average number of person per household	Urban: 2.6 (3.2 in 2005) Rural: 3 (3.55 in 2005)	Significant decrease in average size of household
GDP	Growth rate is 6% per annum	Guangzhou is on increasing economic growth trajectory and has priorities in meeting the development needs.



# Socio-Economic Assumption in 2030

## 1. Population and number of household

Based on the analysis of population trend, join with national economic and social development scenarios, the household population of Guangzhou will reach over 10 million people in 2030. Number of household will rise from 2.3 million (2005) to 3.8 million (2030), and average household size will decrease from 3.2 (2005) to 2.6 (2030).



Population and number of household

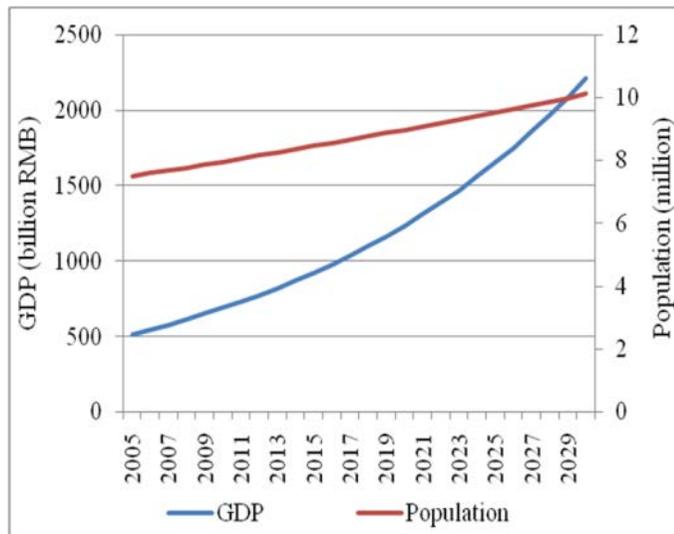


# Socio-Economic Assumption in 2030

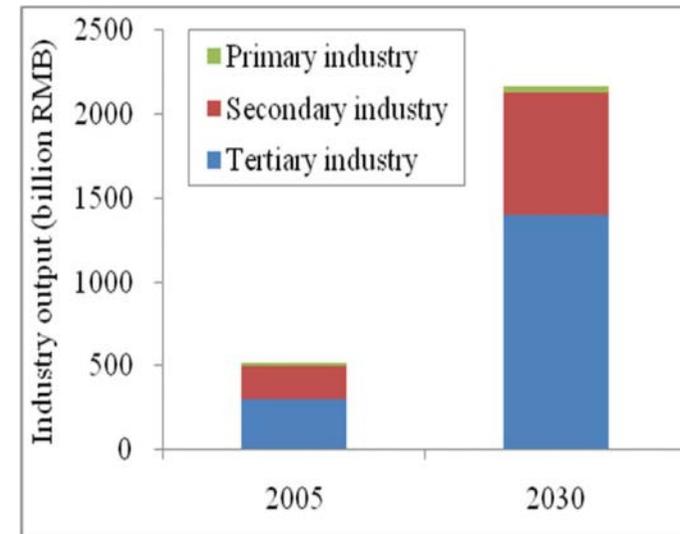
## 2. Economy

It is projected that Guangzhou annual average real GDP to grow at 6% per annum for period 2005-2030. The real GDP of Guangzhou in 2030 is estimated to be approximately 2.17 trillion RMB (about US \$327 billion). The percentage share of the agriculture and industry sector has followed a declining trend, while, the tertiary industry sector is expected to contribute more to GDP in the future.

Population and GDP growth



Production by industry



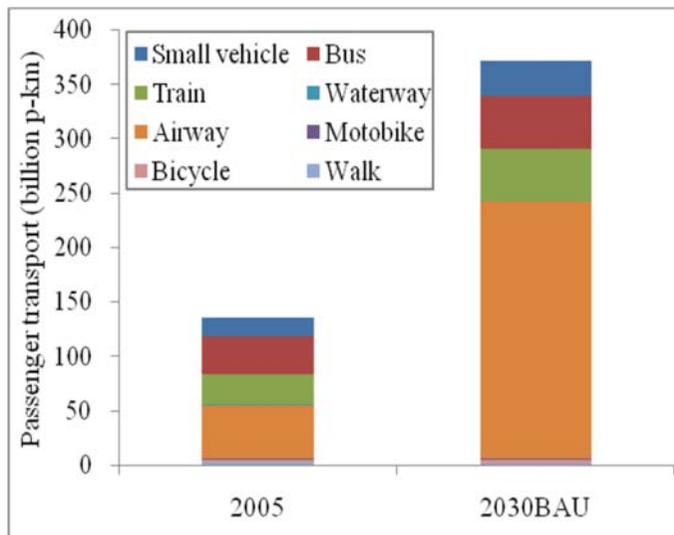


# Socio-Economic Assumption in 2030

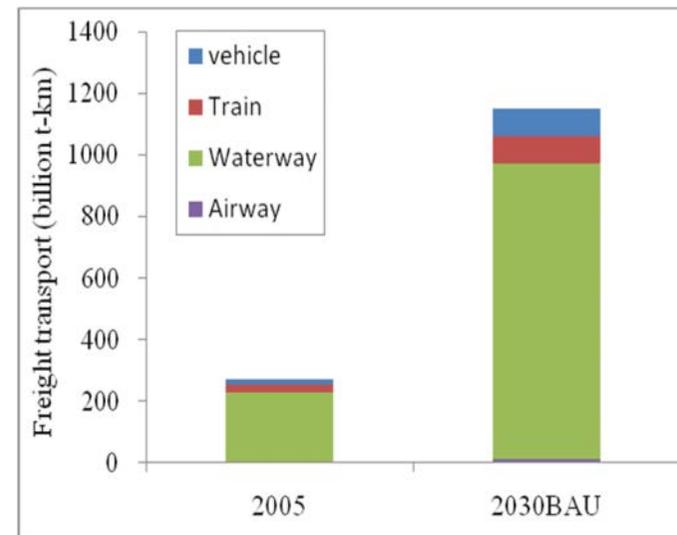
## 3. Transportation

Base on the analysis of passenger transport demand from 1978 to 2009, we expected the passenger transport demand will increase year by year.

Due to the growth of output of the manufacturing industries, the corresponding freight transport demand will increase about 4.2 times from 2005 to 2030.



Passenger transport demand



Freight transport demand



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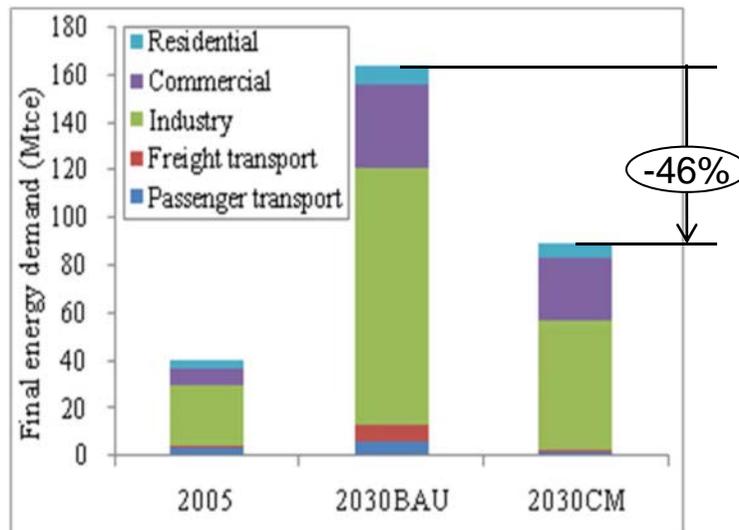
# Energy demand and GHG emission in 2030

## 1. Energy demand

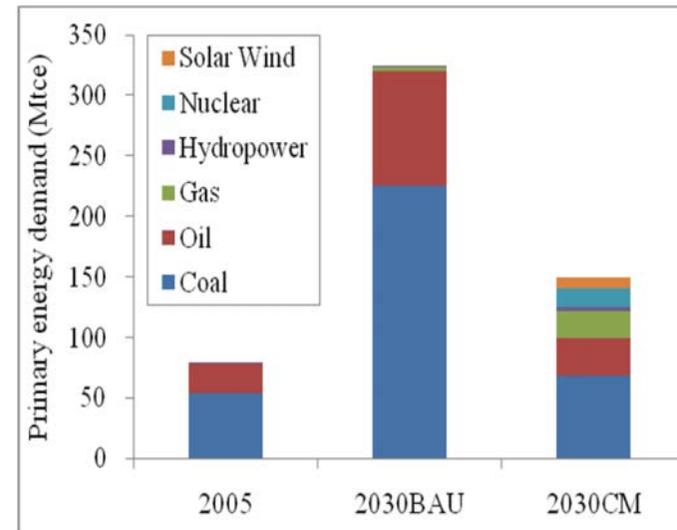
The total energy demand of Guangzhou is projected to increase about 3 times from 2005 to 2030 BAU. In CM scenario it is reduced about 46% from BAU.

In 2030 BAU, the energy system of Guangzhou would rely more on coal and oil, the share of coal would rise to 70%, followed by oil (28%), natural gas(1%), renewable and hydropower less than 1%.

In CM scenario, the share of renewable energy would increase significantly.



Final energy demand by sector



Primary energy demand

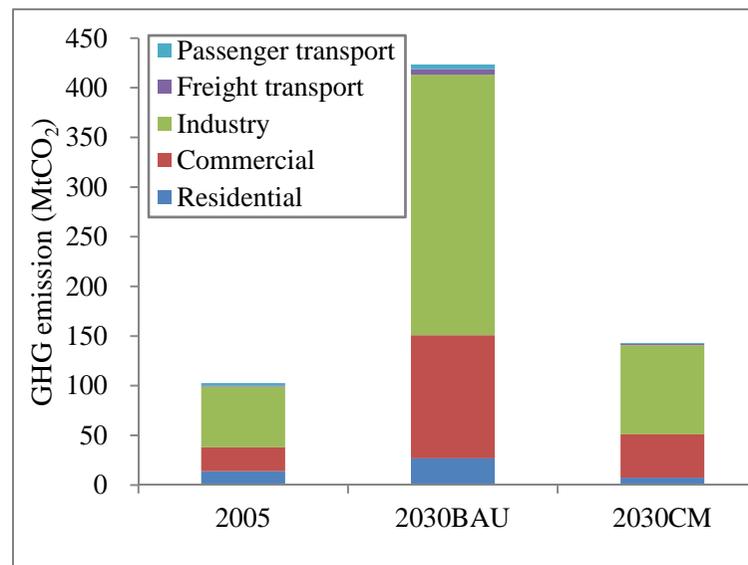


# Energy demand and GHG emission in 2030

## 2. GHG emissions

In CM scenario, the total CO<sub>2</sub> emission will reduce to 143 million t-CO<sub>2</sub>, it is a significantly decrease from BAU.

CO<sub>2</sub> emission from industry will be still maintain the largest share of total both in BAU and CM. Reducing the investment for industry sector, improving efficiency of energy, and actively developing the tertiary industry are the direction of development in Guangzhou in the future.



CO<sub>2</sub> emissions by sector

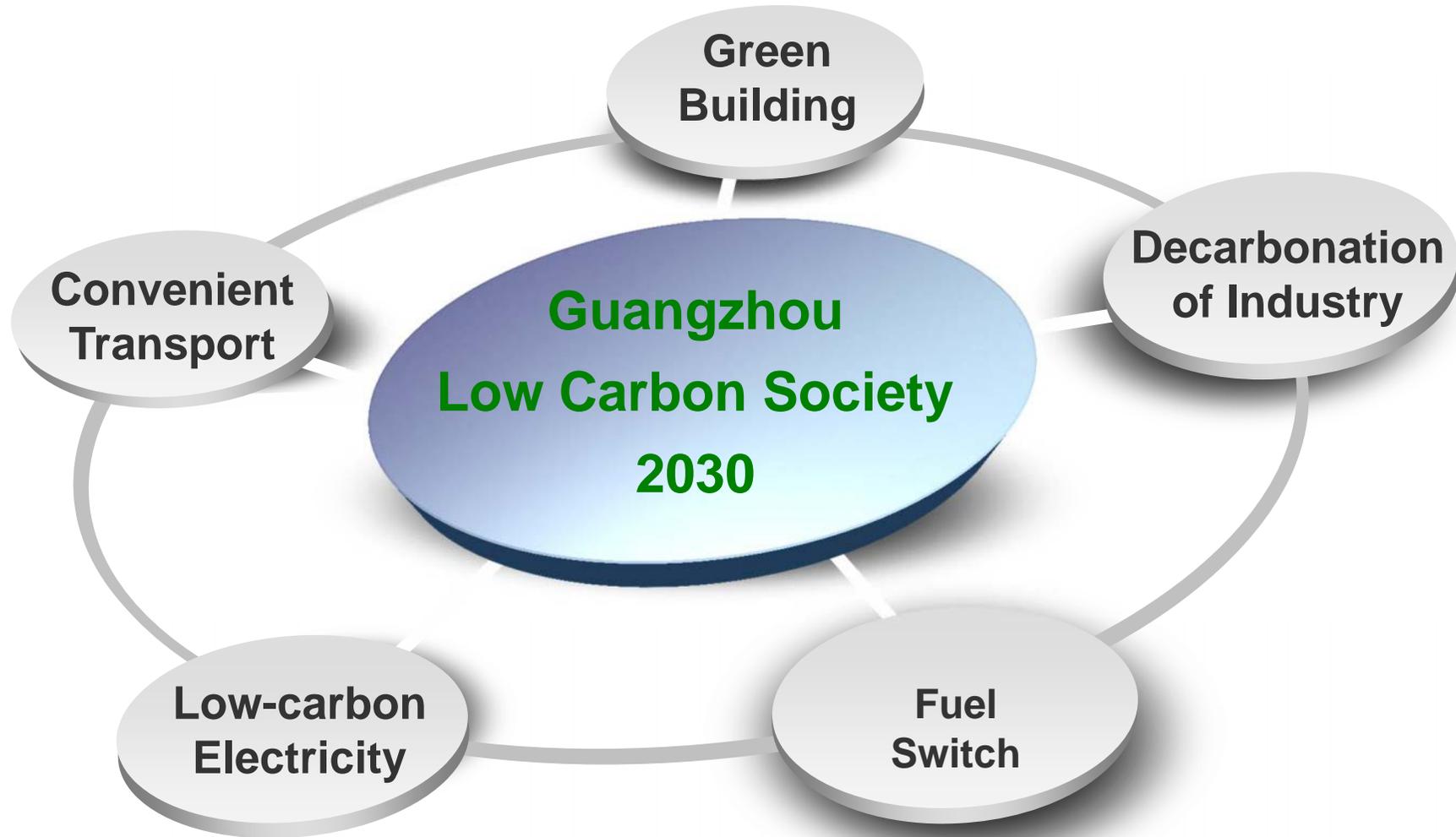


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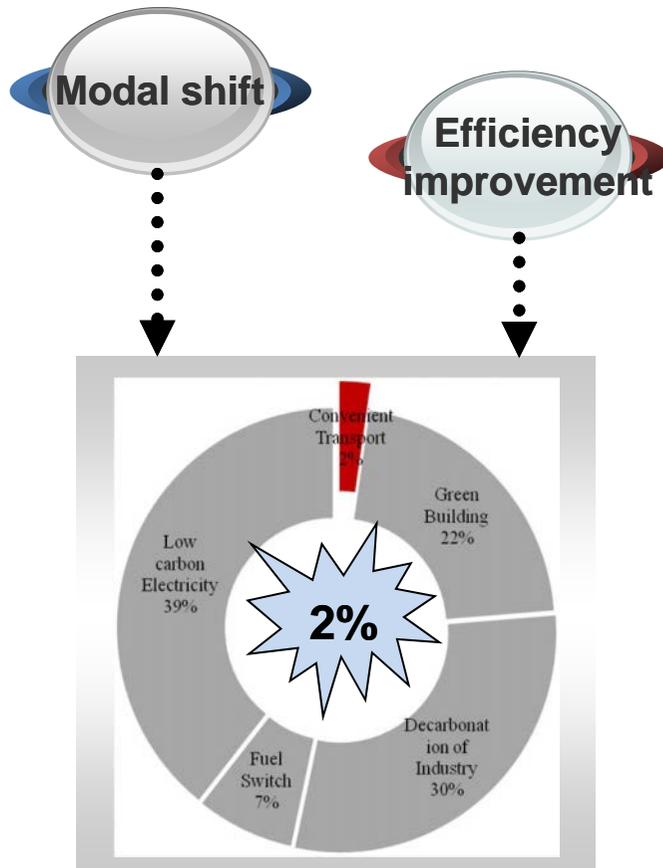


# Actions towards LCS



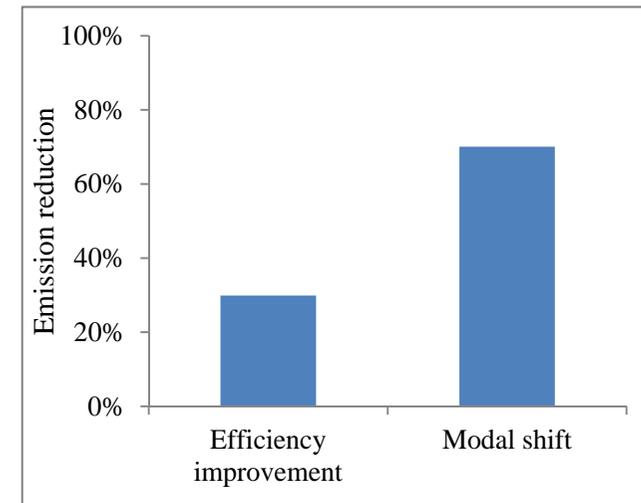


# Action 1: Convenient Transport



Passenger transport: the share of private vehicles reduce 25%, bus and train increase 20%, bicycle and walk increase 5%; Energy efficiency improve 50%.

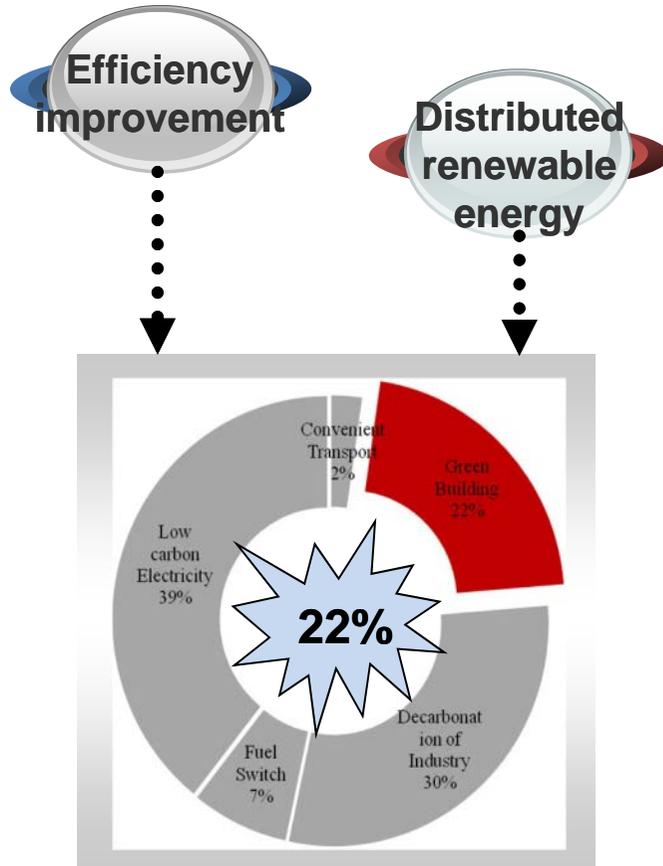
Freight transport: the share of vehicles reduce 25% and 30% in domestic and cross border respectively, train increase 26%, ship increase 4%; Energy efficiency improve 50%.



CO2 emission reduction by action 1

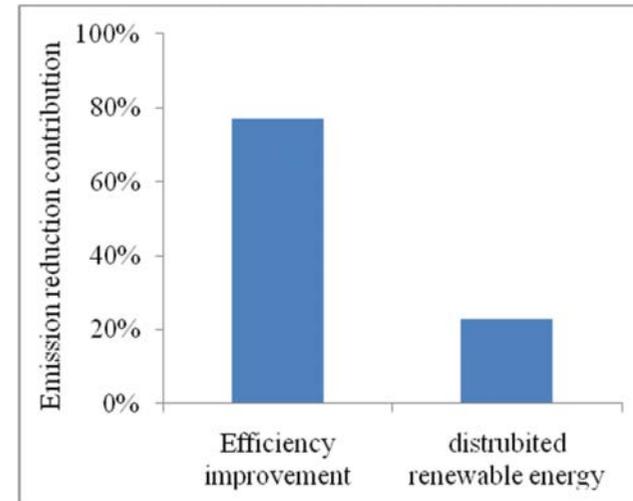


# Action 2: Green Building



Efficiency improvement: shift to equipment with outstanding energy efficiency, such as: energy-efficient appliances, office equipment, lighting, elevator and so on.

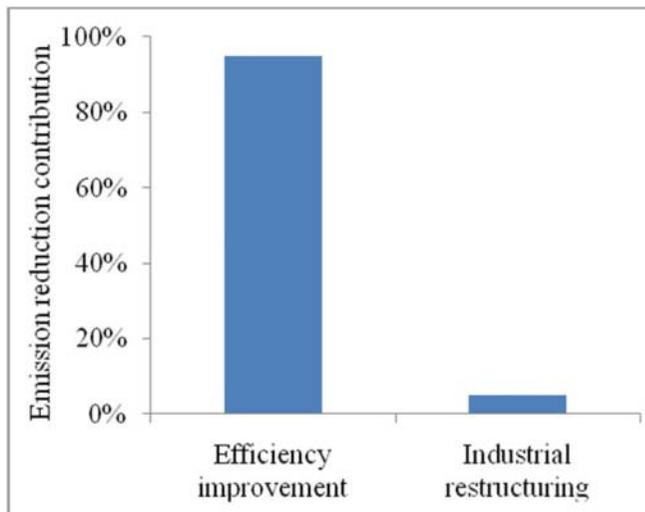
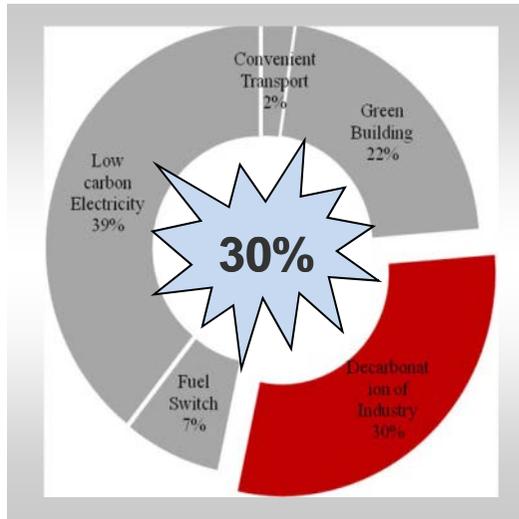
Distributed renewable energy: subsidy to introduce natural energy system (solar and wind energy); Low interest loan in investment to buildings using renewable energy.



CO<sub>2</sub> emission reduction by action 2



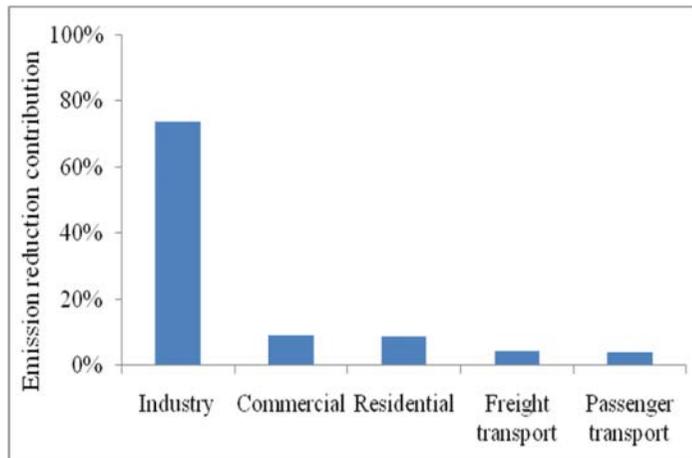
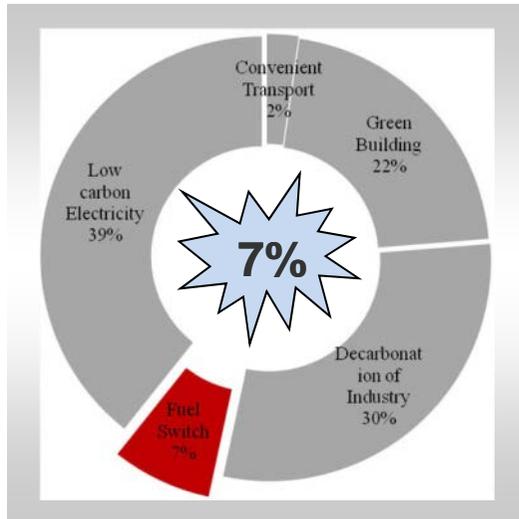
# Action 3: Decarbonation of Industry



- It comprises two aspects: energy efficiency improvement and industrial restructuring.
- Energy efficiency improvement: improve equipment utilization efficiency, accelerate the transformation of large-scale equipment, energy management and recycling of surplus energy.
- Industrial restructuring: eliminate backward production capacity, expand industrial scale, and investment shift from energy-intensive industries to the tertiary industry.



# Action 4: Fuel Switch



Industry sector has the largest share of CO<sub>2</sub> emission reduction, following by building and transport sectors.

A shift from high carbon intensity fuel to lower ones; encourage the utilization of new and renewable energy.

## Industry

nature gas and electricity increase 5% and 10% to replace coal

## Building

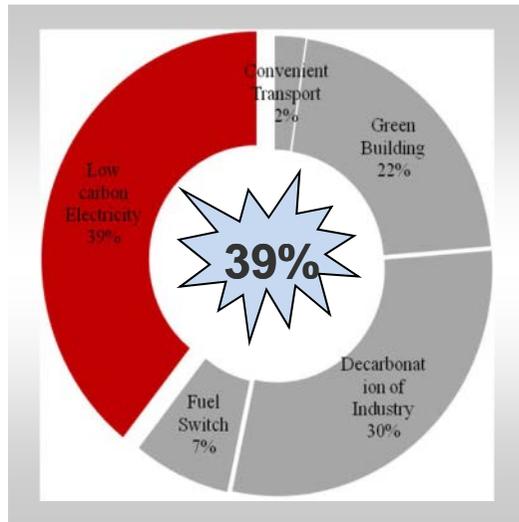
nature gas and electricity increase 10% and 20% to replace oil products

## Transport

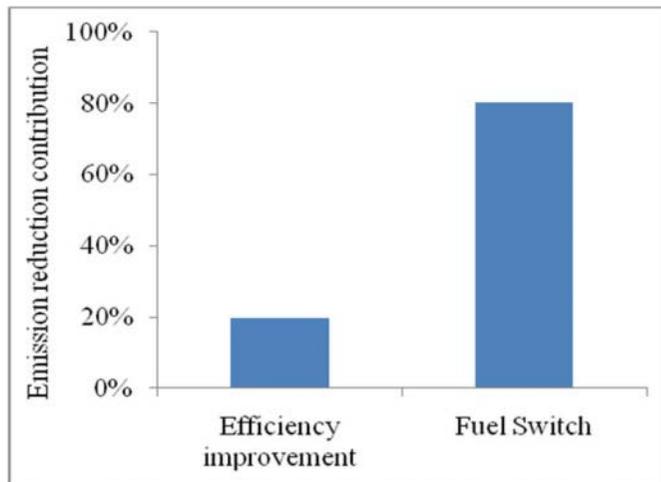
nature gas and biofuel increase 20% to replace gasoline and diesel



# Action 5: Low carbon Electricity



- The main measures are power generation efficiency improvement and fuel switch
- Power generation efficiency improvement: energy efficiency improvement, expand power generation capacity, reduce transmission loss
- Fuel switch: increase the use of renewable energies, develop nuclear power plant, and to promote the creation of energy from wastes.



**THANKS FOR YOUR ATTENTION!**

