

A grayscale world map serves as the background for the title and author information.

# Low-Carbon Development in China's 11<sup>th</sup> Five Year Plan

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# *Annual Review of Low-carbon Development in China (2011~2012)*

- ⌚ How did the policies work?
- ⌚ What policies worked better? Why?
- ⌚ What are the challenges ahead?
  - ⌚ No policy recommendation
  - ⌚ No contrast and comparison among nations on policy effectiveness

# Key Findings

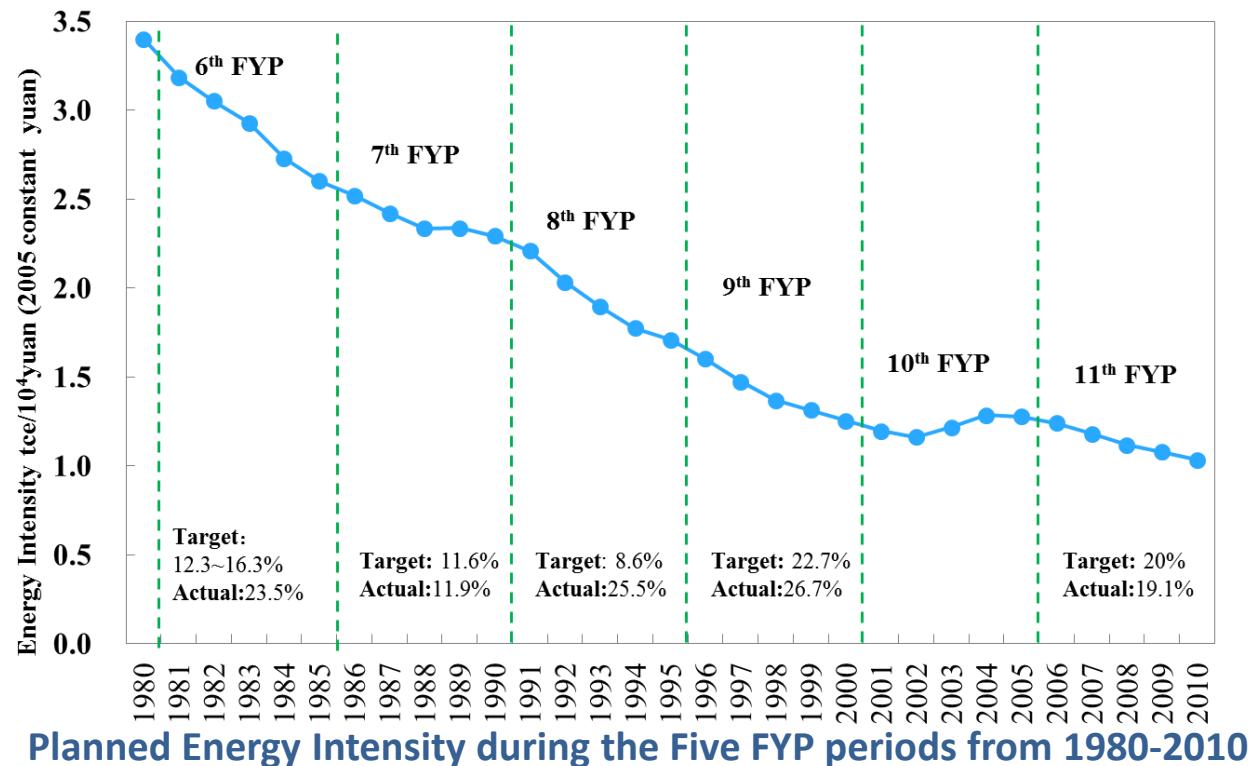
- ① Reversed the increasing trend of energy intensity (EI) in the 11<sup>th</sup> FYP, achieved the EI reduction target, but EI remains high
- ① Fast growth in renewable energy, but slow progress in improving energy mix
- ① Technological progress accounted for ~70% of EI reduction, and structural adjustment ~1/4
- ① Structure: Economy ↓, Industry ↑, Product ↑
- ① Geographic redistribution of high-intensity industries slowed EI reduction

# Key Findings (continued)

- ④ China's LCD policy characterized by national mandate with government funding; government funding key to the achievement
- ④ China's LCD X-shape curve: increasing total volume and decreasing intensity
- ④ Energy use in buildings and transport sectors grew faster than in industry, next biggest concern
- ④ World's largest emitter, gap with 2<sup>nd</sup> place growing
- ④ Daunting challenges ahead in 12<sup>th</sup> FYP

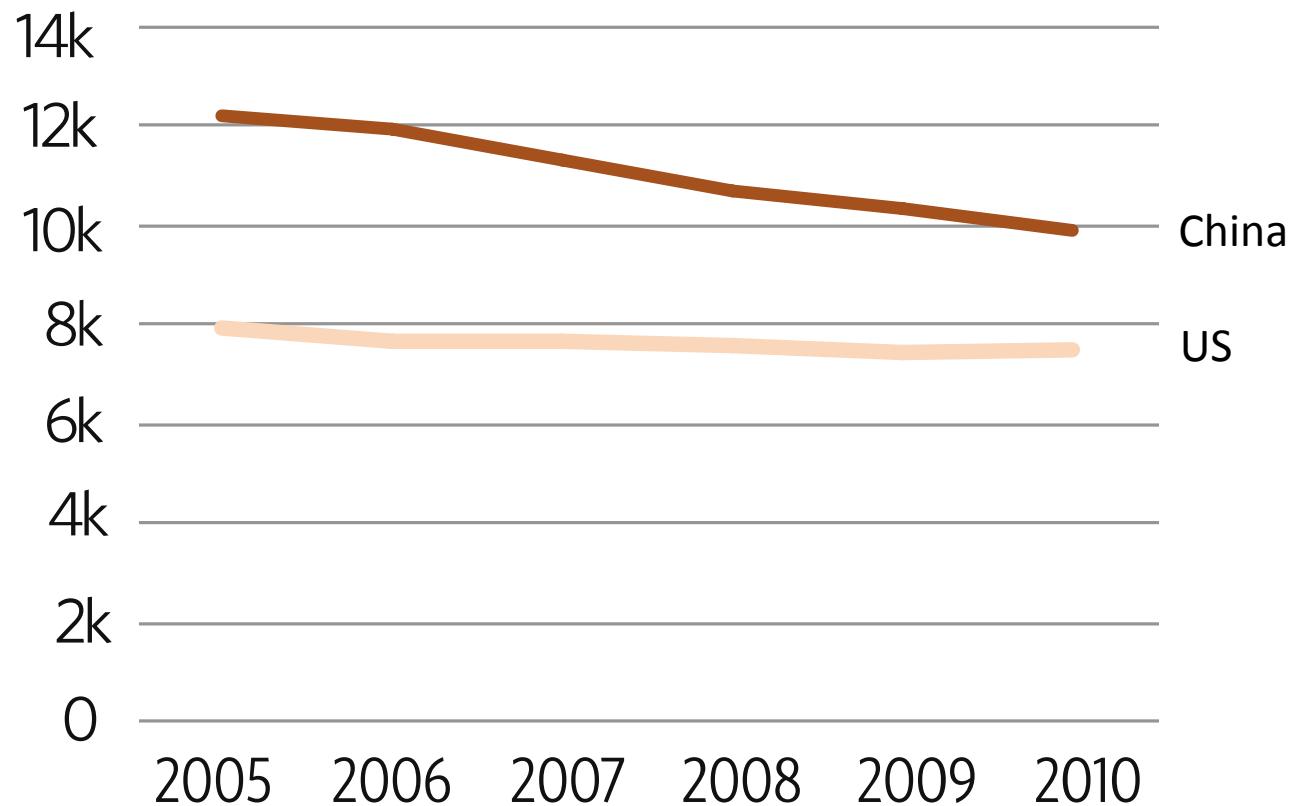
# Reversal of the increasing trend of energy and carbon intensity

The 11<sup>th</sup> FYP reversed the upward trend of energy intensity during the 10<sup>th</sup> FYP and saw a 19.1% decrease in energy intensity.



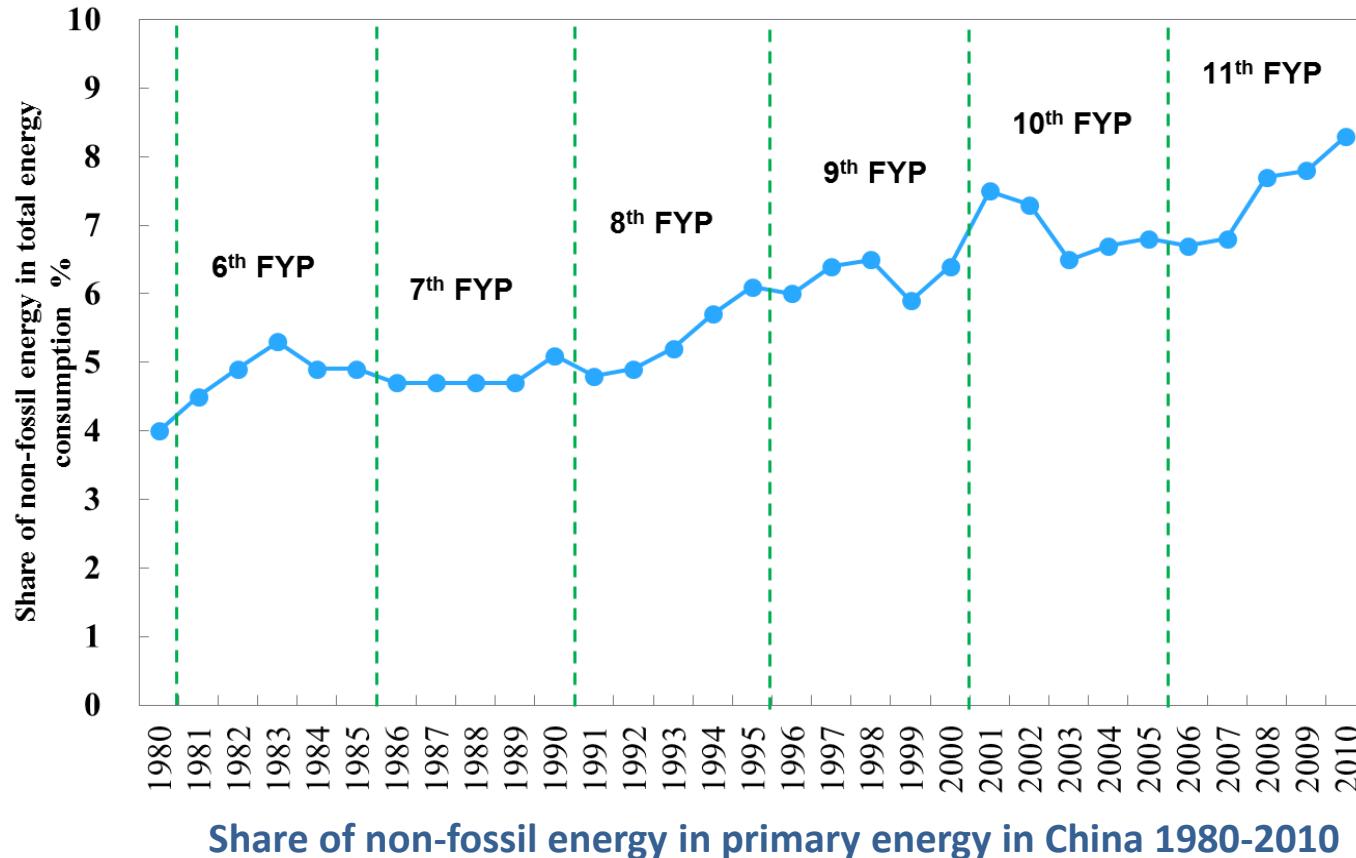
Data source: the 5<sup>th</sup> FYP, the 6<sup>th</sup> FYP, the 7<sup>th</sup> FYP, the 8<sup>th</sup> FYP, the 9<sup>th</sup> FYP, the 10<sup>th</sup> FYP and the 11<sup>th</sup> FYP; energy consumption per unit of GDP is in 2005 yuan. And calculated according to China Statistical Yearbook 2010. 2010 data are calculated based on the fact that energy consumption per unit of GDP in China during the 11<sup>th</sup> FYP went down by 19.06%.

## Energy Intensity of GDP (Btu/\$)



# Fast growth in new and renewable energy

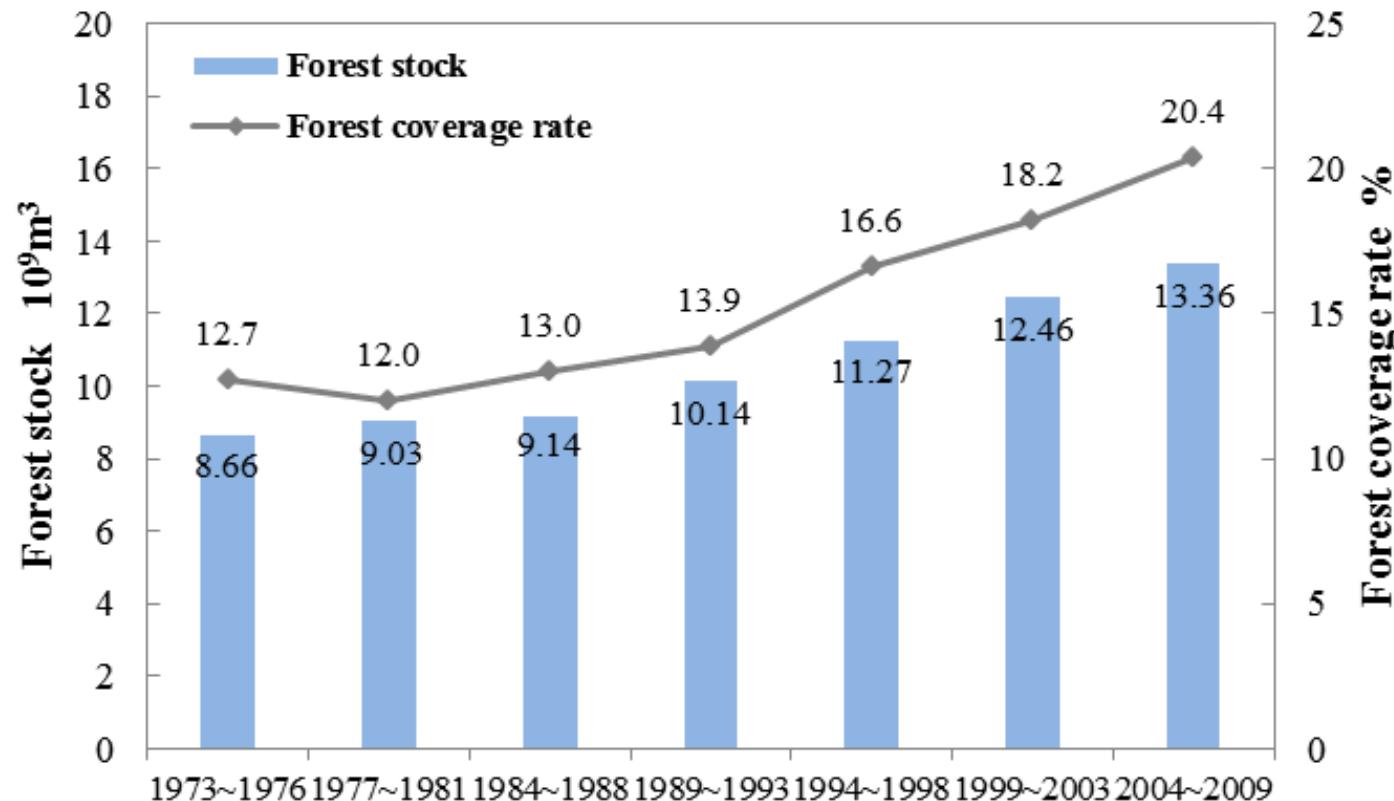
The 11<sup>th</sup> FYP witnessed the highest growth in new energy and renewable energy in three decades; Legislation, policies and institutions helped lay the foundation for new energy and renewable energy development in the future.



Data source: 1980-2009 data come from China Energy Statistical Yearbook 2010; 2010 data come from 2011 China Statistical Yearbook

# Fast growth in forest carbon sequestration

**Fastest development in forestry** among all FYPs except for the 9<sup>th</sup> FYP. During the 11<sup>th</sup> FYP, 4.5 million tons of CO<sub>2</sub> was sequestered by forest annually.

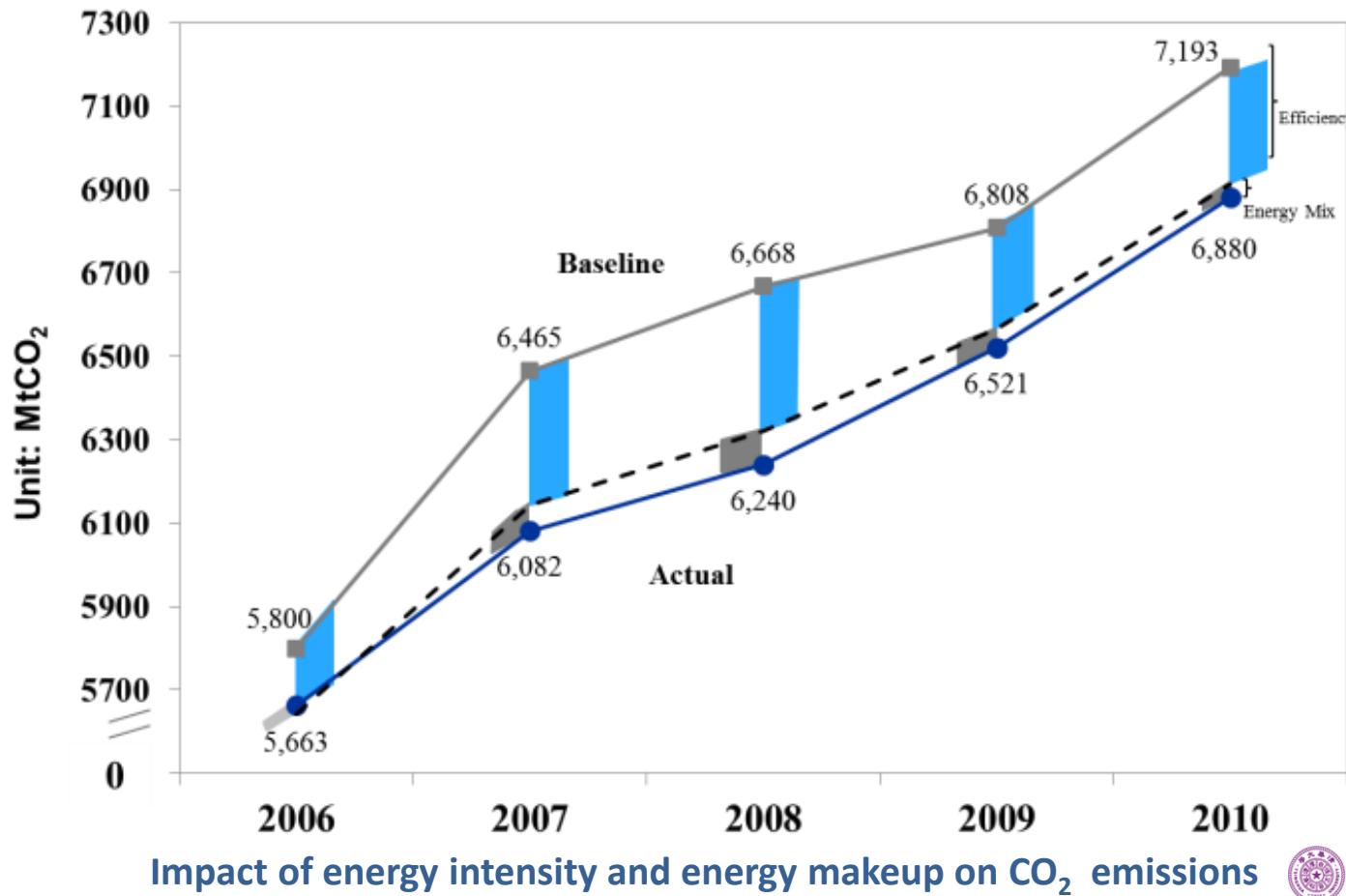


## Changes in Forest Coverage and Forest Stock in Forest Censuses

Data source: State Forestry Bureau, forestry census data

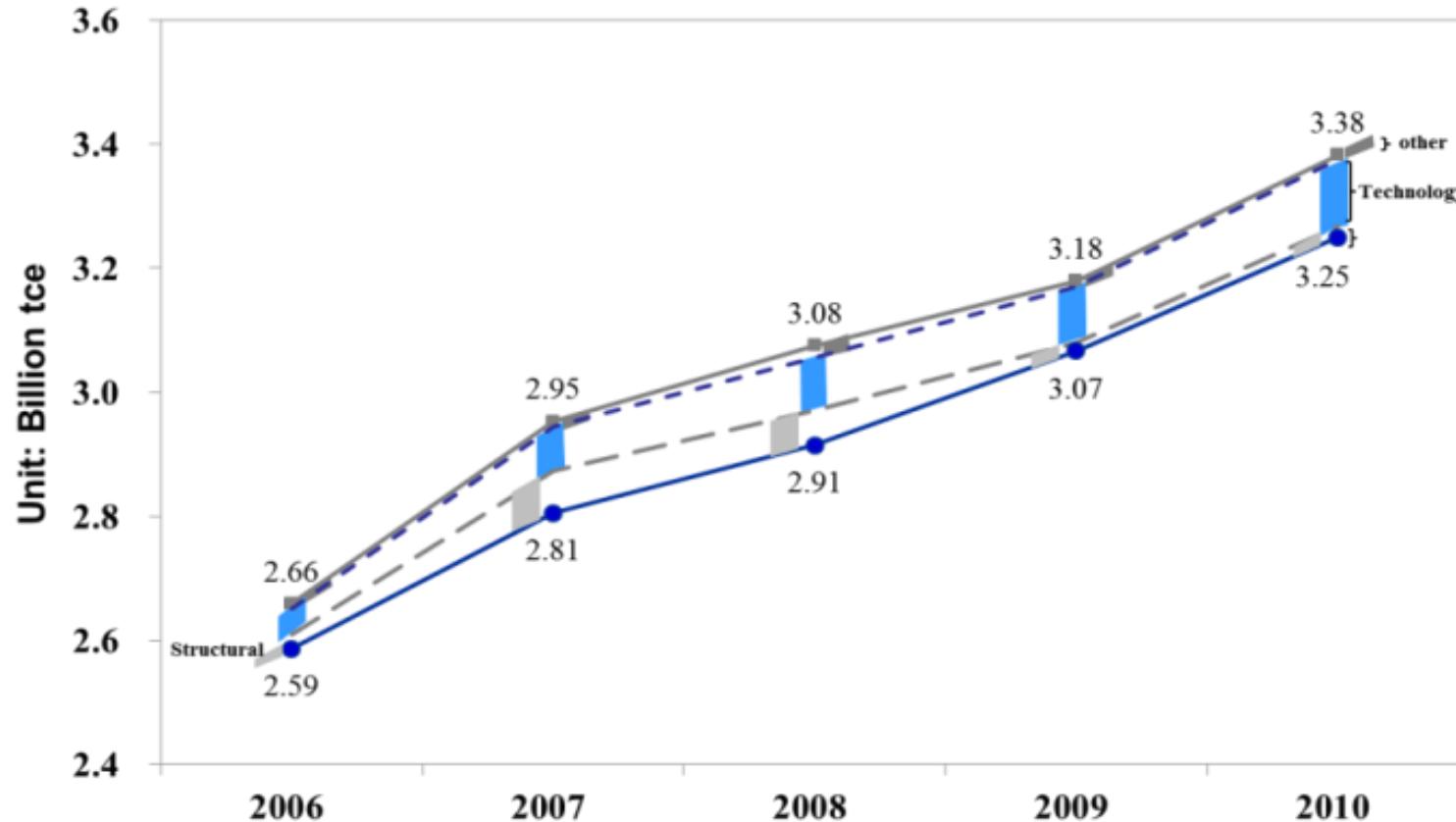
# Energy efficiency was key, energy mix contributed little

- Q Emissions abatement was **1.55 billion tons of CO<sub>2</sub>**.
- Q **Energy efficiency improvement** is the main contributor to CO<sub>2</sub> emissions abatement, accounting for **87% of total CO<sub>2</sub> abatement**. Energy mix was less significant contributor to CO<sub>2</sub> emissions abatement.



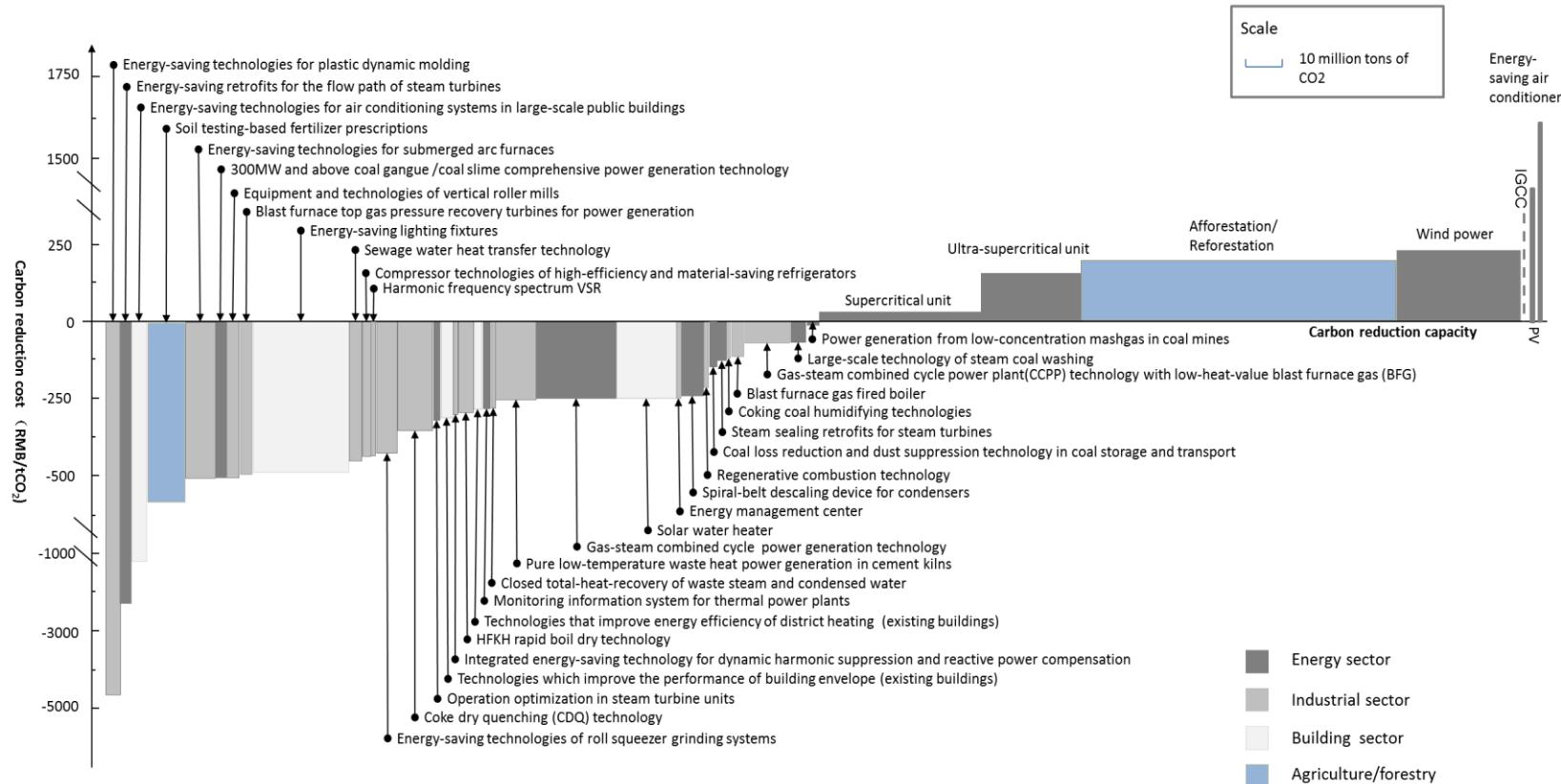
# Technological Improvement and Structural Adjustment Supported Energy Intensity Reduction

- ④ Energy savings in China during the 11<sup>th</sup> FYP was 630 million tce.
- ④ Technology accounted for 69% of total energy savings, structural adjustment 23%, and residential energy consumption 8%.



# Low-Cost Technologies Were Widely Adopted

EE and RE technologies have been widely applied to **electricity, industry and building sectors**.



**Cost curve for technologies with CO<sub>2</sub> emissions reduction capacity of greater than 1 million tons in 2010**

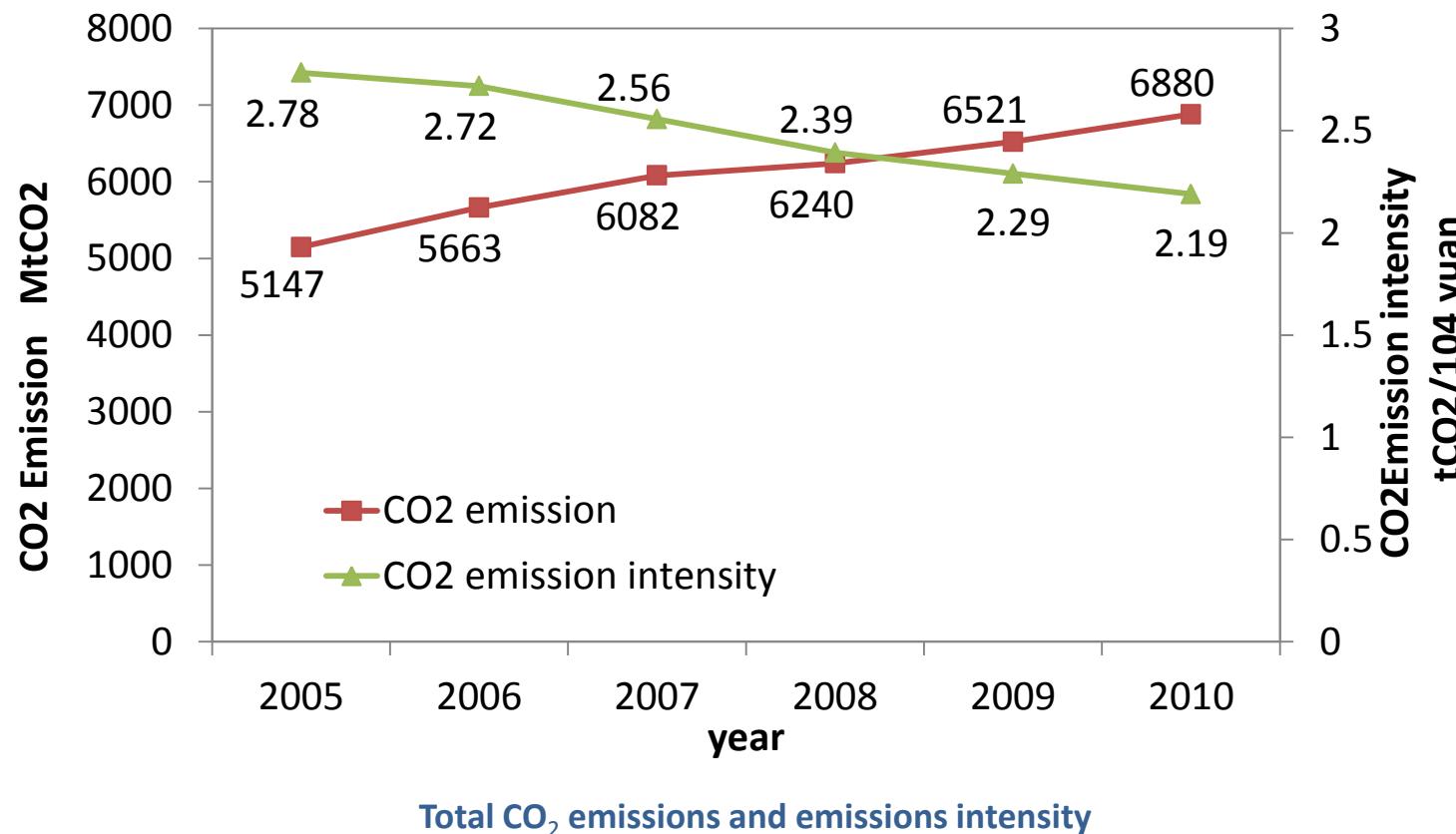
Note: (1) 2010 carbon reduction capacities of photovoltaics, IGCC, and energy-saving air conditioners were 700, 0, and 690 thousand tCO<sub>2</sub>, respectively.

(2) We use 2.71tCO<sub>2</sub>/tce as the CO<sub>2</sub> emissions index for coal equivalent. 2010 coal consumption for thermal power generation is 0.312 kg/kWh.

Data source: data from industrial sources are calculated based on investment and energy-saving and carbon reduction benefits of typical case studies in "Analysis and evaluation of key energy-saving and emission-reducing industrial technologies." Other results are calculated by Climate Policy Initiative at Tsinghua University.

# X-Shape: Decrease in Energy Intensity and Increase in Total Emissions

- ① Energy-related growth in CO<sub>2</sub> emissions in China increased from **5.15 billion tons** to **6.88 billion tons**\*. Exceeded the US and became the largest energy emitter. **21.9%** more than those in the US in 2010.
- ② **Total CO<sub>2</sub> emissions in all sectors showed an upward trend**



\* EIA report shows that energy-related CO<sub>2</sub> emissions in China in 2009 were 7.71 billion tons; CDIA's calculation was 6.82 billion tons; BP's calculation was 8.33 billion tons.

# National mandates coupled with central government funding; Economic incentives were greatest contributor

- During the 11<sup>th</sup> FYP, Chinese energy saving policy measures include:  
**administrative measures** such as setting energy saving targets for key energy-intensive enterprises and phasing out obsolete capacity;  
**stimulus measures** such as energy saving rewards and subsidies; and  
**market-based measures** such as energy performance contracting.
- Administrative means abated **473 million tCO<sub>2</sub>**, stimulus measures **777 million tCO<sub>2</sub>**, and market-based measures **15 million tCO<sub>2</sub>**.
- High efficiency of policy is due to large-scale national investment.** During the 11<sup>th</sup> FYP, fiscal funding from state and local governments for every ton of CO<sub>2</sub> abatement was **167 yuan**.

# Investment in Renewable Energy during the 11th FYP was 1730 billion yuan

- ① Total social investment in new energy and renewable energy in China during the 11<sup>th</sup> FYP was **1730 billion yuan** (266.6 billion USD, 192.6 billion Euros).
- ② Hydropower investment was 621.8 billion yuan (**35.9%**), wind power investment was 469.9 billion yuan (**27.1%**), nuclear power investment was 366.8 billion yuan (**21.2%**), photovoltaics investment was 199.7 billion yuan (**11.5%**), biomass energy investment was 74.9 billion yuan (**4.3%**).

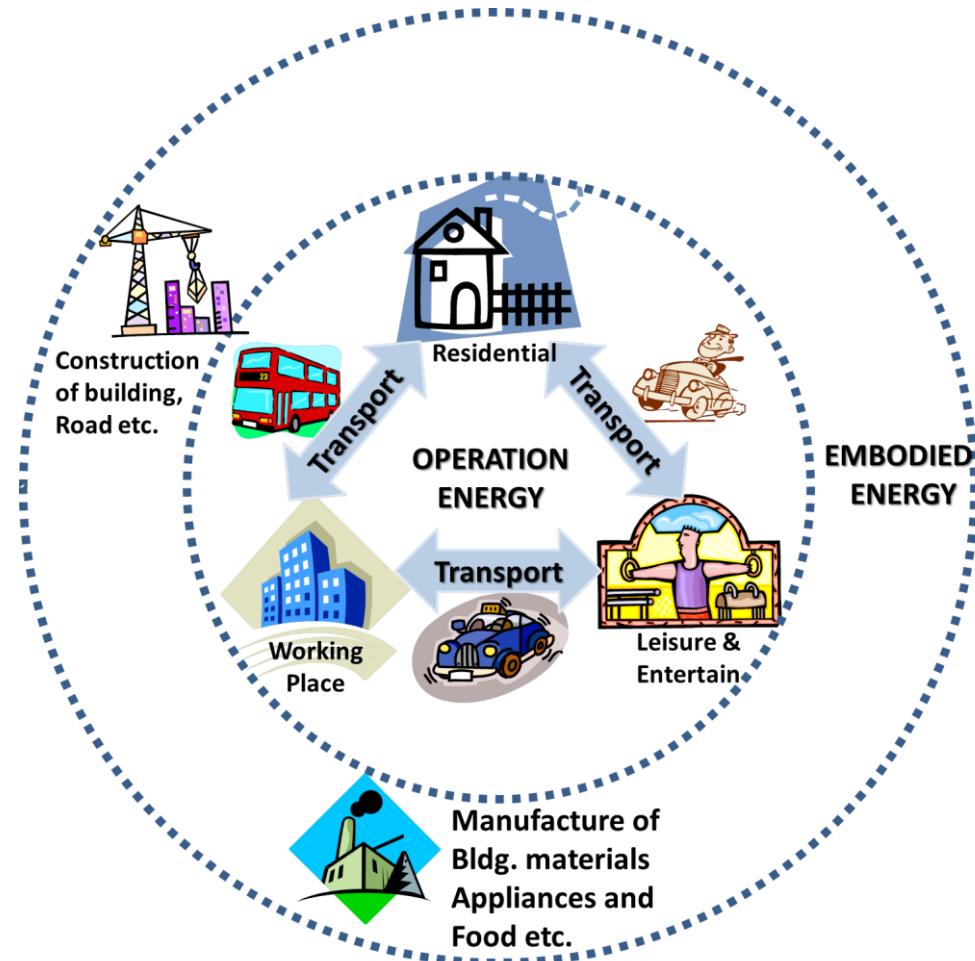
# Energy Efficiency Investment during the 11th FYP was 859.2 billion yuan

- ① **Central and local government funding** was 126.1 billion yuan, accounting for **14.7%** of total social investment; **private funding** was 733.1 billion yuan, accounting for **85.3%** of total social investment.
- ② Total investment in the **industrial sector** amounted to 551.1 billion yuan (**64.1%** of total society investment in energy efficiency); total investment in the **building sector** was 259.3 billion yuan (**30.2%** of total social investment in energy efficiency); investment in **other sectors** was 4.88 billion yuan (**5.7%** of total social investment in energy efficiency).

Unit: 100 million yuan

# Buildings and transport sectors as growing challenges

- Carbon emissions directly related to **consumption sectors** accounted for **30%** of total carbon emissions and **grew faster** than total emissions (41% vs. 35%), esp. building and road construction, construction materials and consumer goods.
- Consumption sector will be the principal energy-consuming and carbon-emitting sector in the future.**

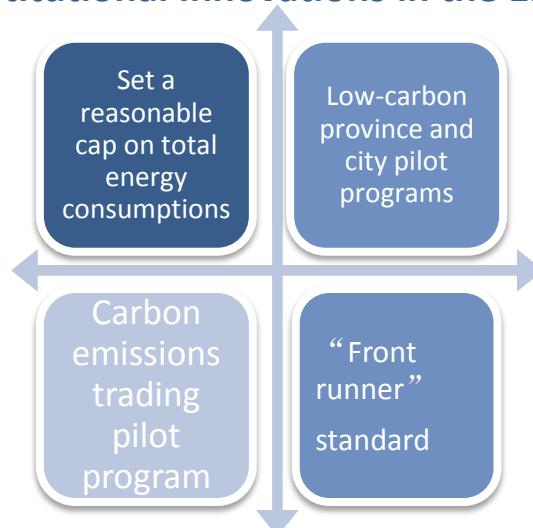


# Energy Saving and Carbon Abatement Targets and Policies in the 12th FYP

## Comparison of Energy Saving and Carbon Abatement Indicators in the 11<sup>th</sup> FYP and the 12<sup>th</sup> FYP

Indicators	11 <sup>th</sup> FYP	12 <sup>th</sup> FYP	Nature
Annual growth rate of GDP	7.5%	7%	Expected
Reduction in energy consumption per unit of GDP	20%	16%	Mandatory
Reduction in CO <sub>2</sub> emissions per unit of GDP	NA	17%	Mandatory
Share of non-fossil energy in primary energy consumption	NA	11.4%	Mandatory
Forest coverage	20%	21.66%	Mandatory
Forest growing stock	NA	Increase by 600 million m <sup>3</sup> to reach 14.3 billion m <sup>3</sup>	Mandatory

## Policy and Institutional Innovations in the 12<sup>th</sup> FYP



# Four Challenges in the 12<sup>th</sup> FYP

- ④ Industrialization and urbanization drive up energy consumption;
- ④ Low hanging fruits picked
- ④ Local government drive for growth
- ④ RE growth not enough to meet the 11.4% target

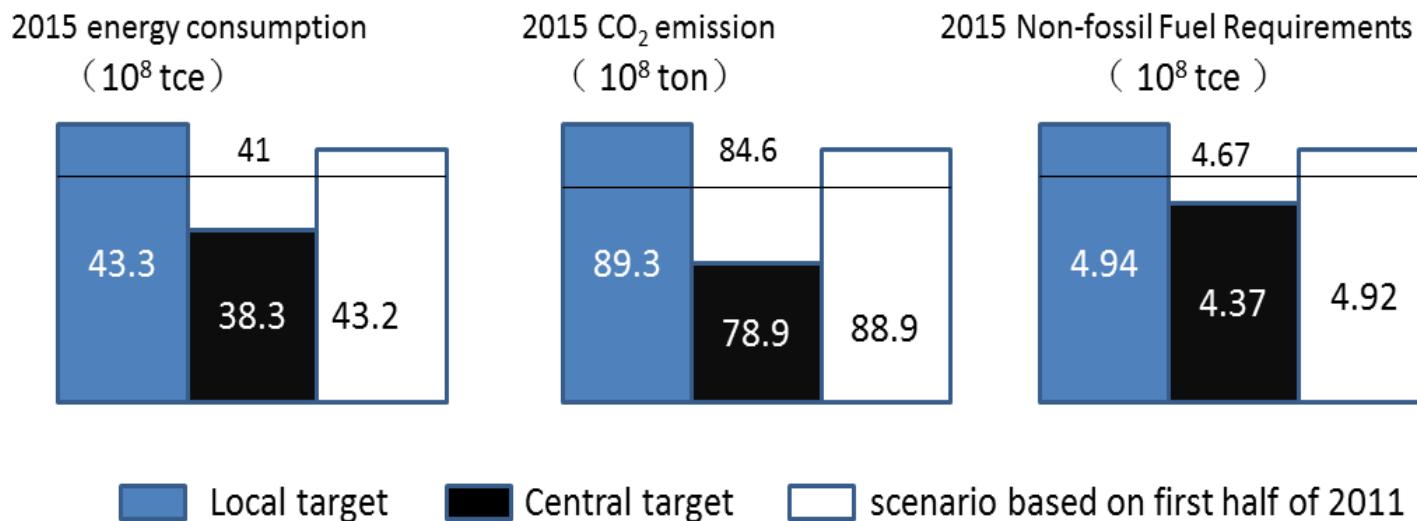
2015 Energy Consumptions Scenarios under Different Annual GDP Growth Rates and Different Reductions in Energy Consumption per Unit of GDP (100 million tce)

Reduction in Energy Consumption per Unit of GDP	16%	17%	18%	19%	20%	21%	22%
GDP Growth Rate							
7.0%	38	38	37	37	36	36	36
7.5%	39	39	38	38	37	37	36
8.0%	40	40	39	39	38	38	37
8.5%	41	41	40	40	39	39	38
9.0%	42	42	41	41	40	40	39
9.5%	43	42	42	41	41	40	40
9.6%	43	43	42	42	41	41	40
10%	44	43	43	42	42	41	41

## Four Challenges (continued)

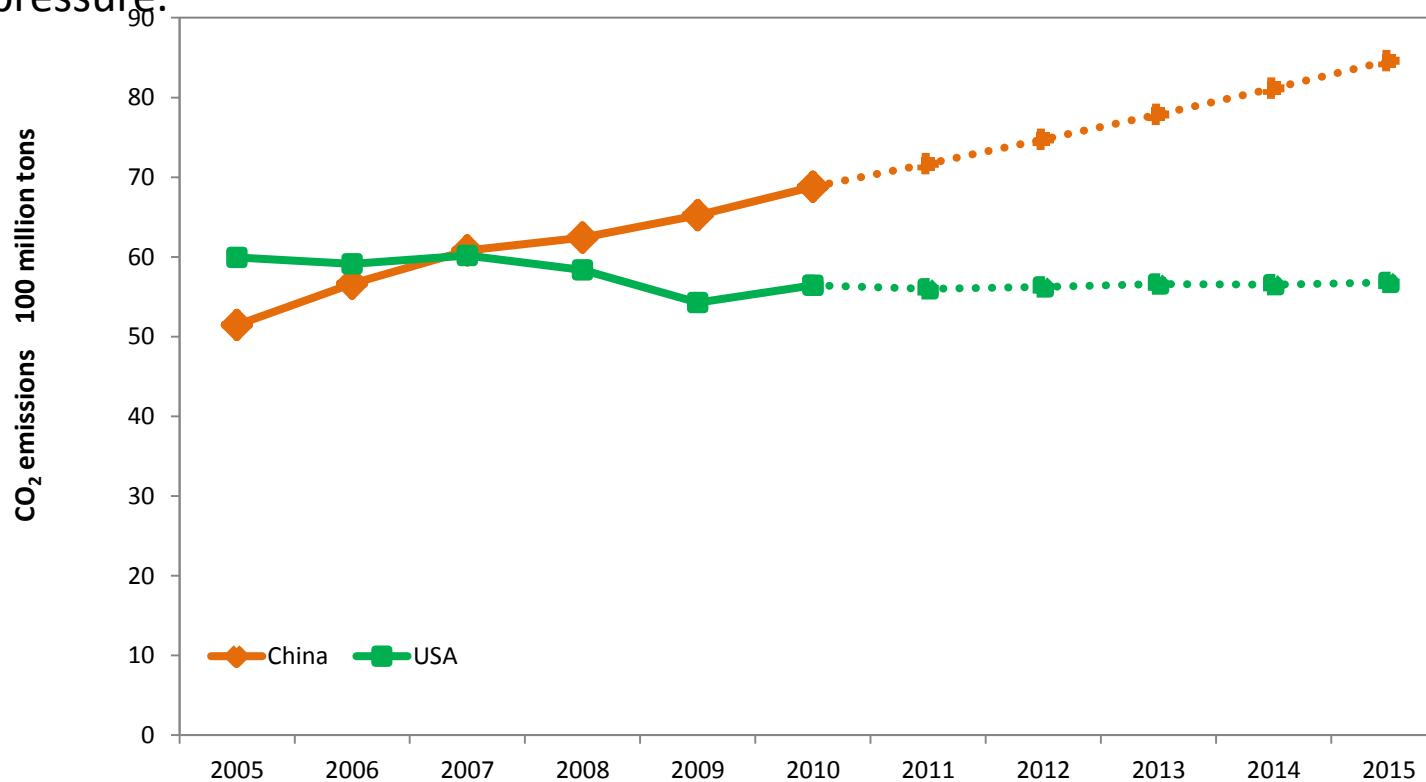
- ② Economic development goals in the 12<sup>th</sup> FYP set by the central government and local governments are inconsistent. **Local governments' weighted average annual GDP growth rate is much higher than that set by the central government.**
- ③ National energy consumption, CO<sub>2</sub> emissions, new energy and renewable energy demand goals set by the central government and local governments are also not aligned.

Gap Analysis of central and local targets



# Growing gap and international pressure

- Assuming an energy consumption cap of **4.1 billion tce**, energy-related CO<sub>2</sub> emissions in 2015 would reach **8.46 billion tons**.
- EIA estimates that in the reference scenario, 2015 CO<sub>2</sub> emissions in the US will be 5.68 billion tons, approximately the same as the 2010 level.
- China emissions is expected to be **49% higher than the US**, implying greater pressure.



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**Thank you**

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