Low-Carbon Development in China's 11th 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

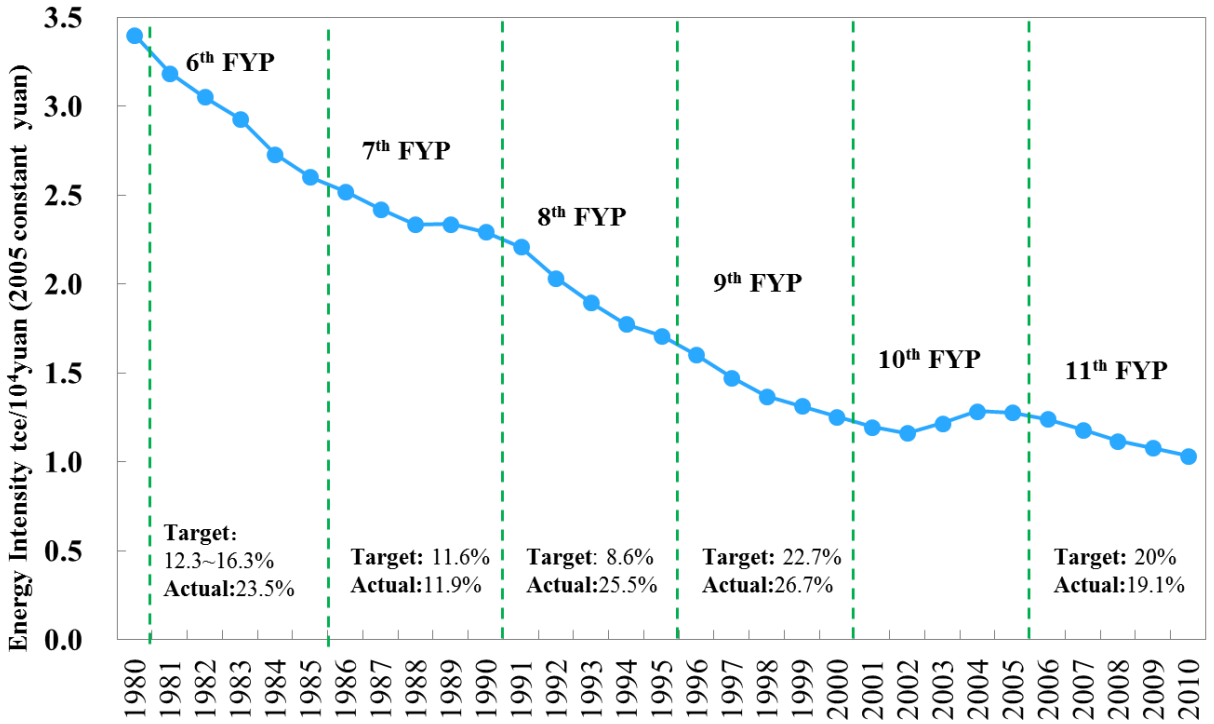
- Reversed the increasing trend of energy intensity (EI) in the 11th FYP, achieved the EI reduction target, but EI remains high
- Fast growth in renewable energy, but slow progress in improving energy mix
- Technological progress accounted for ~70% of EI reduction, and structural adjustment ~1/4
- Structure: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

Key Findings (continued)

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

Reversal of the increasing trend of energy and carbon intensity

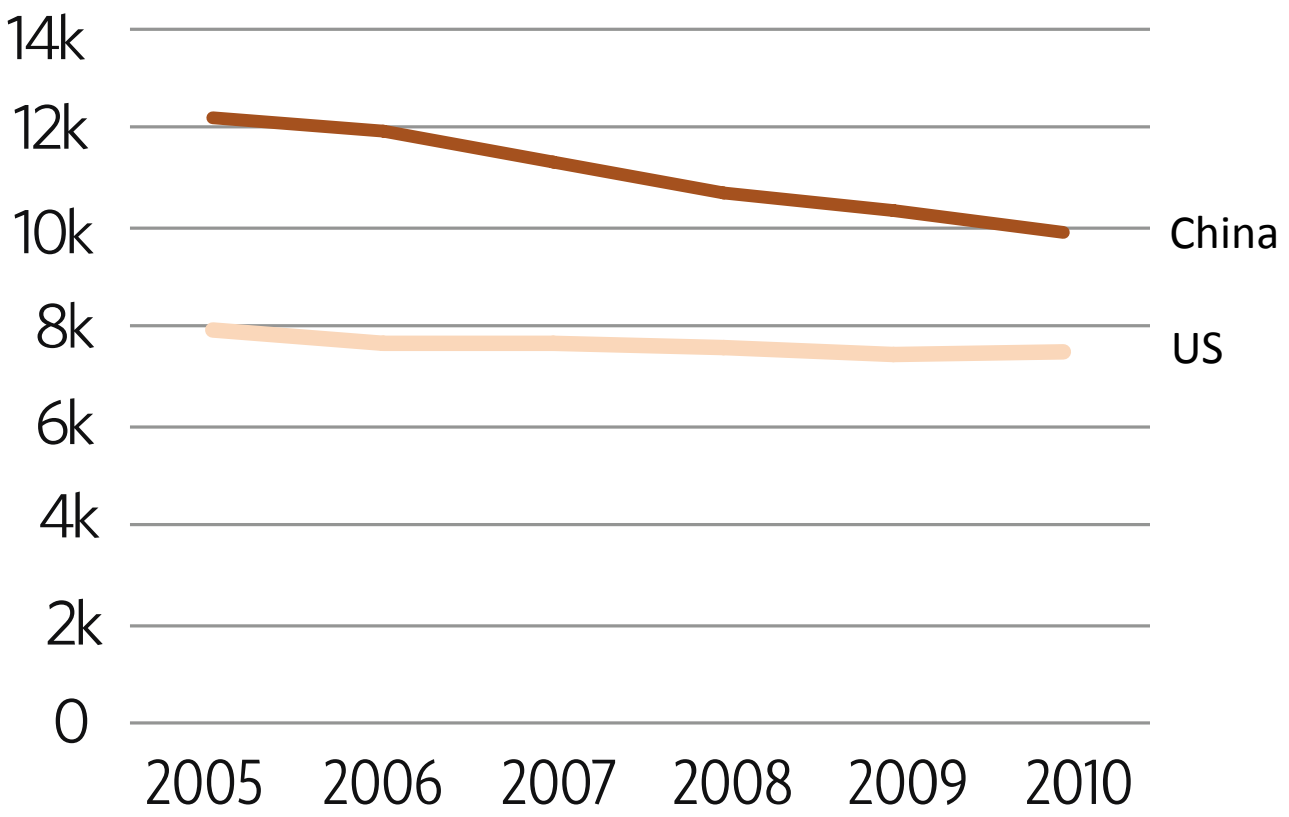
The 11th FYP reversed the upward trend of energy intensity during the 10th FYP and saw a **19.1%** decrease in energy intensity.



Planned Energy Intensity during the Five FYP periods from 1980-2010

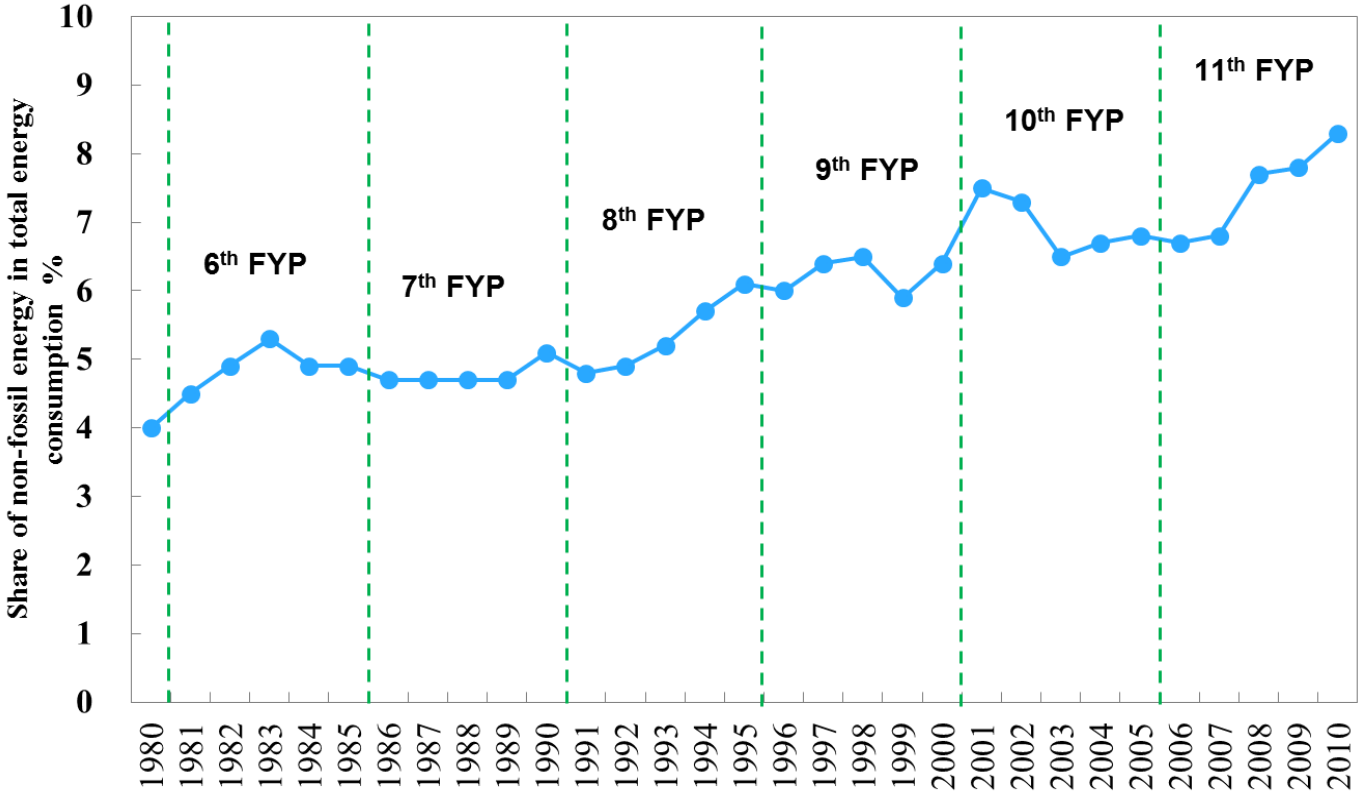
Data source： the 5th FYP, the 6th FYP, the 7th FYP, the 8th FYP, the 9th FYP, the 10th FYP and the 11th FYP; energy consumption per unit of GDP is in 2005 yuan. And calculated according to China Statistical Yearbook 2010. 2010 data are calculated based on the fact that energy consumption per unit of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

Energy Intensity of GDP (Btu/$)



Fast growth in new and renewable energy

The 11th 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.

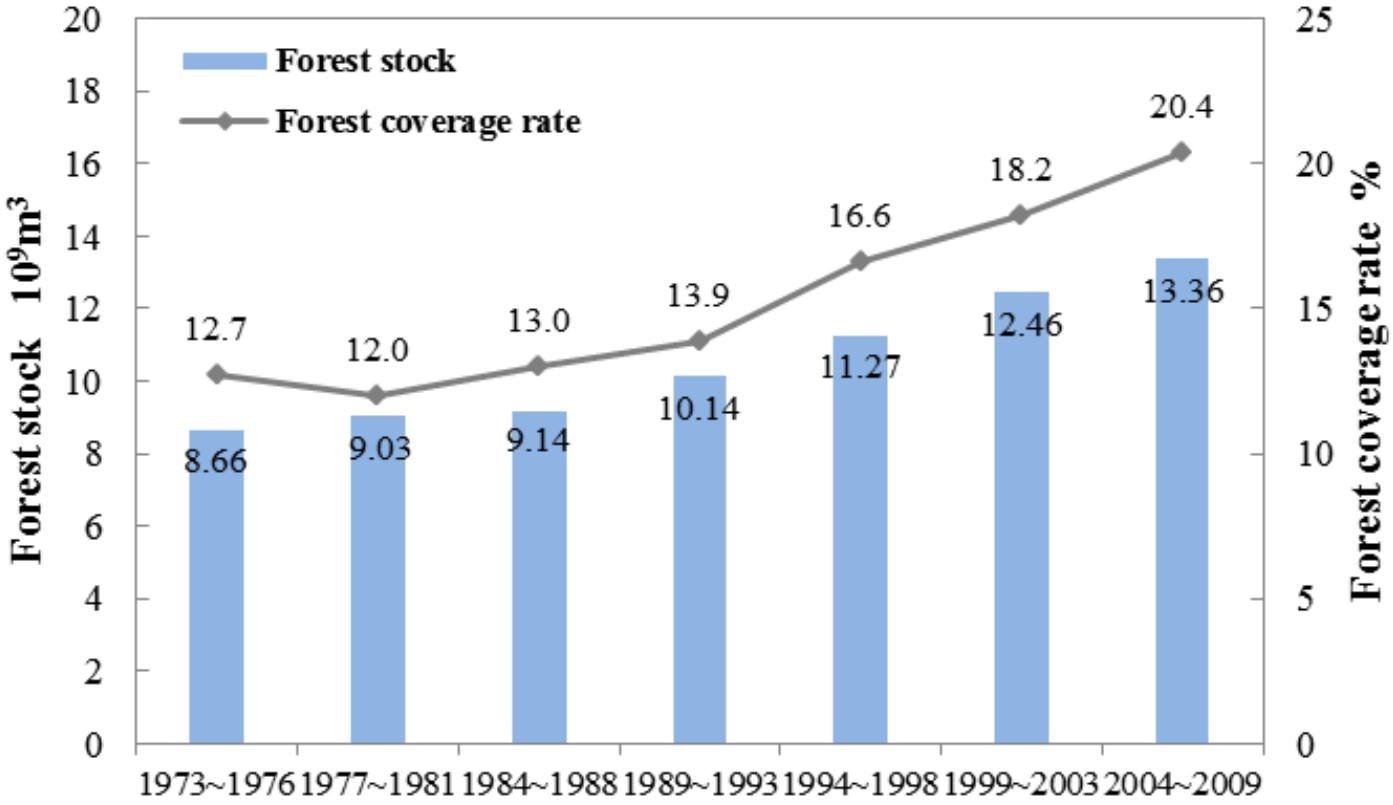


Share of non-fossil energy in primary energy in China 1980-2010

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 9th FYP. During the 11th FYP, 4.5 million tons of CO2 was sequestered by forest annually.

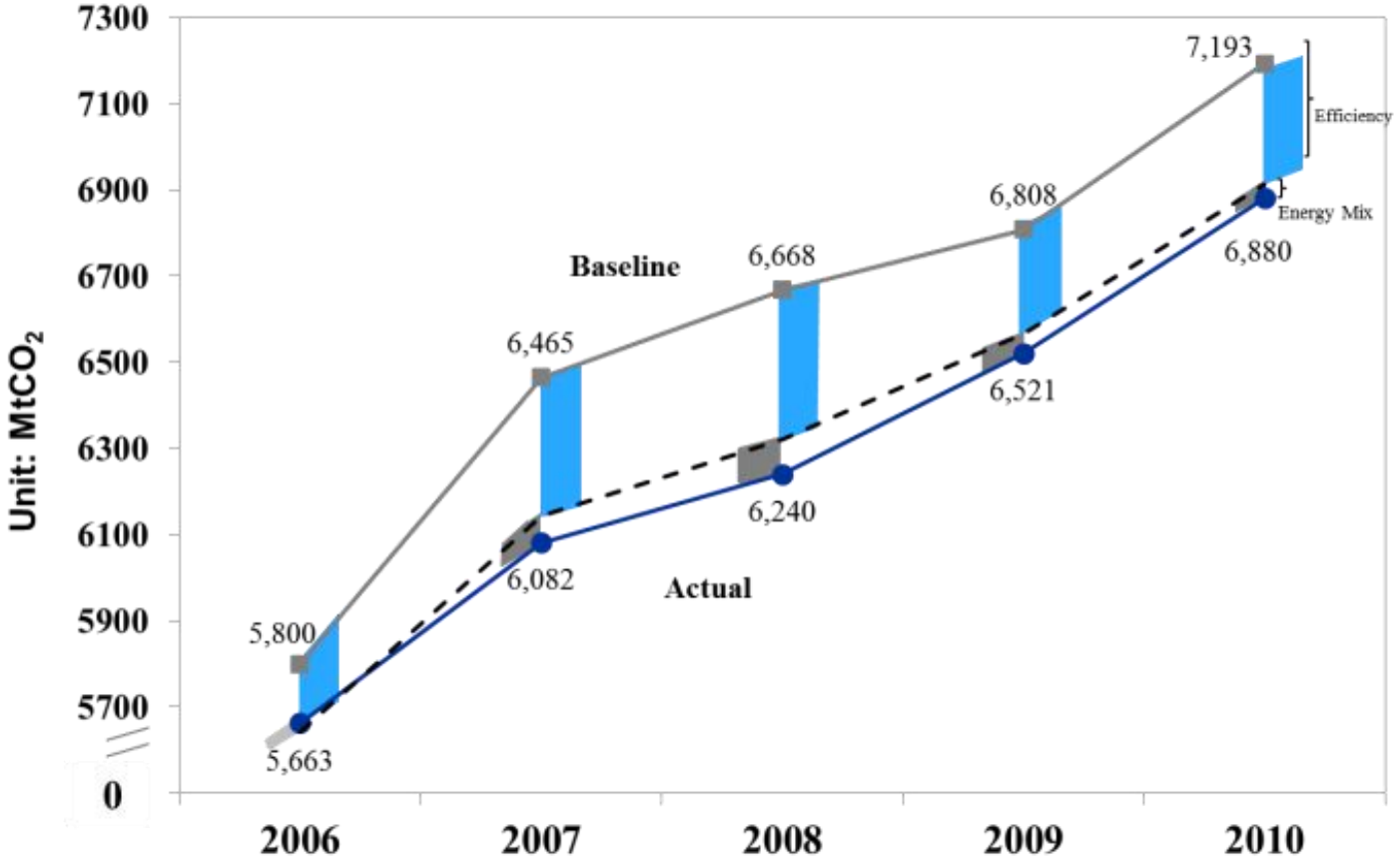


Changes in Forest Coverage and Forest Stock in Forest Censuses

Data source: State Forestry Bureau, forestry census data

Energy efficiency was key, energy mix contributed little

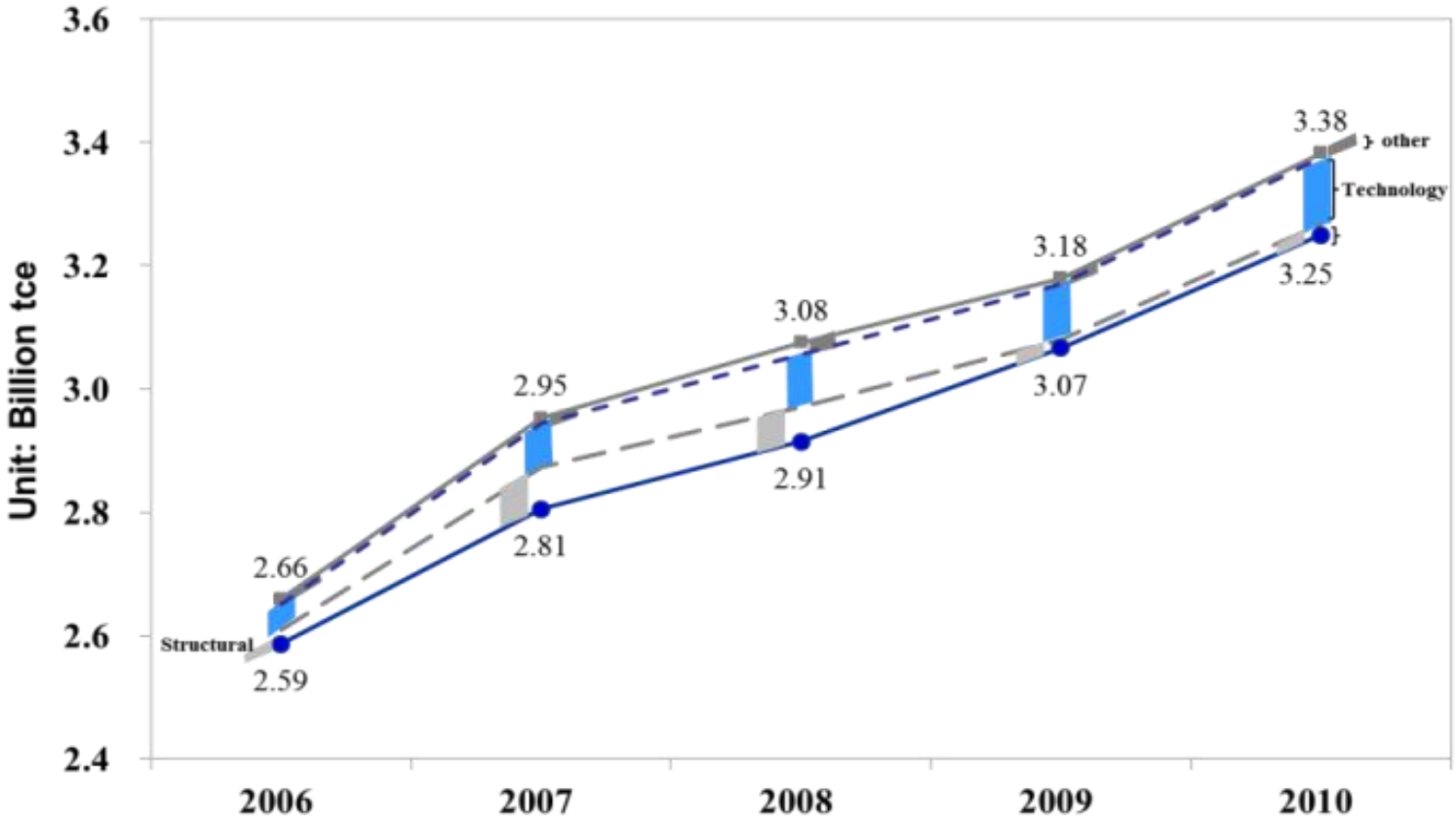
- **Emissions abatement** was **1.55 billion** tons of CO_2.
- **Energy efficiency improvement** is the main contributor to CO_2 emissions abatement, accounting for **87% of total CO_2 abatement**. Energy mix was less significant contributor to CO_2 emissions abatement.



Impact of energy intensity and energy makeup on CO_2 emissions

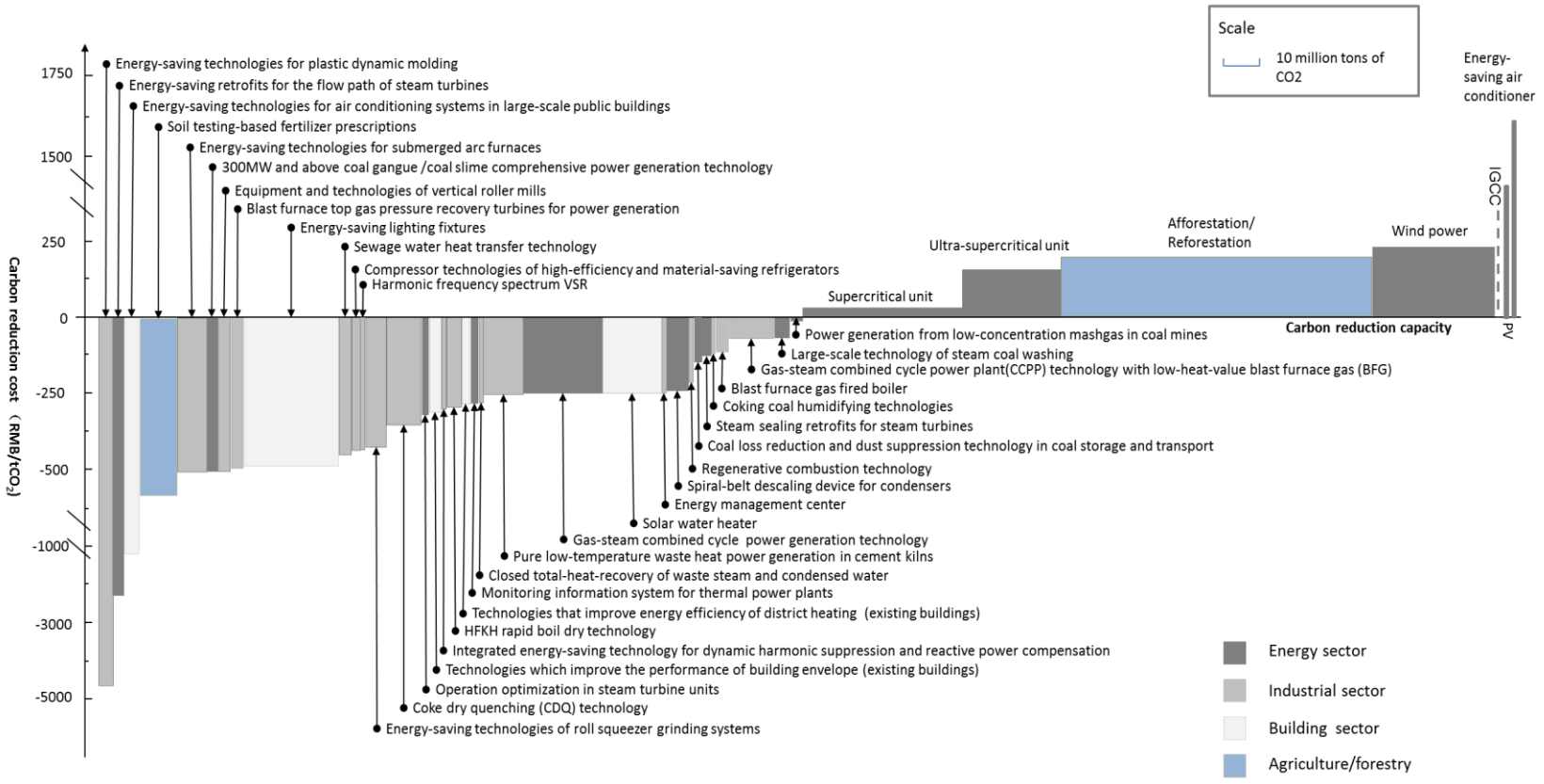
Technological Improvement and Structural Adjustment Supported Energy Intensity Reduction

- **Energy savings** in China during the 11th FYP was **630 million tce**.
- **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**.



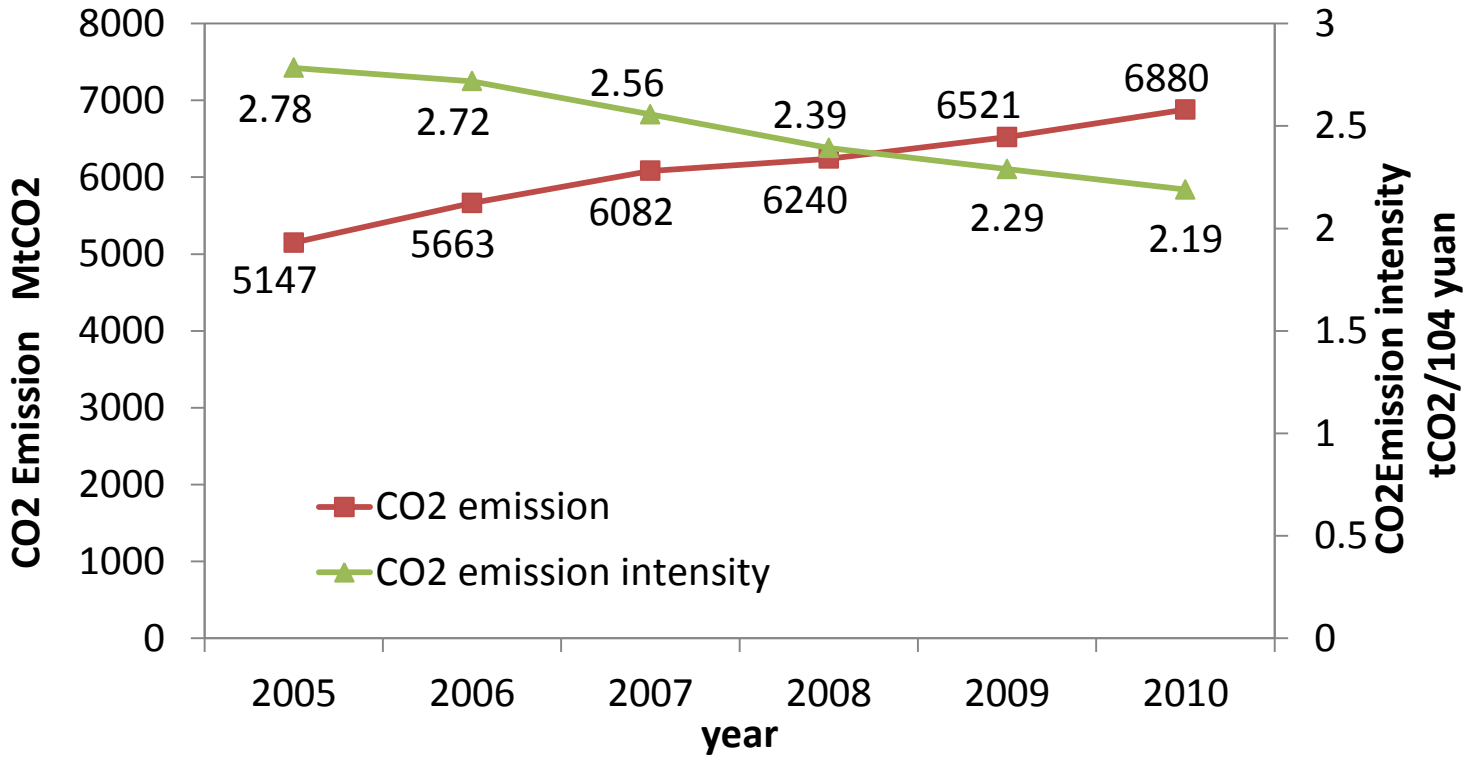
Cost curve for technologies with CO_2 emissions reduction capacity of greater than 1 million tons in 2010

Note: （1）2010 carbon reduction capacities of photovoltaics, IGCC, and energy-saving air conditioners were 700, 0, and 690 thousand tCO_2, respectively.
（2） We use 2.71tCO_2/tce as the CO_2 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 Tsingua University.

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

- Energy-related growth in CO_2 emissions in China increased from **5.15 billion tons** to **6.88 billon tons***. Exceeded the US and became the largest energy emitter. **21.9%** more than those in the US in 2010.
- **Total CO_2 emissions in all sectors showed an upward trend**



Total CO_2 emissions and emissions intensity

* EIA report shows that energy-related CO_2 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 11th 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_2**, stimulus measures **777 million tCO_2** , and market-based measures **15 million tCO_2**.
- **High efficiency of policy is due to large-scale national investment**. During the 11th FYP, fiscal funding from state and local governments for every ton of CO_2 abatement was **167 yuan**.

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

- Total social investment in new energy and renewable energy in China during the 11th FYP was **1730 billion yuan** (266.6 billion USD, 192.6 billion Euros).
- 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%**).

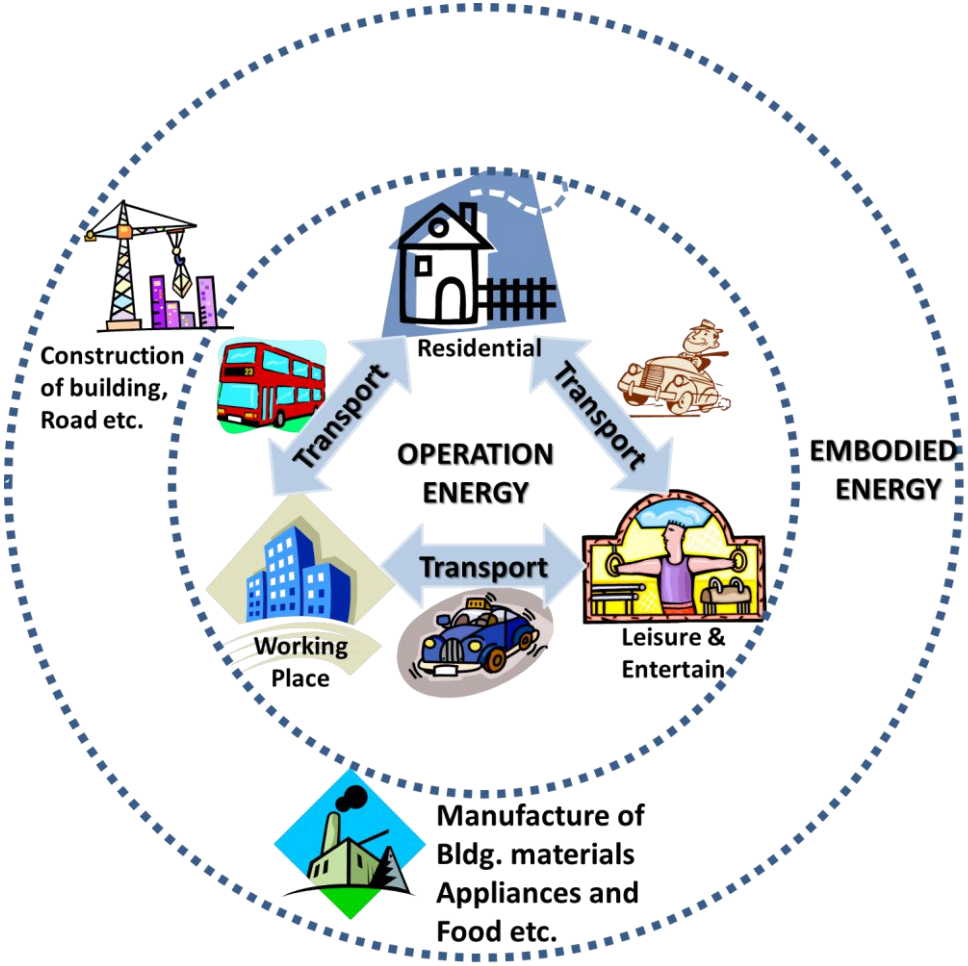
Energy Efficiency Investment during the 11th FYP was 859.2 billion yuan

- **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.
- 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.**

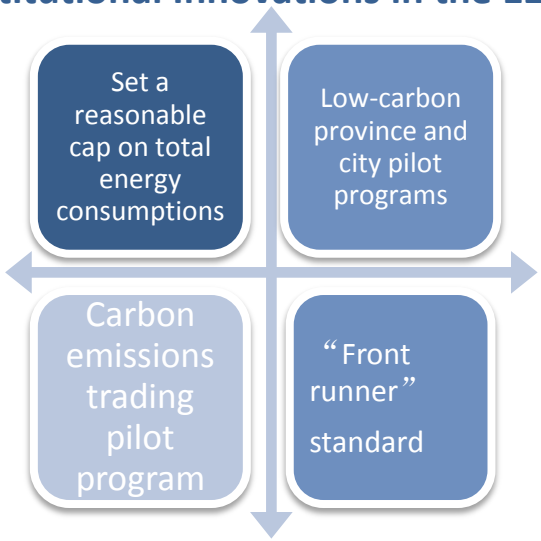


Energy Saving and Carbon Abatement Targets and Policies in the 12th FYP

Comparison of Energy Saving and Carbon Abatement Indicators in the 11th FYP and the 12th FYP

Indicators	11th FYP	12th FYP	Nature
Annual growth rate of GDP	7.5%	7%	Expected
Reduction in energy consumption per unit of GDP	20%	16%	Mandatory
Reduction in CO2 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^3 to reach 14.3 billion m^3	Mandatory

Policy and Institutional Innovations in the 12th FYP



Four Challenges in the 12th FYP

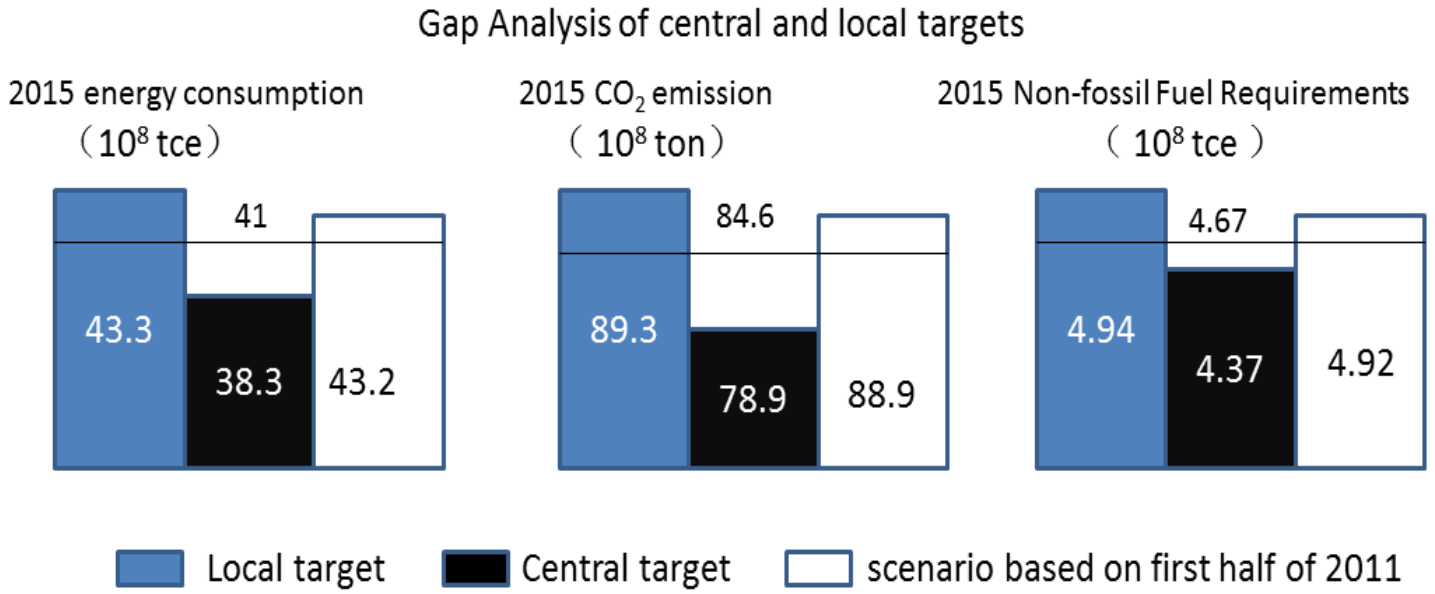
- Industrialization and urbanization drive up energy consumption;
- Low hanging fruits picked
- Local government drive for growth
- RE growth not enough to meet the 11.4% target

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 / GDP Growth Rate	16%	17%	18%	19%	20%	21%	22%
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

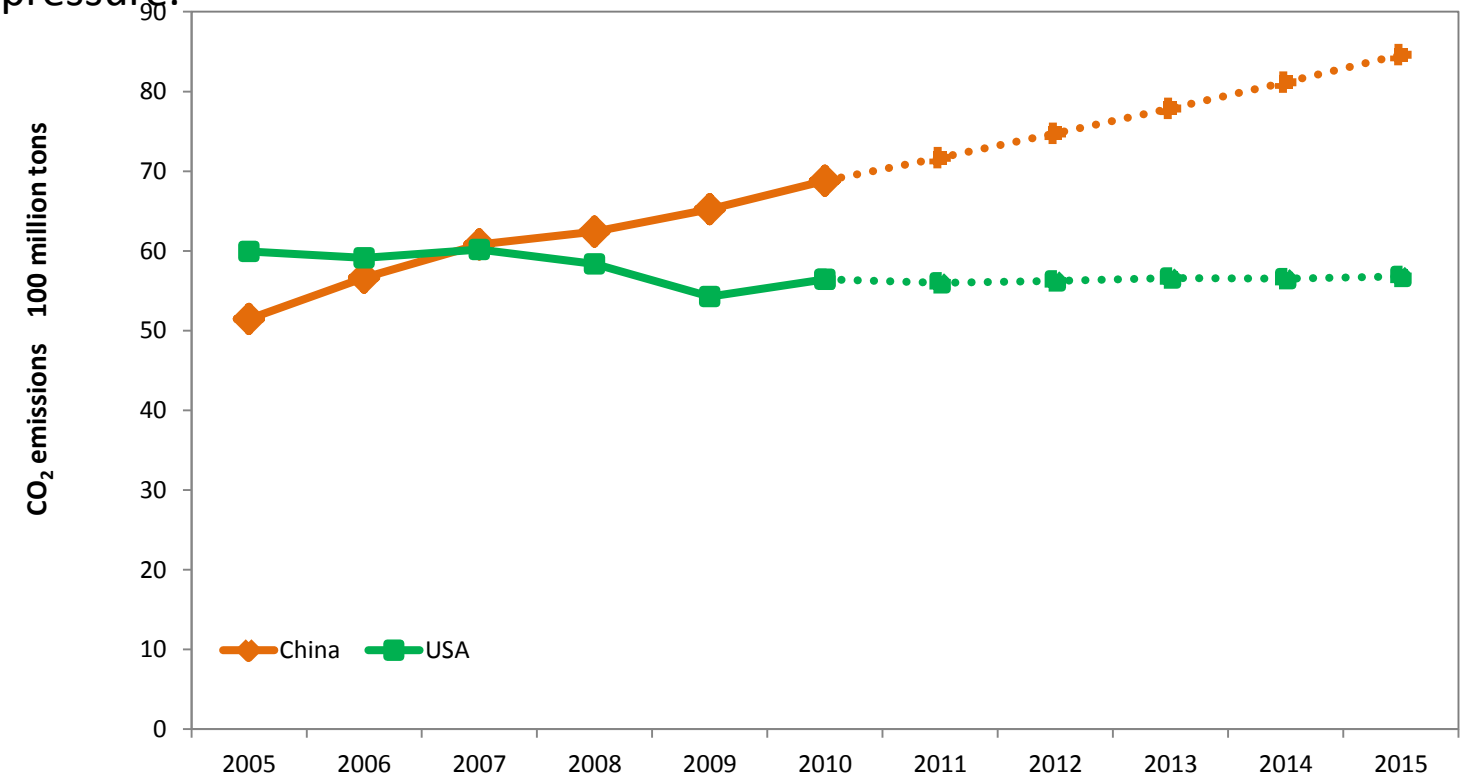
Four Challenges (continued)

- Economic development goals in the 12th 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.**
- National energy consumption, CO_2 emissions, new energy and renewable energy demand goals set by the central government and local governments are also not aligned.



Growing gap and international pressure

- Assuming an energy consumption cap of **4.1 billion tce**, energy-related CO_2 emissions in 2015 would reach **8.46 billion tons**.
- EIA estimates that in the reference scenario, 2015 CO_2 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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