

Shifting China's Economic Growth Pattern to Green and Low-Carbon Development

——Targets and Measures of China's Low-Carbon Development in the 12th Five-Year Plan

Bin LIU

Institute of Energy, Environment and Economy

Tsinghua University

December 1, 2011

Durban, South Africa

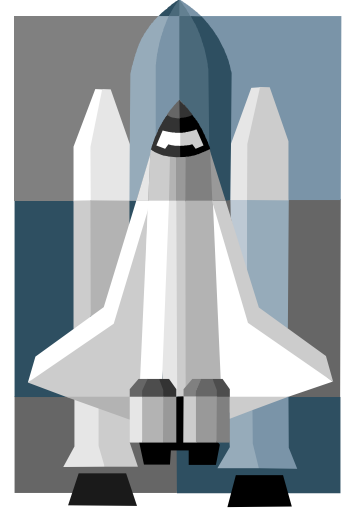
1. China has grasped opportunities of peaceful development and economic globalization in the first decade of 21 century and made significant progress in economic development, however the resource-dependent and extensive economic growth pattern can hardly be continued further into the future.

□ GDP

- At the annual growth rate of 10.4% from 2000 to 2010;
- Ranked as the world's second largest economy from 6th place;

□ Energy and emission

- Energy consumption has increased by 120% during 2000 to 2010 (vs. global growth rate around 20%); the share of world total energy consumption increased to 20% ;
- The share of world CO₂ emission has increased to 23% ;
- Coal production amounted to more than 3.2 Gt, well beyond the reasonable supply capacity;



- 2. Energy conservation and carbon mitigation have been made remarkable achievements during the 11th Five-Year Plan period, however the energy consumptions and CO₂ emissions at a higher growth rate have not been fully turned around.**
- During the 11th Five-Year Plan period
 - Energy intensity of GDP has drooped by 19.1%
 - CO₂ emission intensity of GDP has decreased by 21%
 - GDP has increased by 71.3%
 - Energy consumption has increased by 38%, with the total amount of 3.25Gtce
 - The share of non-fossil energy has come up to 8.4% in 2010 from 6.8% in 2005
 - Renewable energy ranked first of the world in term of growth rate, scale of deployment and investment
 - Non-fossil energy still can't meet the incremental energy demand
 - Fossil energy remained fast-growing, leading to a large emission of CO₂ as a result (coal increased by 34%)

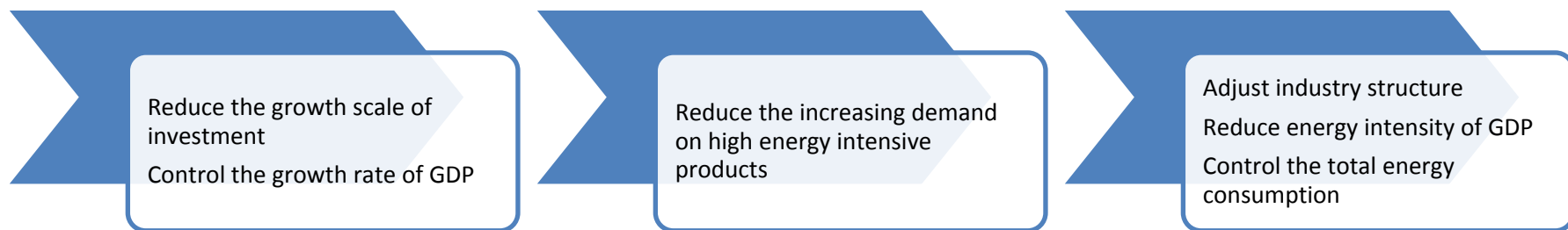


3. It is imperative to shift China's development pattern from mainly investment- and export-driven one to domestic demand-led one in the coming 12th FYP period

- The rapid growth of investment has driven the development of infrastructure and production capacity, and the rapid expansion of energy intensive sectors as a result, thus hindering further restructuring of industrial sectors and reduction of energy intensity of GDP
- According to World Bank, China's investment has contributed to 43% of GDP, in contrast to the world average of 22%;
- Household expenditure accounted to 37% of GDP, the world average was 61%.
- China's export accounted 20.1% in GDP in 2000, and 32% in 2008.
- Total volume of import and export ranked 2nd from 8th place in the world
- The share in total international trade increased from 3.9% to 9.6%
- Energy consumption for manufacturing export goods accounted for about one fourth of total domestic energy consumption.



4. Transforming from economic growth pattern driven mainly by increase of investment and expansion of export will facilitate the adjustment of industrial structure and accelerate the decrease of energy intensity and CO₂ emission intensity of GDP.



- Energy intensity of GDP will decrease by 0.45% if the share of investment in total GDP reduced by 1%, while the final consumption increased by 1%.
- China's industry accounts to 47% of total GDP, while heavy industry accounts to 71% in total industry sectors.
- The steel and cement production has taken half or even more of global total production (the share was only 18% and 34% in 2000), which is already sufficient meet the demand of industrialization and urbanization
- Production capacity tends to stabilized during the 12th Five-year plan period under proper economic growth rate of 8-9%.



5. 12th Five-year plan puts forward: reasonable control of total energy consumption, provinces (cities) with high expected economic growth rates should intensify industrial restructuring, and set even stronger targets for reducing the energy intensity of GDP

- Control of the total energy demand will need:
 - Further declining the rate of energy intensity of GDP;
 - Proper adjustment of the annual growth rate of GDP.

Energy demand Elasticity ϵ	Annual growth rate of GDP during 12 th Five-year plan period				
	7.0%	8.0%	9.0%	10.0%	11.0%
Energy intensity of GDP decreased by 16%	38.3 ($\epsilon=0.48$)	39.9 ($\epsilon=0.54$)	41.8	43.7	45.7
Energy intensity of GDP decreased by 18.5%			40.5 ($\epsilon=0.51$)		
Energy intensity of GDP decreased by 21%				41.1 ($\epsilon=0.49$)	
Energy intensity of GDP decreased by 23.5%					41.7 ($\epsilon=0.47$)

- In the 2011 plans published by provincial governments:
 - GDP growth rate under 10%: Beijing (8%), Shanghai (8%), Hebei (8.5%), Zhejiang (9%), Guangdong (8%), Henan (8%), Shandong (9%);
 - GDP growth rate between 12-13%: 13 provinces;
- When the GDP growth rate increases 1 per cent from the national level (7-8%), the target of energy intensity decline rate should increase 2-3%.

6. **China will move to establish low-emitting industrial systems and consumption patterns as its main target, and take the industrial restructuring, energy efficiency improvement and large-scale development of new and renewable energy as its primary response measures.**
- **To advance technical energy conservation, enhance energy efficiency:** Government should scale up the R&D on advanced energy efficient technologies, upgrade traditional industrial technologies, and push productions moving into higher-end of value chain.
 - Technical energy conservation played a significant role in achieving 19.1% decrease of energy intensity of GDP during the 11th Five-year Plan period, in which.
 - **To adjust industry structure, improve structural energy conservation:** To develop strategic new emerging industries, and restrict expansion of production capacity and export of high energy intensive, heavy pollution and resource-related products, and improve strategic adjustment of industry structure.
 - Energy intensity of GDP could decrease by more than 1% with 1% decrease of the share of industry in total GDP.
 - **To develop new and renewable energy, reduce the share of fossil energy in total primary energy consumption.**
 - Optimizing energy structure will contribute about 20% to achieving the target of carbon intensity of GDP decreased by 40-45% by 2020.
 - **To guide the transformation of consumption pattern, and improve the establishment of low carbon society.**
 - Establish ideals of low carbon development and ecological culture in transport, building and living consumption fields;
 - Avoid traditional consumption pattern of developed countries featured with high carbon emission infrastructure and over consumption.

7. Strengthening technological innovations and promoting emerging low-carbon industries are two underlying pillars to achieve low carbon development

China's low carbon development depends on advanced energy technologies, which pushed the innovation of low carbon technologies, and will make great progress during the 12th Five-year Plan period.

- Energy saving and energy efficiency technologies: low energy consumption buildings, new energy vehicles and electrical cars, waste heat utilization, and clean coal utilization technologies and so on;
- New energy technologies: wind power, PV, biofuel, advanced nuclear power;
- RD&D CCS.

- ❑ The large amount of additional investment in new energy and energy efficiency fields will be the new driven force of economic growth.
- ❑ New energy and smart grid will be two strategic new emerging industries.
- ❑ The investment in energy saving and new energy fields will go beyond 10 trillion RMB in order to achieve the target of voluntary mitigation actions in 2020.



8. Low carbon projects being piloted in China's 5 provinces and 8 cities would play a model role in the outreaches, deployments and actions in relation to the green and low carbon endeavor.

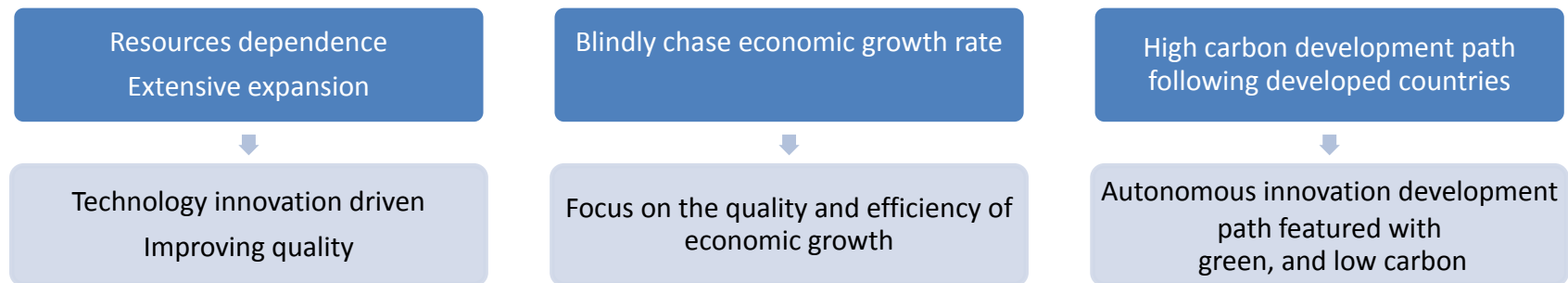
- It still remains to further raise the public awareness of low carbon concept
 - The decrease rate of CO₂ intensity of GDP should be more than 45% the general national target, and some cities could be 48-50%.
- To lay out higher targets and concrete implementation measures in the following areas:
 - Transform development patterns;
 - Adjust industry structure;
 - Energy saving in industry, transportation and building sectors;
 - Develop new and renewable energy.
- Pilot projects aim to strengthen:
 - Carbon emission statistics, accounting and management system;
 - Explore market mechanisms such as carbon emission trading.

9. A low-carbon pattern transfer requires the new concepts of scientific development, insightful strategic visions, forward-looking deployments, and ever stronger polices and measures.

- ❑ The binding targets of energy intensity of GDP decreased by 16% and CO₂ intensity decrease by 17% during the 12th Five-year Plan period are the second phased target of China's CO₂ intensity of GDP decreased by 40-45% by 2020 compared with 2005 level.
- ❑ The share of non-fossil energy in total energy consumption will increase to 15% in 2020 from 6.8% in 2005. CO₂ intensity of GDP will decrease 5% further than the decline rate of energy intensity by 2020.
- ❑ To achieve the 45% target, CO₂ intensity of GDP should decrease by 21%, 17~18% and 15~16% during the 11th, 12th, and 13th Five-year Plan period respectively.
- ❑ Relatively mitigation target, i.e. CO₂ intensity of GDP will be applied during the period by 2020; the targets of total quantity control and peak of CO₂ emission for the middle- and long-term will be further analyzed and considered.

10. To take advantage of the golden opportunity of peaceful development during the 2nd decade of 21st century, and achieve the shift to a green and low carbon development pattern in a relatively favorable international situation.

- In the 1st decade: Seize the opportunity, accelerate the development
- In the 2nd decade: Accelerate the transformation of development pattern, achieve green and low carbon development



- Aim to complete transformation of development patterns, and transit into a green, low carbon, sustainable development path in the next 10 years.
- Aim to control the CO₂ emission at 9~10 billion tons of CO₂ by 2020, with a view to significantly reducing the increase or stabilizing the total CO₂ emission.

Thanks !

lbinet@tsinghua.edu.cn