



Clean energy transition in China

Chen Yi

National Center for Climate Change Strategy and International Cooperation

The highlighted role of China in controlling emissions

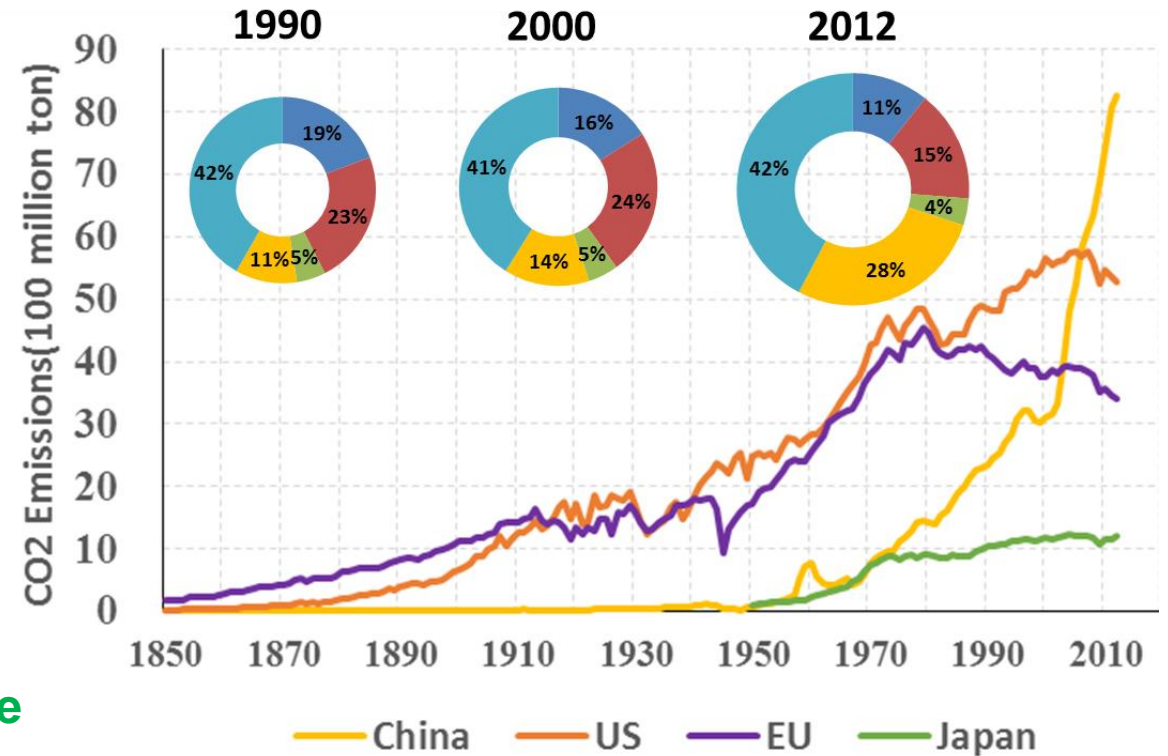
With rapid industrialization and urbanization, China have become the main contributor to the rapid growth of global carbon emissions and energy consumption

$$CO_2 = GDP \times \boxed{\text{energy}/GDP} \times \boxed{CO_2/\text{energy}}$$

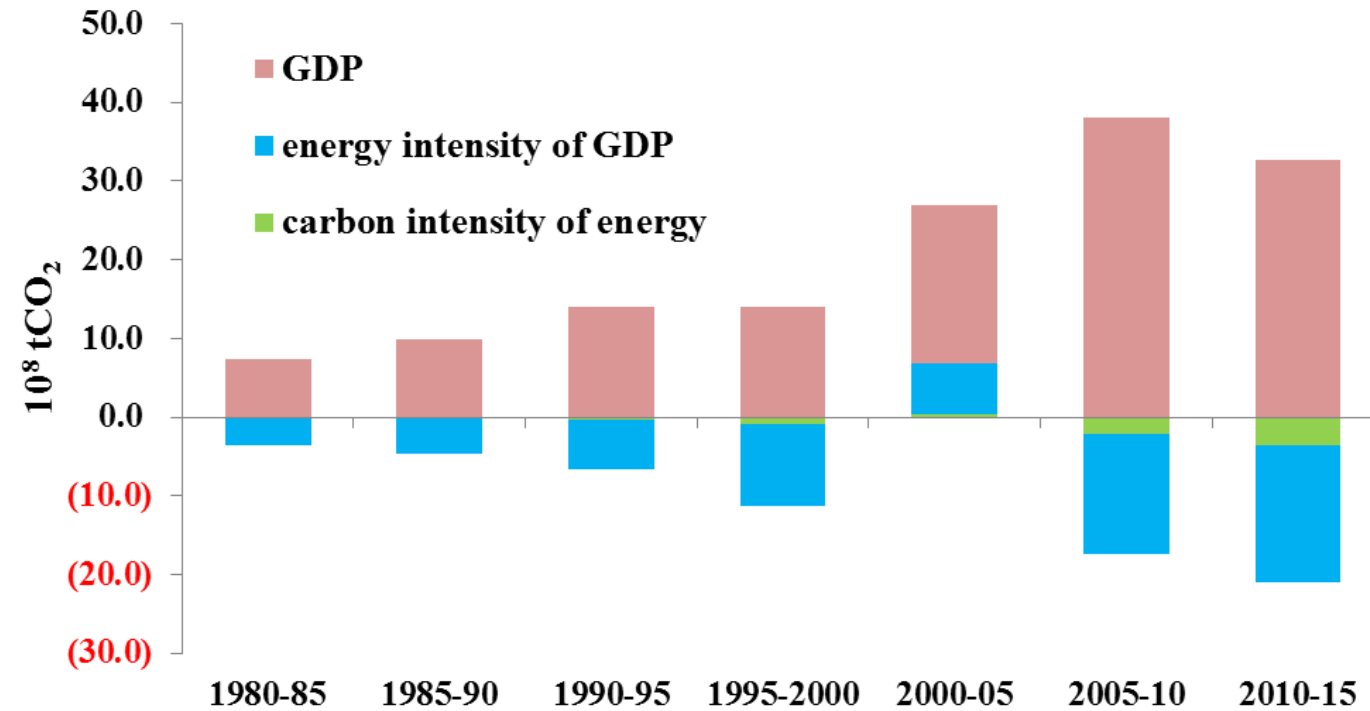
**Energy efficiency
(energy conservation)**

Energy structure

The prerequisite of decoupling growth with carbon emissions



Findings from historical trend of emissions



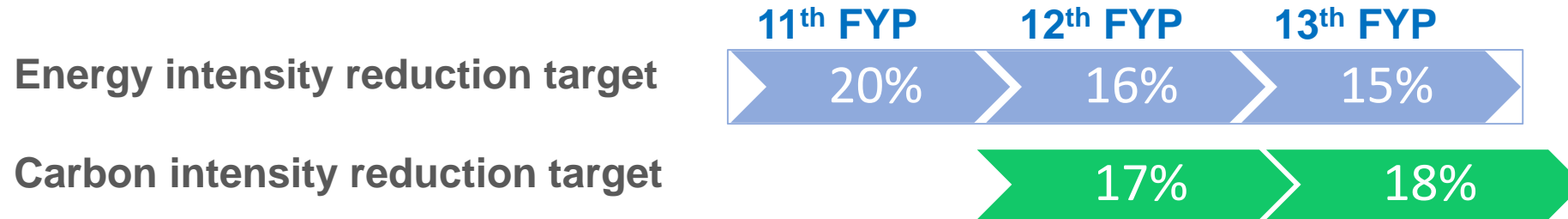
- 1. Economy growth is the major driver of China's carbon emissions**
- 2. Energy intensity of GDP is the main driving factor for China's historical carbon emission reduction.**
- 3. Carbon intensity of energy has been rising in recent years, though its magnitude still falls far behind of that from energy intensity of GDP**

A black and white photograph of a calm sea with a small structure in the distance and mountains on the horizon. The structure is a small, dark, rectangular tower with a platform on top, situated in the middle of the water. The horizon is low, showing a range of mountains under a pale sky. The water is still, with a clear reflection of the structure.

China' s Policies and Measures in promoting energy conservation

Administrative measures

Set reduction target on both energy intensity and carbon intensity



establish high level leadership on energy conservation and climate change

set up a leading working group on energy conservation and emissions reduction

Strengthen the assessment of energy conservation/emission control targets for all provinces / key enterprises

Launch the Energy Conservation and Emission Reduction Statistical Monitoring and Implementation Assessment Plan and Methods

- (1) a statistical index and system for monitoring
- (2) a evaluating system
- (3) a statistical analysis system for the evaluation of energy intensity of GDP,

Financial measures

Fiscal policies

“rewards instead of subsidies” policy in accordance with the amount of energy saved.

Rewarding policy for improving energy-saving renovation of existing buildings

Subsidies for highly efficient appliances producers, subsidy /rewarding policy for EMC projects

government green procurement

Tax policies

adjusting taxes on energy resources(coal, crude oil, gas), passenger vehicles, corporate income tax, etc

Pricing policies

differential power pricing for energy intensive industries, multi-step electricity pricing for residential use

Financial policies

Decreasing loans to energy intensive industries; Green-credit policy

Key energy efficiency initiatives

Key energy-saving projects:

10 key projects (11th FYP) covering transport, building, CHP, surplus heat utilization, green lighting, appliances.

5 key projects (12th FYP) including energy conservation transformation, EMC, subsidies of appliances and capacity building in parallel with other sectorial projects in industry, building, transport.

Top-1000/10000 Enterprises Energy Conservation Program

Covering 33% (11th FYP) and >60% (12th FYP) of national energy consumption

Energy efficiency Benchmarking in Key energy consuming sectors:

23 categories in 11th FYP -> 33 categories in 2016

Eliminating obsolete production capacity in manufacturing:

power, steel, aluminum, cement, glass, paper, etc

Consumer subsidies for purchasing high efficient products:

Coolers, vehicles, lights, electric generators, etc.

Early warning control on energy conservation

Achievements and challenges

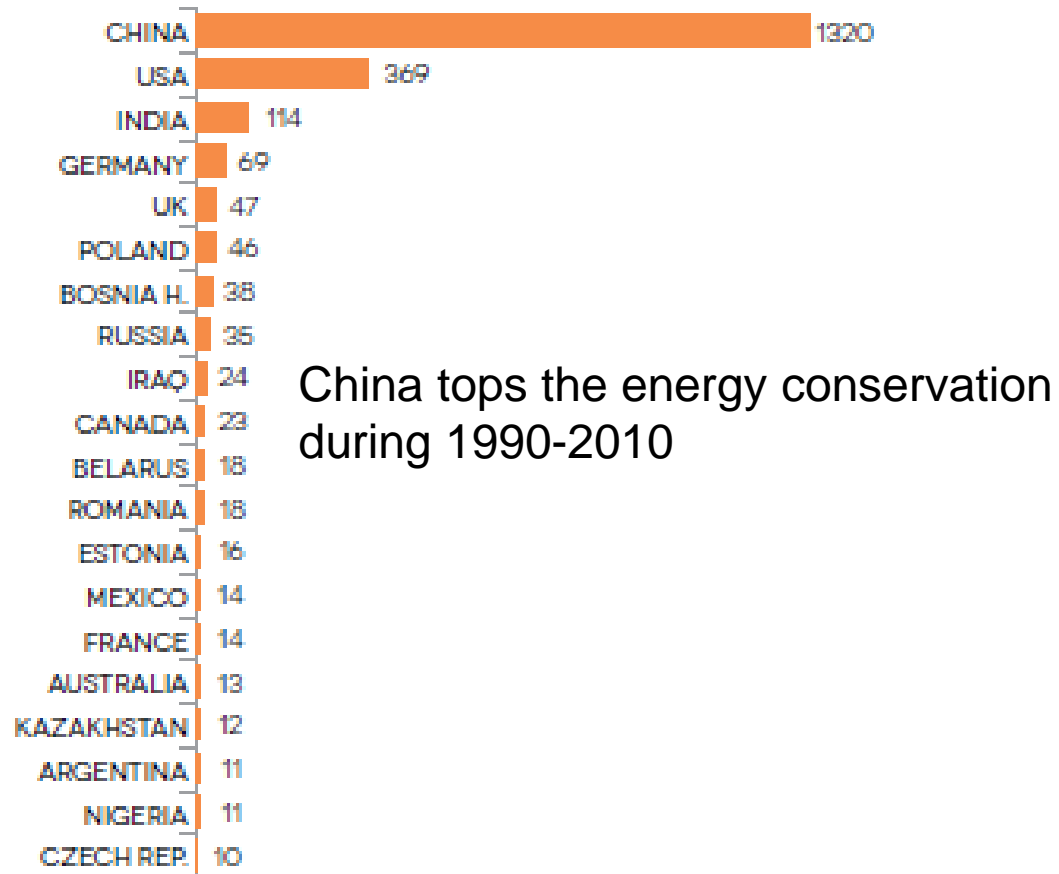


FIGURE 3.23B LARGEST ENERGY SAVERS,
CUMULATIVE 1990-2010 (EJ)

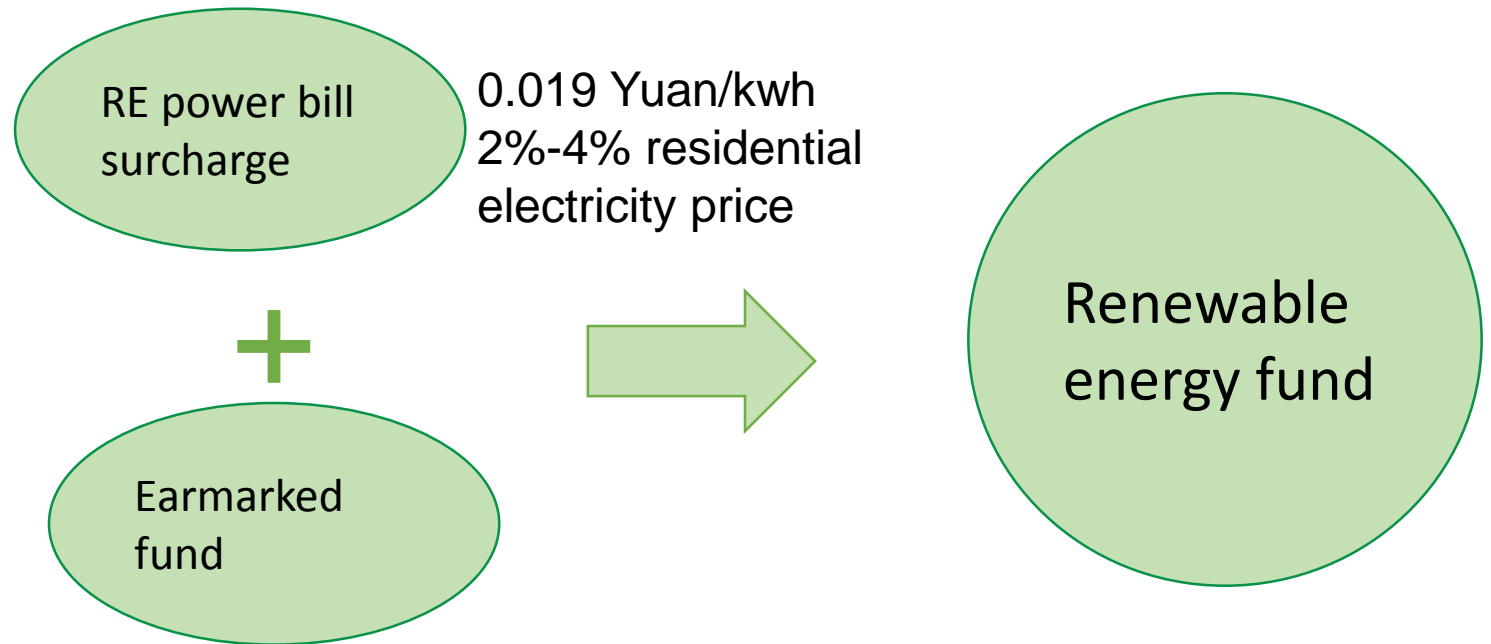
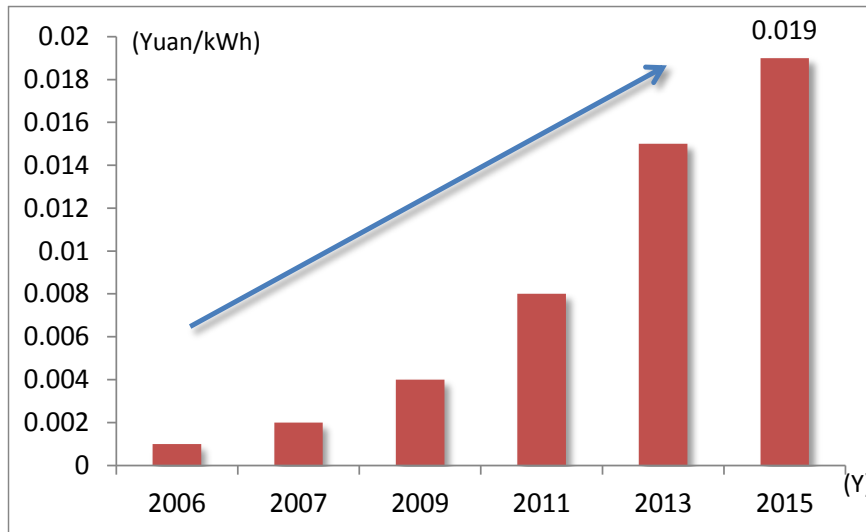
- Current energy prices do not fully reflect their impacts on environment
- Misfit between national and provincial energy data causes confusion in assessment and supervision
- Inadequate personnel and institutional mechanisms regarding energy management, supervision, etc. constrains further improvement in energy efficiency

A black and white photograph of a calm sea with a small structure in the distance and mountains on the horizon. The structure is a small, dark, rectangular tower with a platform on top, situated in the middle of the water. The horizon is low, with a range of mountains visible in the background under a pale sky.

China' s Policies and Measures in promoting RE developments

Launch and revision of Renewable energy law

Set down a framework covers all relevant regulations, sectoral targets, development plans, fiscal and subsidy policies, and national standards.

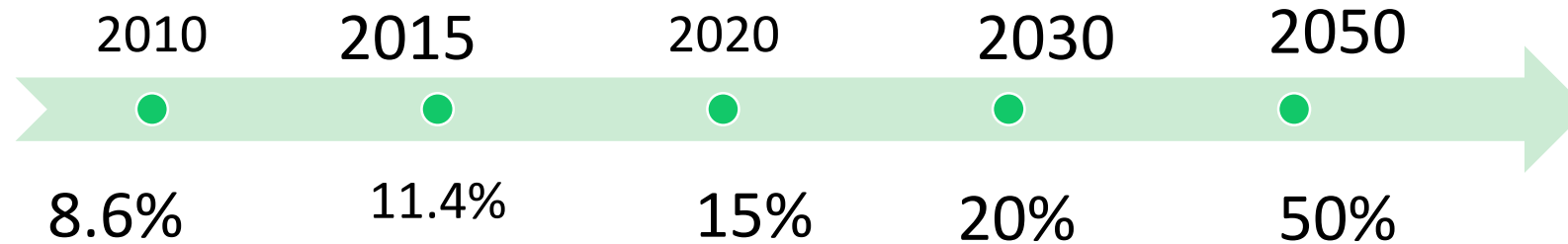


Pricing mechanism and preferential tax prices

	FiTs (Yuan/kwh)	Tax reduction	Subsidies for grid access
Onshore wind	0.49、 0.52、 0.56、 0.61	50%	1 fen/kwh(<50km) 2 fen /kwh(50-100 km) 3 fen/kwh(>100 km)
Solar PV	0.9、 0.95、 1	50%	
Agriculture and forest biomass	0.75	100%	
waste	0.65	100%	

Strategic planning on RE development

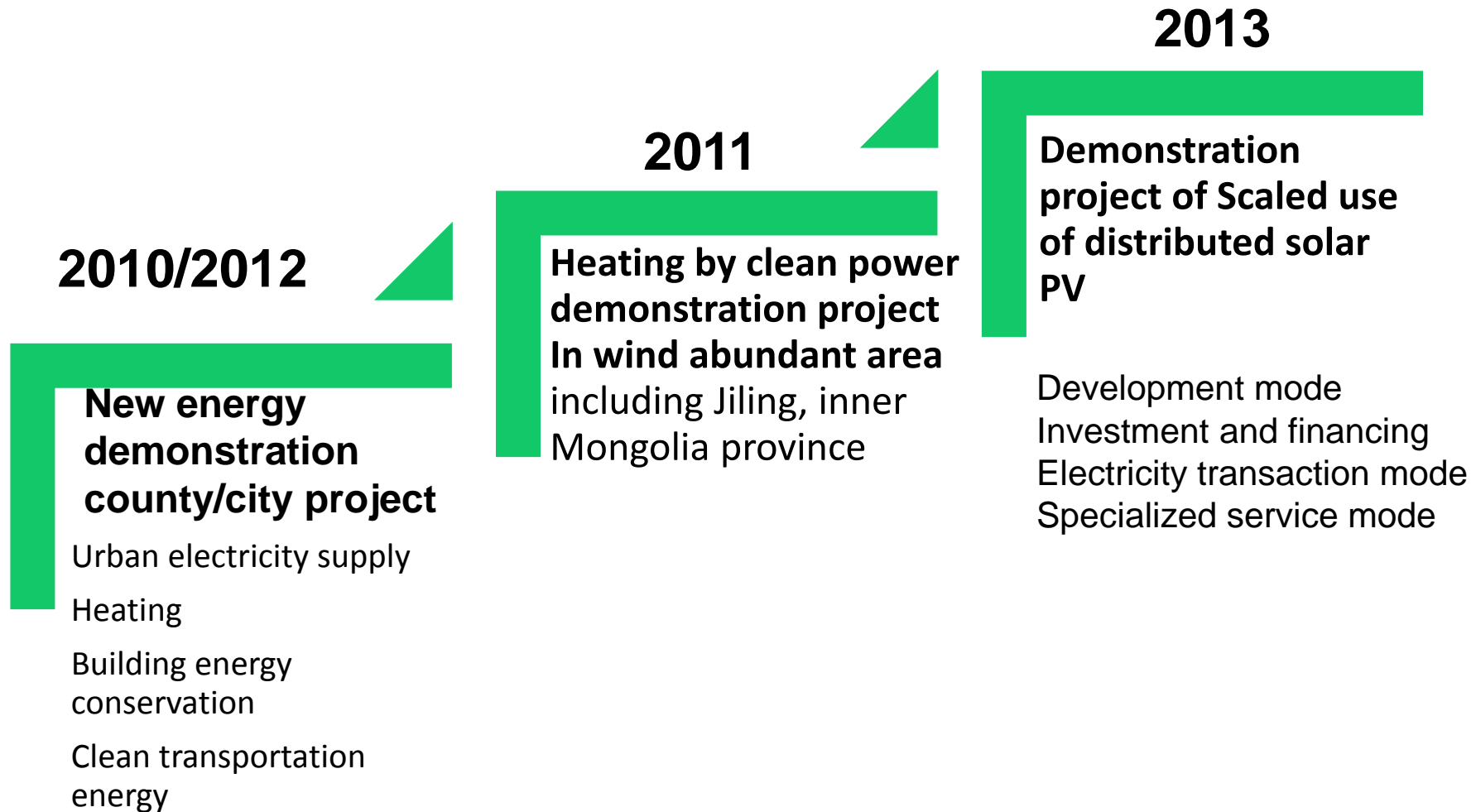
setting national targets on non-fossil percentage in primary energy consumption
(non-fossil is crucial both in addressing climate change and air pollution)



13th FYP plan on RE: hydro, wind, solar, biomass

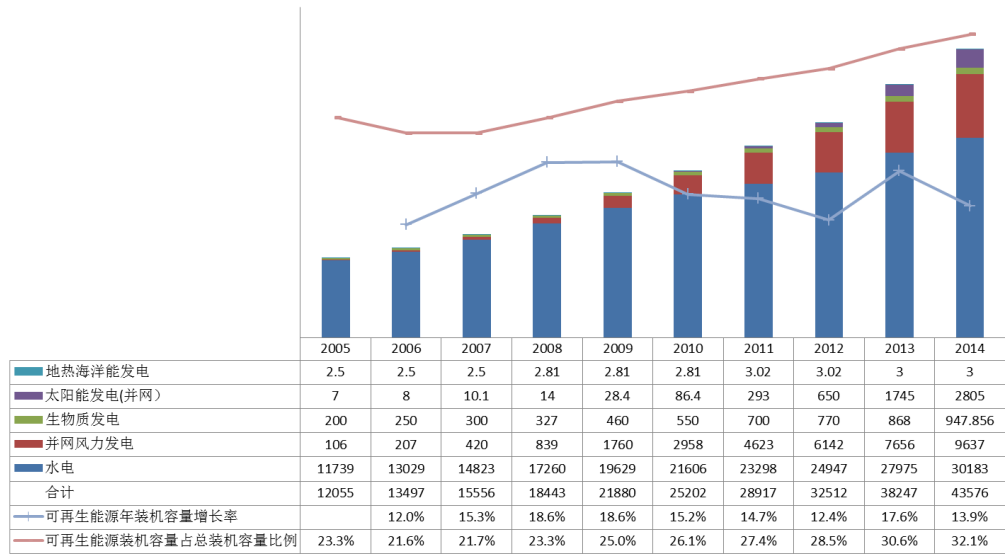
	Installed capacity		Installed capacity
Power sector		Thermal applications	
hydro	340 GW	Biogas	8 billion m3
wind	210 GW	Solar water	800 million m2
Solar PV	105 GW	Geothermal	1600 million m2
Solar thermal	5 GW		
Biomass power	15 GW		

Demonstration projects

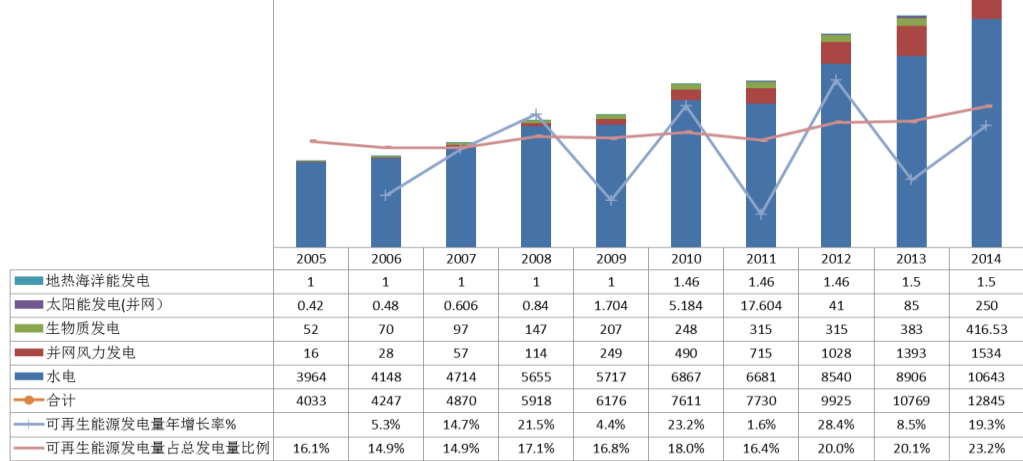


Achievements and Challenges

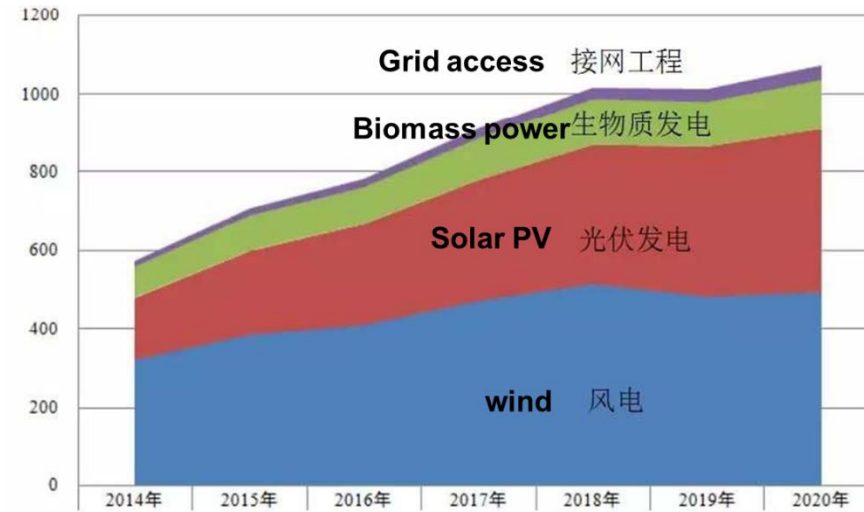
中国可再生能源装机容量（万千瓦）



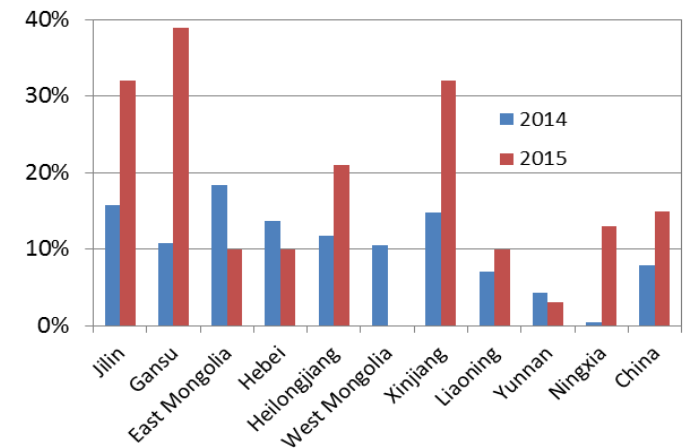
中国可再生能源发电量（亿千瓦时）



1. Subsidy need soars as installed capacity grow, more than twice the collected RE power bill surcharge in 2020



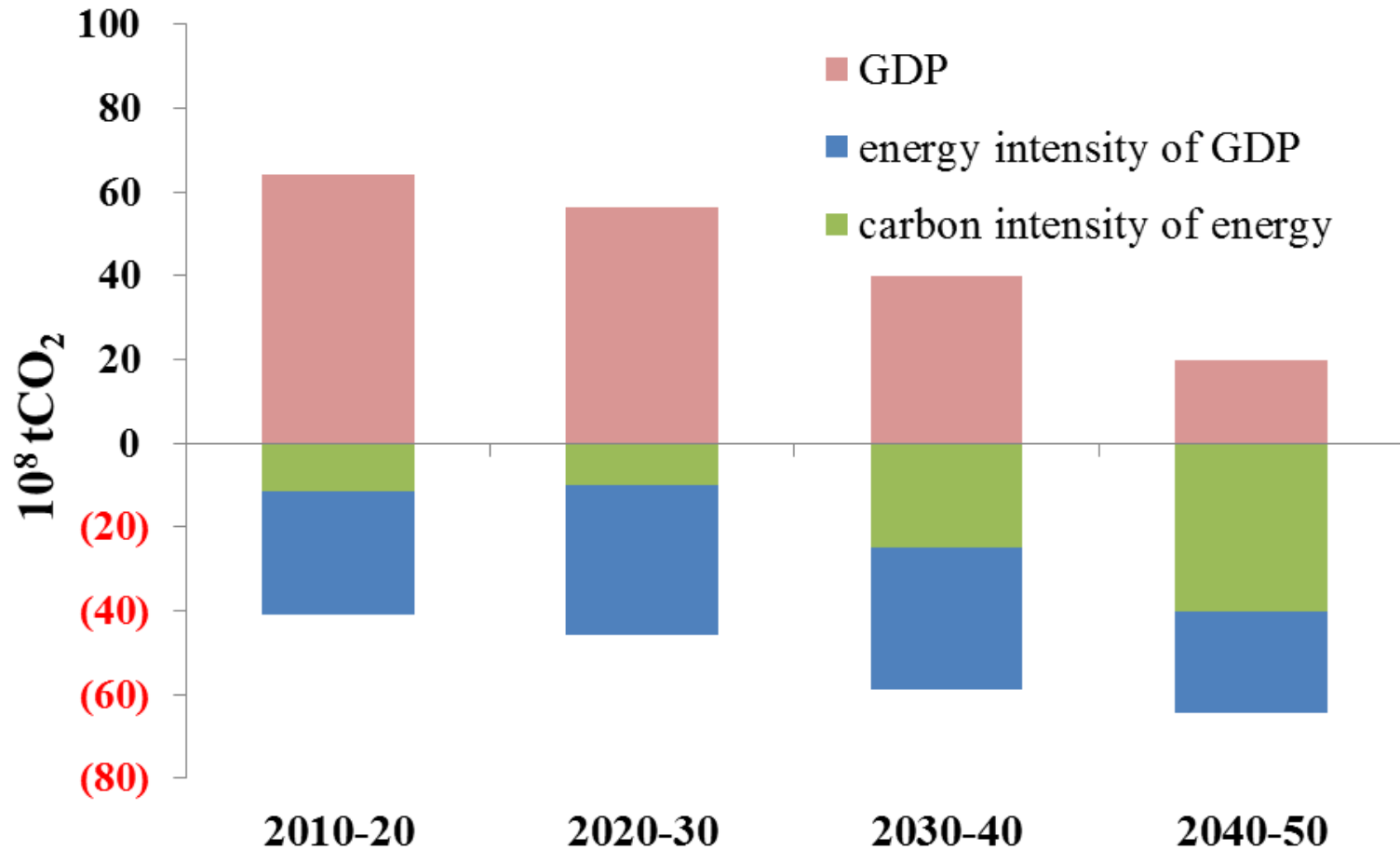
2. High abandon rate of RE (wind for eg)



A black and white photograph of a calm sea with a small structure in the distance. The structure is a small, dark, rectangular tower with a cross-like top, possibly a navigational aid or a small lighthouse. The water is very still, and the horizon is low, with a hazy sky above. The overall mood is serene and quiet.

**China' s deep decarbonization
pathway analysis and its implication
on energy development**

Kaya decomposition of carbon emissions

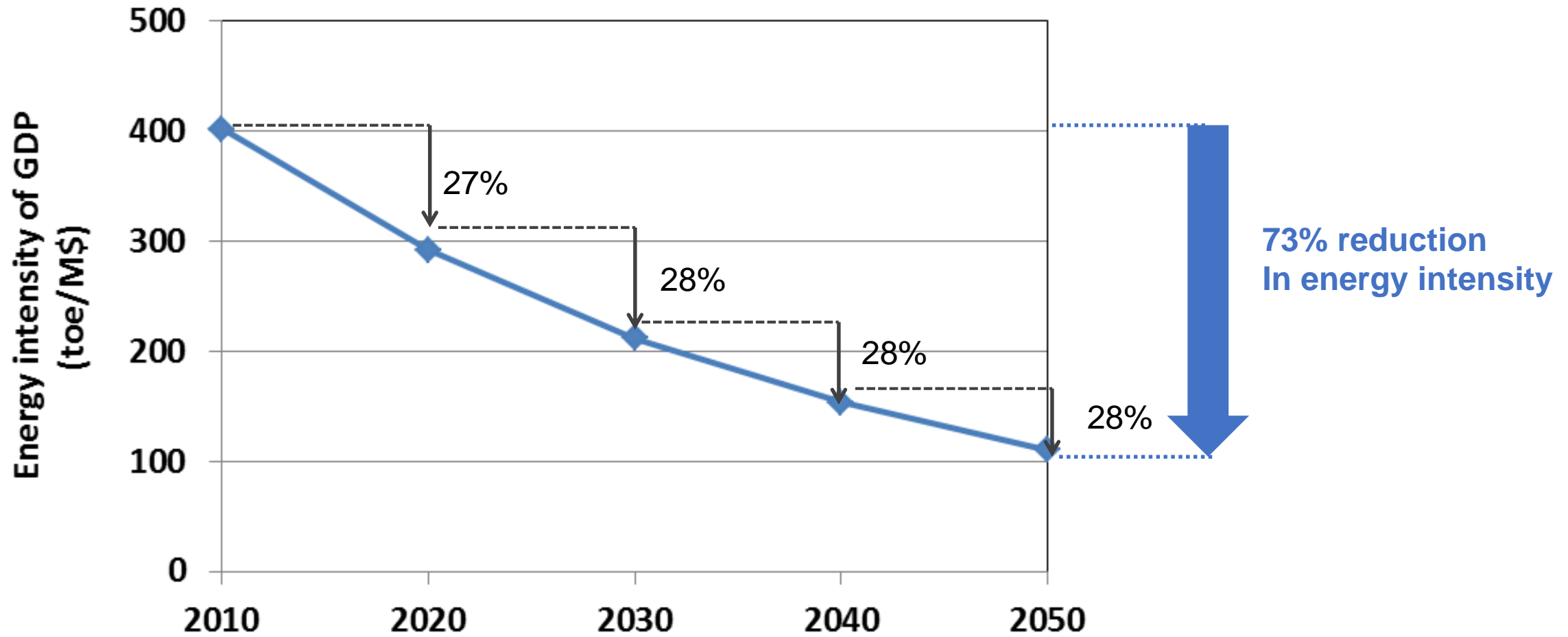


1. Huge potential in emission reduction from energy conservation and RE development

2. Energy conservation still plays a key role in reducing China's carbon emissions

3. The decarbonization of energy system gradually dominates the emissions reduction after 2030 due to the expansion of RE and CCUS application. CCUS's annual net removal of 2100Mt in 2050 (28% emission reduction).

Trends of energy efficiency



Final and primary energy use by fuel type

Figure 7. Final energy use in 2010 and 2050, by fuel type

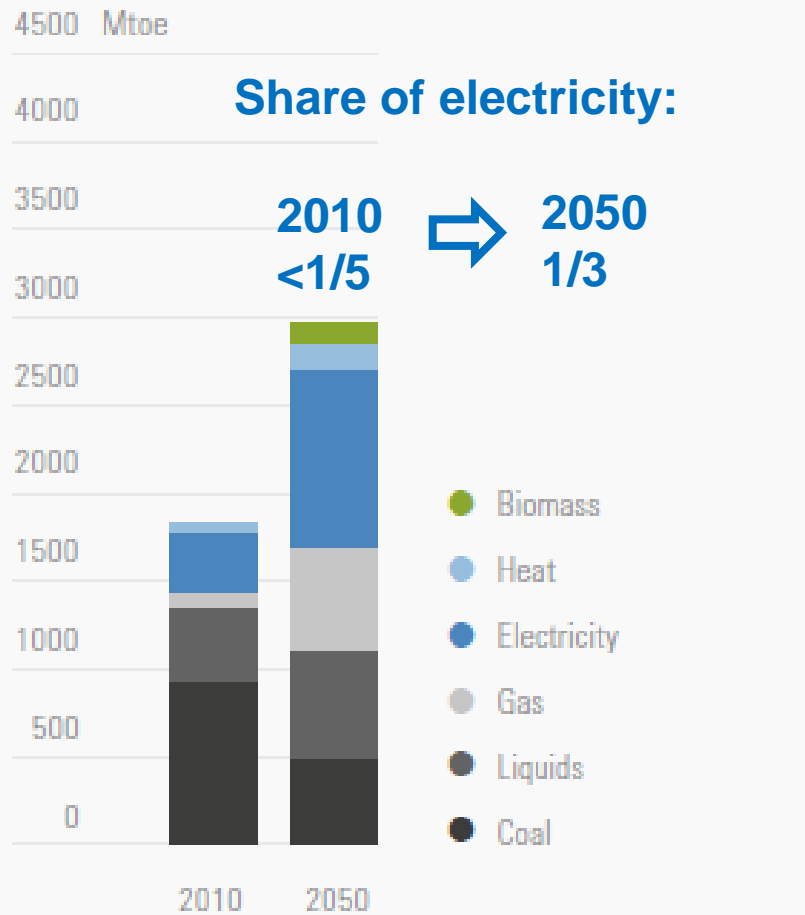
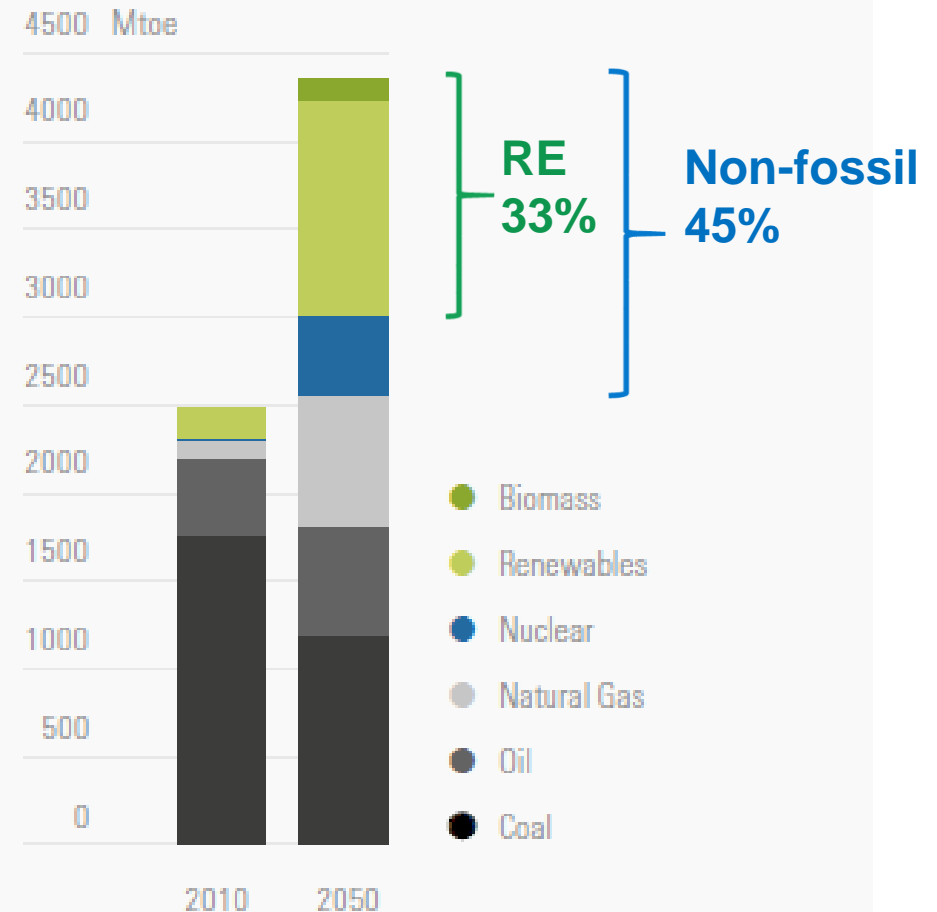
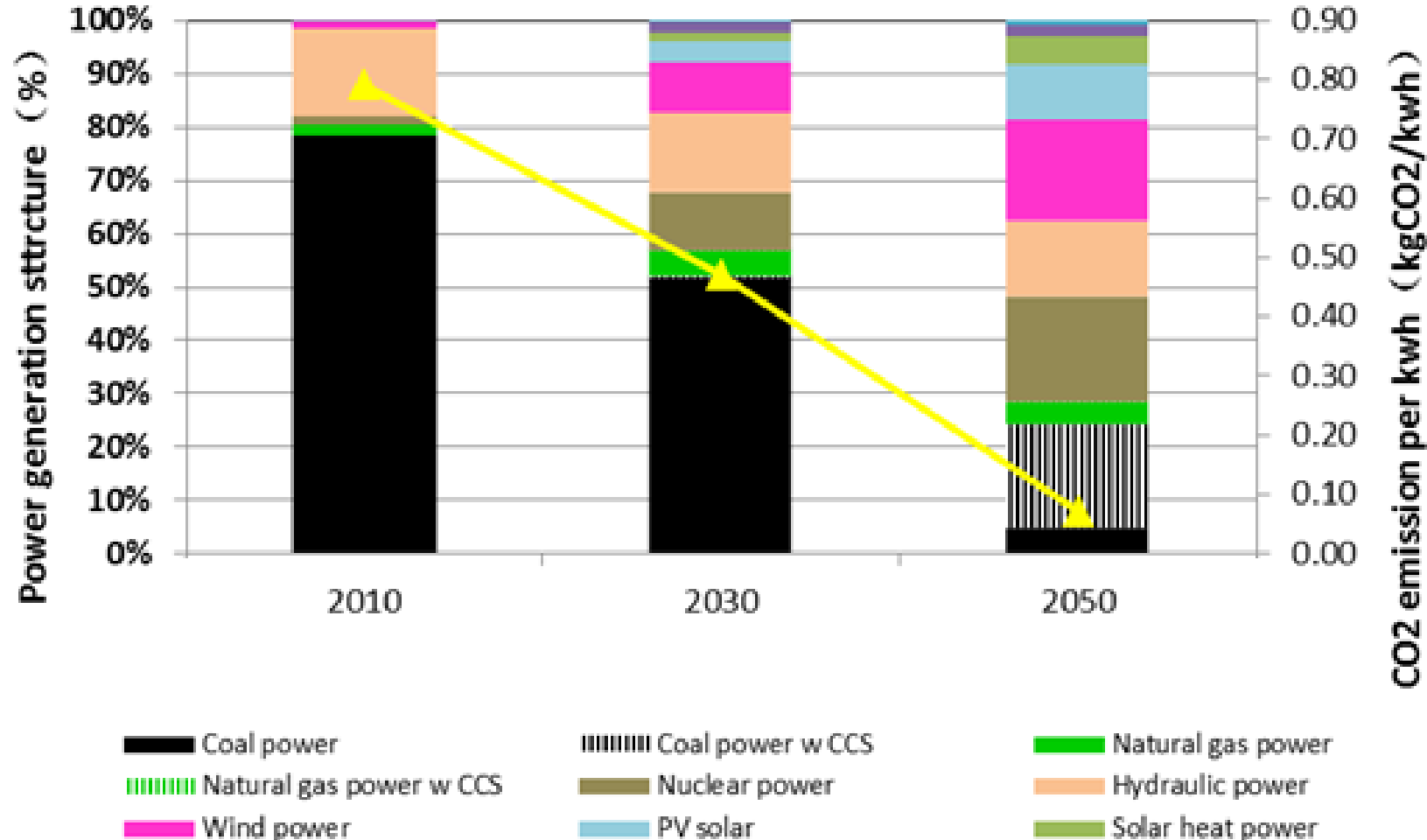


Figure 6. Primary energy use in 2010 and 2050, by fuel type



Decarbonization of Power Sector



91% reduction in electricity emission intensity

Policy Suggestions for energy low carbon transition

Reform energy price system to encourage energy conservation/ low carbon energies

Create an enabling business environment

- Revise RE subsidy/preferential policy schemes by rewarding both construction and operation
- Continue use subsidy but in a gradually decreasing manner to encourage RE development

Encourage innovation

- Innovate the use of information technology to improve the efficiency of facilities
- strengthen R&D in RE technologies (efficiency, cost)

Enhance the integration of RE into power system

- Better grid access and more flexible peak-load infrastructure

Improve energy data availability

- Improve energy use data collection in facility level
- Increase the availability of provincial/city level and improve data access
- Enhance capacity building for qualified human and institutional capacity for deployment of advanced technologies and related infrastructure

谢谢！

