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Meeting China's Climate Goals

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September 21, 2015



China: New developments in 2014-2015

China-U.S. climate agreement (Nov. 2014) and China's INDC (June 2015).

China is shifting to a new normal, with slower, more sustainable growth.

Air quality remains a major problem, affecting human health and the economy.

How to balance?



Human Development



globalchange.mit.edu



Industrial Development & Resource Needs



www.china.org.cn

Local Pollution



www.wikimedia.org



www.flickr.com

China's energy system: A snapshot



4000 . . .

By primary energy type

Coal use by sector



By end-use sector



Role in Asian energy demand



Source: China National Bureau of Statistics, 2013; BP Statistical Review of World Energy, 2014.

Peak coal?

Million tons of coal consumption - China total



Electricity demand growth is slowing



Source: China Energy Statistical Yearbooks.

China Energy Outlook 2014



Objective:

Assess future energy use and CO₂ emissions under new assumptions...

- Emissions trading (carbon pricing)
- New efforts to control coal use
- Non-fossil energy subsidies (FIT)
- Energy price reform
- "New normal" economic growth

Used CECP China-in-Global Energy Model (C-GEM).

Source: Zhang, Karplus et al., 2015.

For this analysis we use the China-in-Global Energy Model: C-GEM

A new model for assessing the domestic and global impact of energy and climate policy in China

- 18 sectors from GTAP database
 & China national input-output and energy balance tables.
- Detailed representation of energy-intensive sectors.
- 19 countries and regions





Key features:

- Detailed representation of the energyintensive sectors (iron & steel, non-ferrous metals, non-metallic minerals, chemicals & rubber, and other ferrous manufactured products).
- China data: combined domestic economic and energy data source for China.

Economic output in the No Policy scenario



The size of China's economy (GDP) is projected to grow around six times in real terms between 2010 and 2050.

Three policy scenarios analyzed in the Outlook

Measures	No Policy	Continued Effort	Accelerated Effort	
Emissions trading svstem (reduce	None	Carbon price required to achieve CI reduction (~3%/vear. \$30/ton	Carbon price rises to achieve Cl reduction (~4%/vear. \$55/ton in	
carbon intensity)		in 2035 and \$73/ton in 2050)	2035 and \$126/ton in 2050).	
Fossil resource tax	None	Crude oil/natural gas: 5% Coal: 8 CNY/ton (~\$1.2/ton)	Crude oil & Nature gas: 8% Coal: 10%	
Feed-in tariff for wind, solar and biomass electricity	None	FIT at current rates (wind: 0.51– 0.61 CNY/KWh, solar: 0.90–1.00 CNY/KWh, biomass: 0.75 CNY/KWh)	FIT at current rates, scaling costs are lower than <i>Continued Effort</i> assumption	
Hydro resource development	Only economically viable hydro resources are deployed with no policy constraint.	Achieve the existing target of 350 GW in 2020 and slowly increase to its economic potential of 400 GW by 2050.	Same as the Continued Effort assumption.	
Nuclear power development policy	No targets or measures to promote nuclear energy development.	 40 GW in 2015 and 58 GW in 2020. Assumes site availability of 160 GW. 	 Same as the Continued Effort assumption. Assumes site availability of 400 GW. 	

Continued Effort and **Accelerated Effort** scenarios represent alternative levels of policy stringency.

The Accelerated Effort scenario shifts away from coal toward cleaner low carbon energy sources



CO₂ emissions



Peak Years and Amounts

	No Policy		Current Policy		Accelerated Policy	
Quantity	Peak Year	Amount	Peak Year	Amount	Peak Year	Amount
Coal consumption	>2050	>189 EJ	2030	97.8 EJ	2020	84.2 EJ
Energy-related CO ₂ emissions	>2050	>21 bmt	2040	12 bmt	2030	10.1 bmt

Major uncertainties

- Economic growth slower growth will lead to an earlier peak.
- Cost and availability of low carbon technology.
- Policy decision to develop coal-to-gas and coal-to-liquids technology.
- Natural gas price depends on regional integration of natural gas markets.
- Energy intensity of rising household consumption.



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Thank you 谢谢!