China's climate policy in the context of its energy transition

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IEA

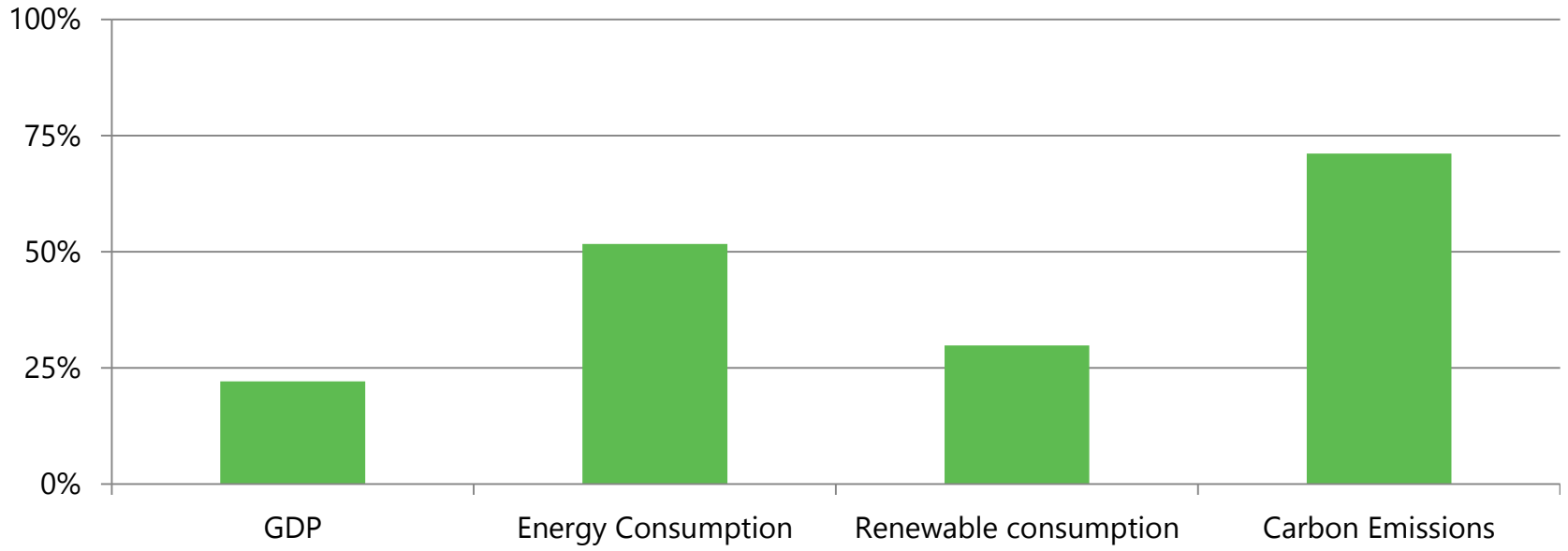
When did China became No. 1 in the world?

Size of the economy (PPP)	2013
Energy consumption	2009
Carbon dioxide emissions	2006
Solar power capacity	2016
Trading nation	2012
Manufacturer	2011
Number of internet users	2008
Largest middle class	2015
Number of billionaires	2015
Fast supercomputer	2010
Patent filing	2011

Note: World Bank - size of the economy, IEA – energy, CO_2 & solar capacity, and G. Allison (2017) for the remaining indicators.

But, China could also be measured on a per capita basis

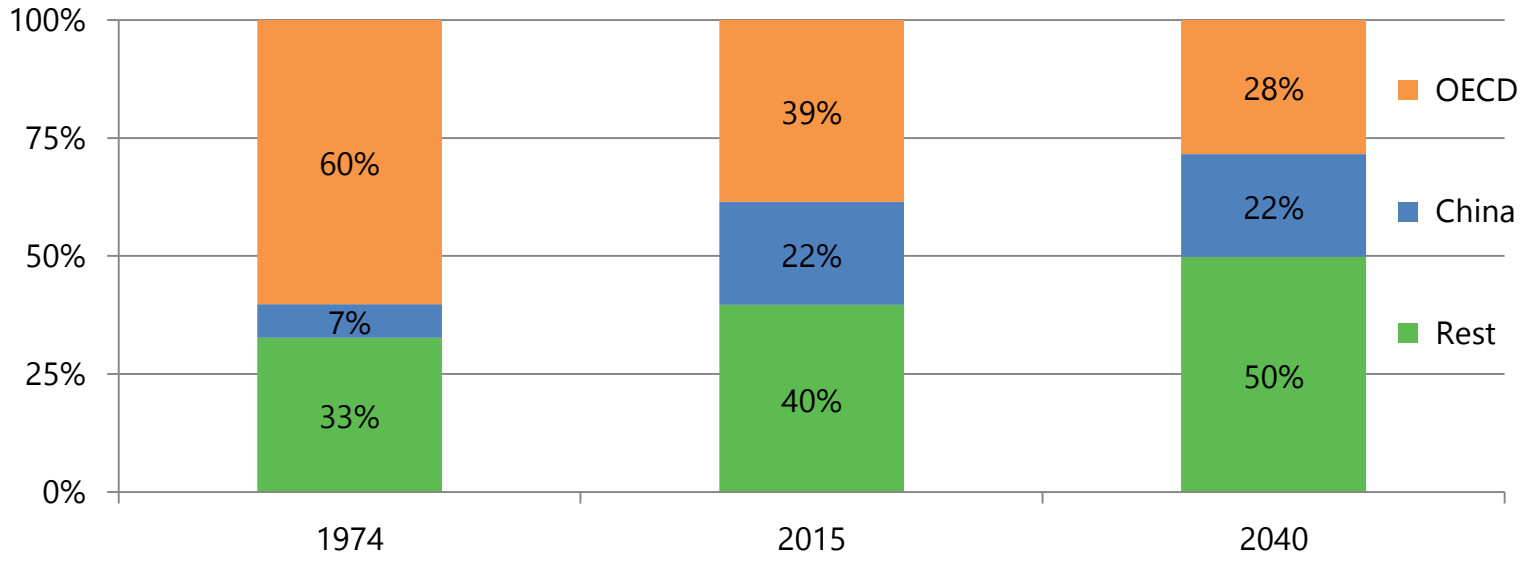
China as a percentage of OECD average, per capita basis



While China possess characteristics of both developed and developing countries, how to approach China for international cooperation is an important issue in the years to come.

Shifting global energy landscape

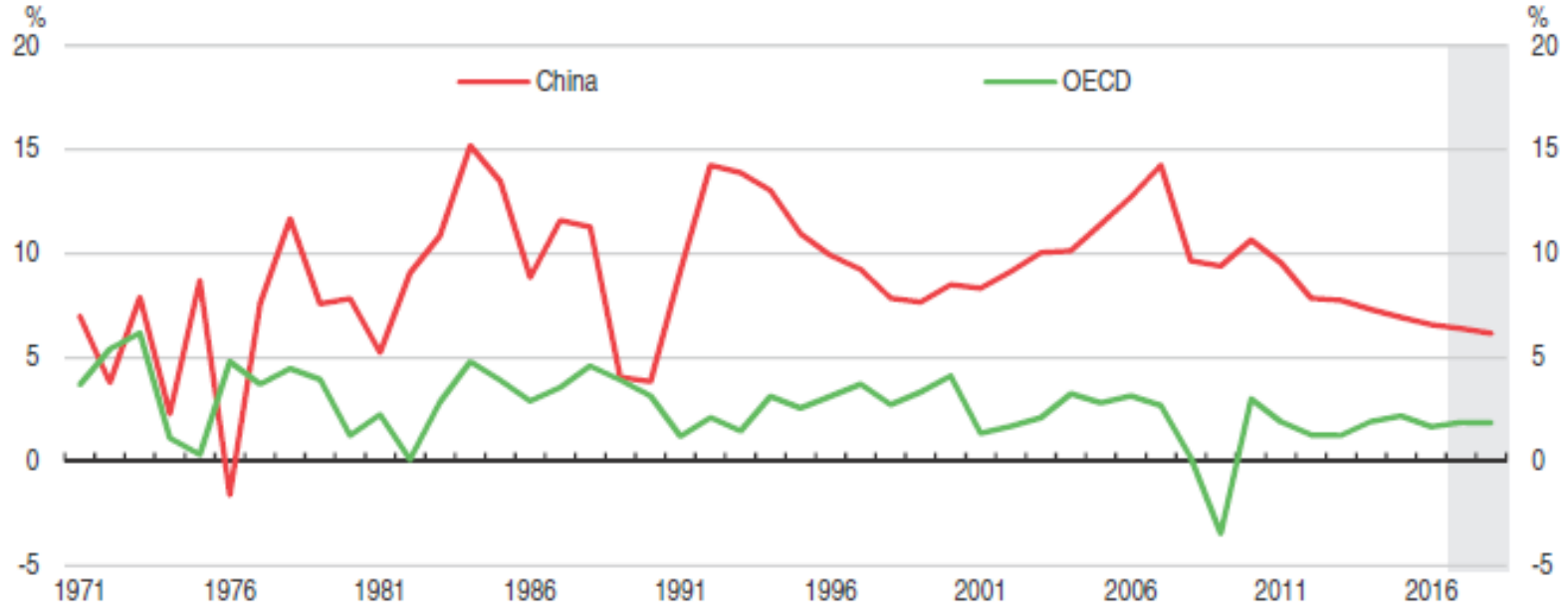
Share of global energy consumption



The centre of gravity of global energy demand is switching decisively to the emerging economies, particularly China.

Chinese economy has entered “new normal”

Real economic growth: China vs. OECD

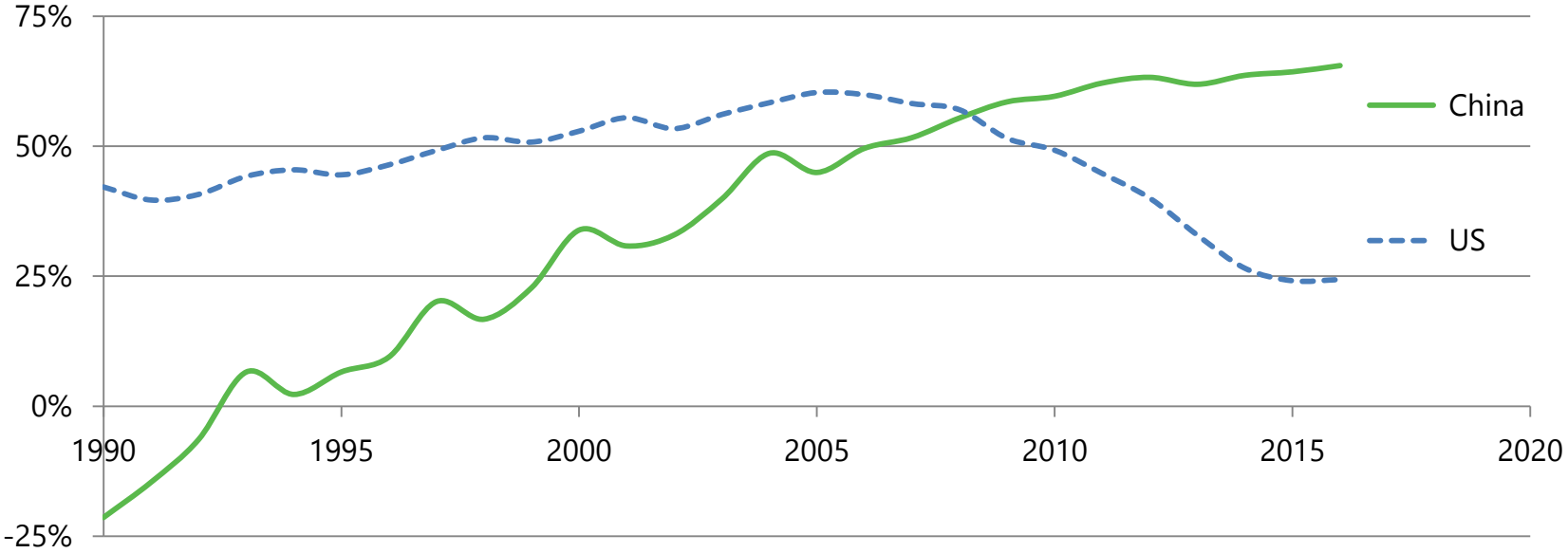


Source: OECD Economics Surveys: China 2017

The Chinese economy is moving away from a heavy industry-, investment- and exports-oriented old model to a new one that largely to be defined.

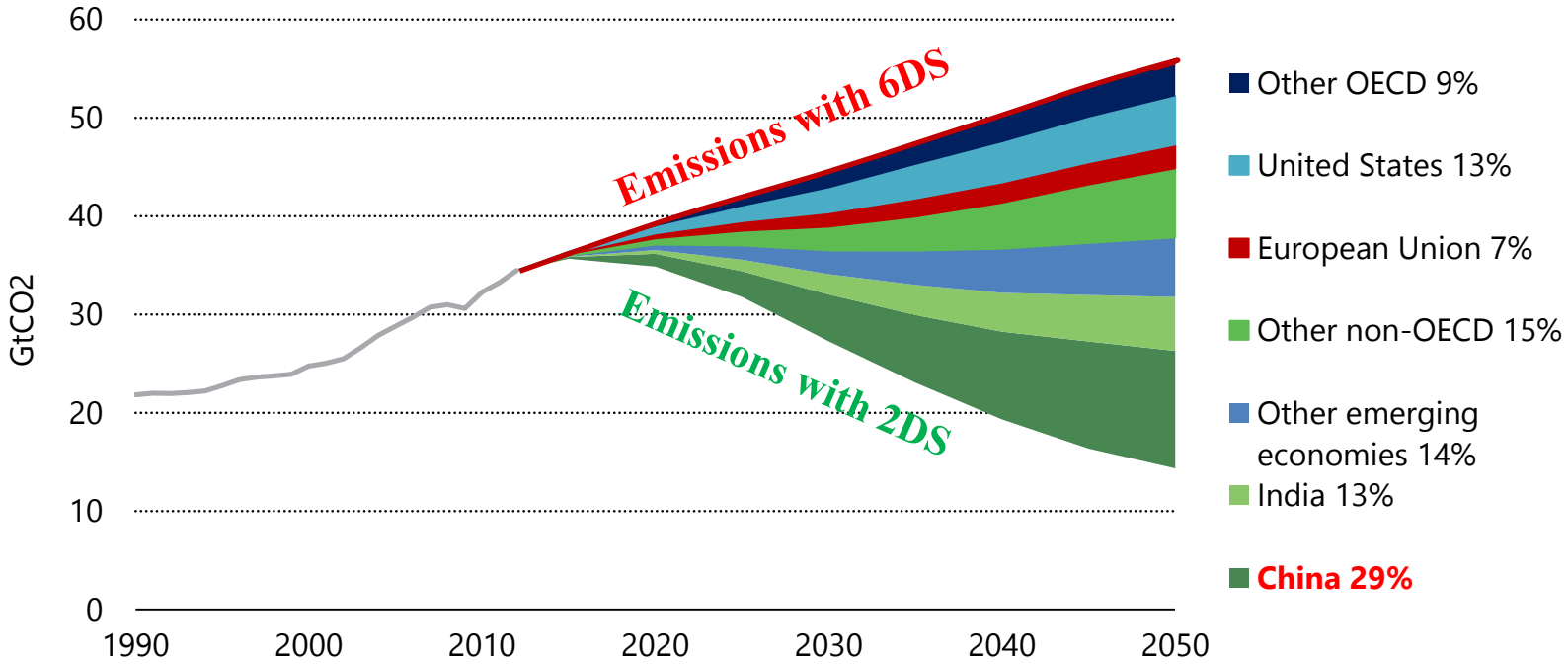
Dynamics of energy security concern

Change of oil dependency rate: China vs. United States



Shale gas revolution in the United States has profound implications for China's perception of energy security and beyond.

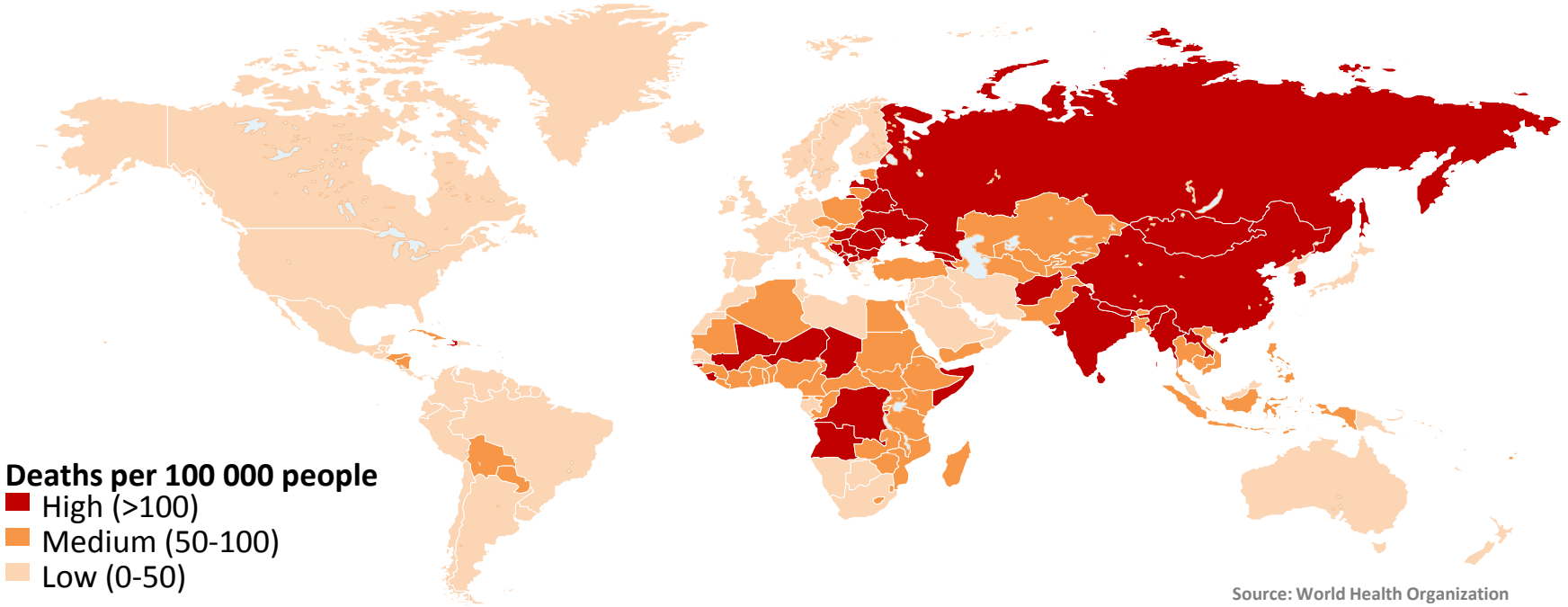
Climate change: an international expectation perspective



About 70% of the decarbonisation actions need to take place in non-OECD countries especially China.

Air pollution is a universal problem, especially in emerging economies

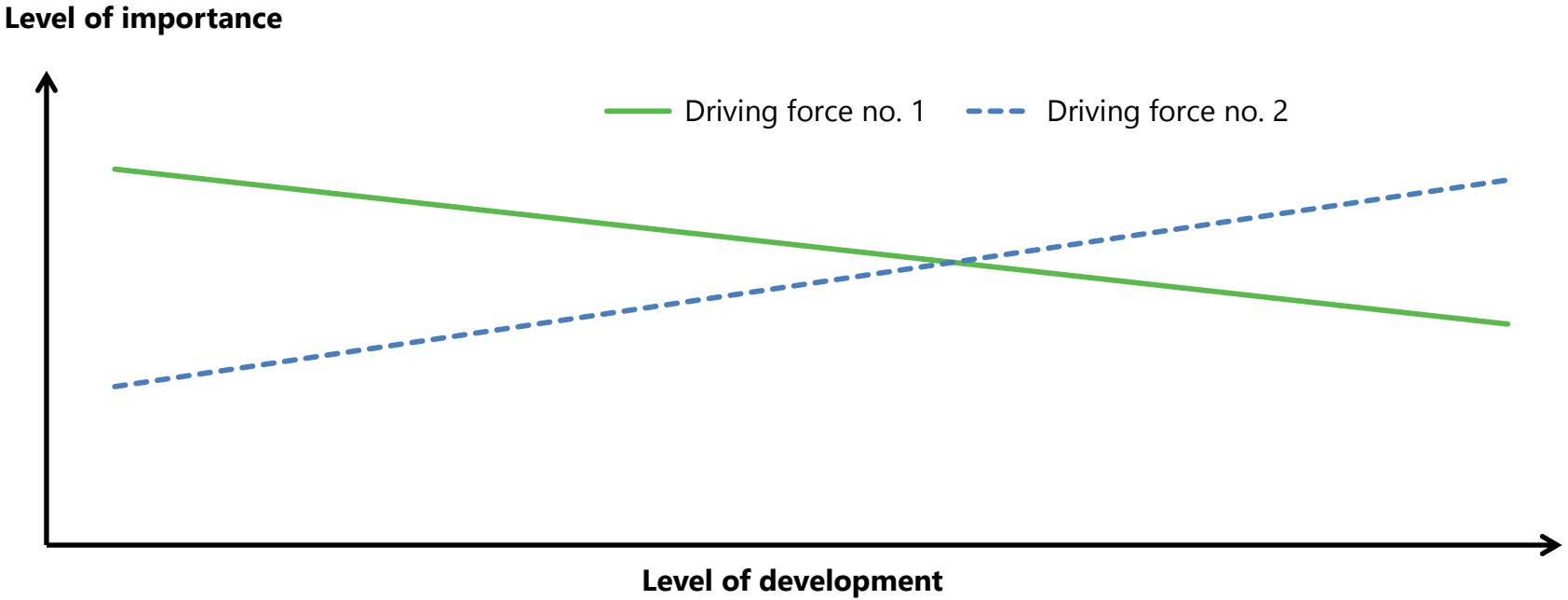
Premature deaths due to air pollution



Source: World Health Organization

6.5 million premature deaths every year are caused by pollution from power plants, factories, cars and trucks globally. Air pollution related health risks are largest in cities around the world.

Policy drivers are important, so do their weighting factors

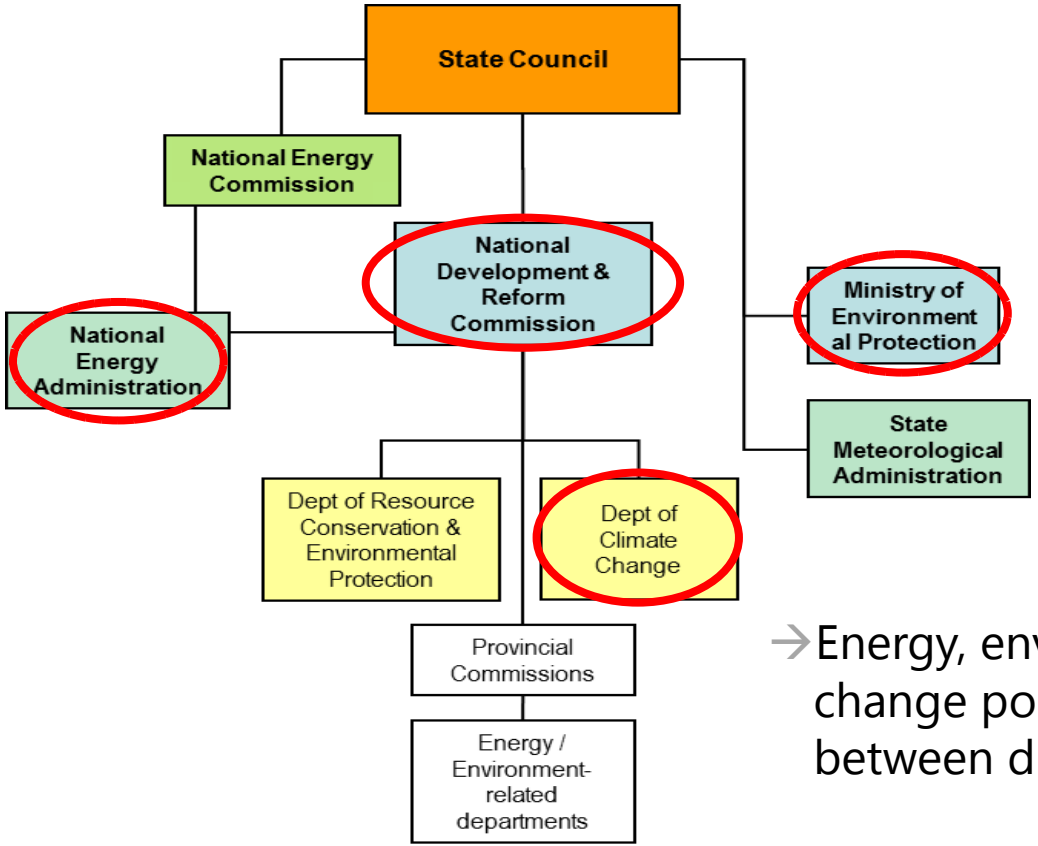


Other than climate change, there are additional policy drivers underlying China's energy transition, evolvement of individual driver's weighting factor is important.

Emissions trading vs. carbon tax

Criteria	Emissions trading	Carbon tax	China's national circumstance
Emissions target setting	?	?	Emissions cap around 2030 without a specific level
Opportunity for gaming	?	?	Major energy statistical revisions occurred several times in the past decades
Social resistance	?	?	China has a strong central government
Clarity of price level	?	?	
Capacity	?	?	Policy implementation is a relatively weak aspect compared with planning in China
Institutional arrangement	?	?	Emissions trading is the responsibility of NDRC, while carbon tax needs to be designed by Ministry of Finance and collected by State Administration of Taxation

A fragmented institutional governance on climate change and environment

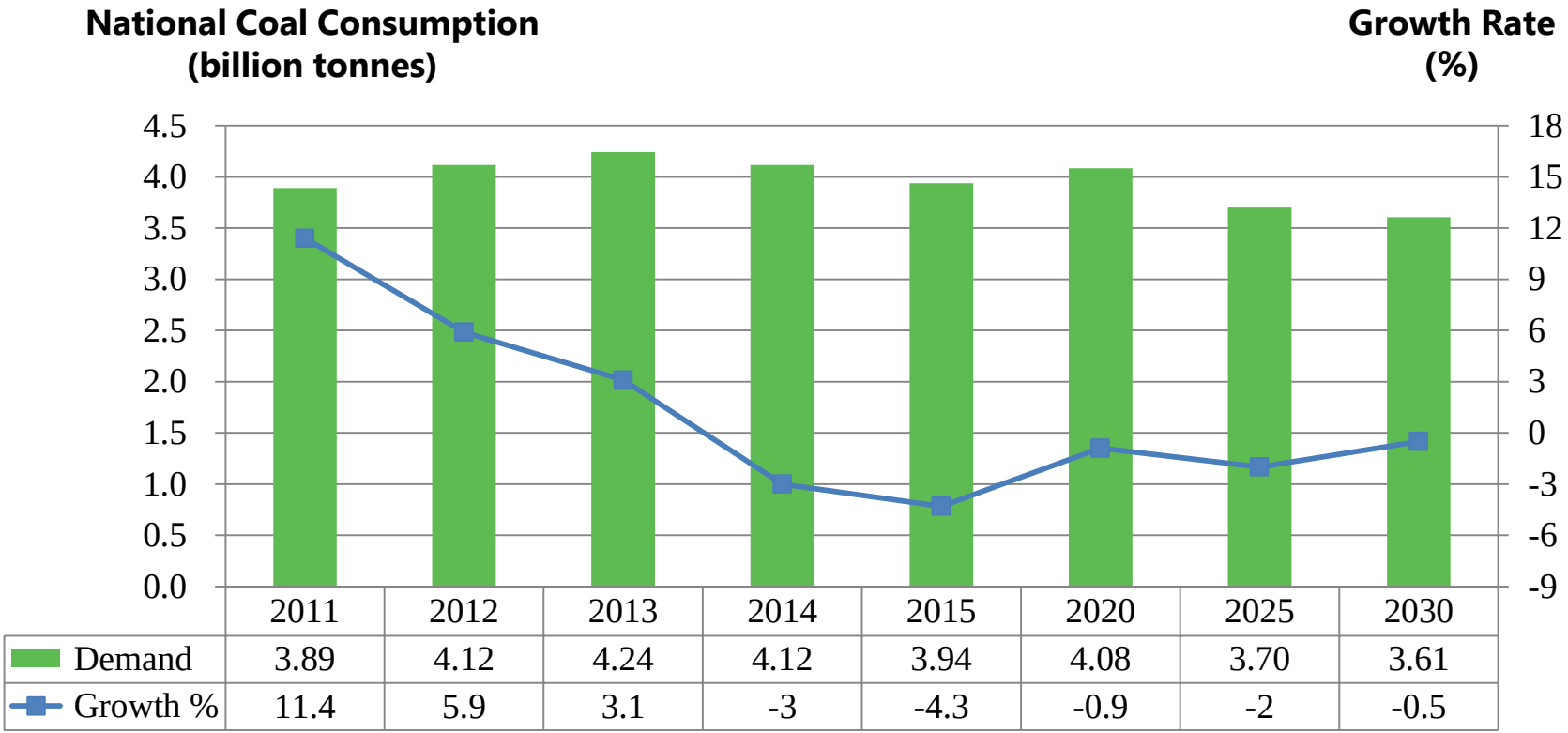


→Energy, environment and climate change portfolios are split between different ministries.

Implications of non-climate driven policy actions

Policy instrument	SO_2 (mg/m^3)		NOx (mg/m^3)		PM (mg/m^3)		Efficiency (gce/kWh)	
	Existing	New	Existing	New	Existing	New	Existing	New
Emission standard of air pollutants for thermal power plants (2011)	200-400	100	200	100	30	30	N/A	N/A
Upgrading and retrofitting action plan for emissions reduction and energy conservation of coal-fired power plants (2014)	N/A	35	N/A	50	N/A	10	<310 (39.6%)	<300 (40.9%)
Comprehensive implementation of the 2014 action plan (2015)	35		50		10		<310 (39.6%)	<300 (40.9%)
Regulation in EU	200-400	150-400	200-450	150-400	20-30	10-20		
Regulation in US	160-640	160	117-640	117	23	23		
Regulation in India	200-600	100	300-600	100	50-100	30		

The future of coal in China is key to emissions trading and beyond



	2011	2012	2013	2014	2015	2020	2025	2030
Demand	3.89	4.12	4.24	4.12	3.94	4.08	3.70	3.61
Growth %	11.4	5.9	3.1	-3	-4.3	-0.9	-2	-0.5

Source: CERS (2016) China Energy Outlook 2030.

A significant strengthening of climate actions before COP21

- More than 25 energy- and environment-related laws have been passed since 1980s.
- Environmental protection and climate change have become a major concern during the 11th FYP (2005-2010).
- 2014: very intense in terms of policy formulation for both climate and energy.

Year	Regulation	Agency
2007	National Climate Change Program	State Council
2011	12th Five-Year Plan (2011-2015)	NDRC
2014	Plan on Upgrading and Reforming Energy Saving and Emission Reduction of Coal-fired Electricity Generation (2014-2020)	NDRC, MEP, NEA
2014	Energy development strategic action plan (2014-2020)	State Council
2014	National Plan on Climate Change (2014-2020)	NDRC

China's pilot emissions trading in 5 cities + 2 provinces

	Beijing	Chongqing	Guangdong	Hubei	Shanghai	Shenzhen	Tianjin
Reduction Goal (intensity-based)	18% over 2010 levels	17 % over 201 0 levels, with a further goal of increasing	19% over 2010 levels	17% over 201 0 levels	19% over 201 0 levels	21% over 201 0 levels	19 % over 2010 levels, with a further goal of less than 1. 69 Ton/CO_2
Trading period	2013 - 2015	2013 - 2015	2013 - 2020	2013 - 2015	2013 - 2015	2013 - 2015	2013 - 2015
Greenhouse Gases Covered	CO_2 Direct (electricity generation and heating) and indirect (manufacturing, public buildings)	CO_2 (direct and indirect), CH_4, N_20, HFCs, PFCs, SF_6	CO_2 (direct and indirect)	CO_2 (direct and indirect)	CO_2 (direct and indirect)	CO_2 (direct and indirect)	CO_2 (direct and indirect)
Threshold	+ 5,000 tonnes CO_2 per year as the average from 2009 to 2011	+20,000 tonnes CO_2 per year from 2010 to 2014	+ 20,000 tonnes CO_2 per year from 2010 to 2012	+ 60,000 tonnes coal consumption for major sectors in 2010 or 2011.	+ 20,000 tonnes CO_2 per year for industrial sectors in 2010 or 2011 Above 10,000 tonnes per year for other sectors	+ 3,000 tonnes CO_2 per year and any building larger than +20,000 sqm	+ 20,000 tonnes CO_2 per year in any year since 2009.
Allowances Issued for 2013-2014	Not released	About 125 Mt CO_2, 4.1 3% annual reduction	388 Mt CO_2/y ear for 201 4 (350M allowances + 28M reserv e)	324 Mt CO_2 for 201 4	About 150 Mt CO_2 for 2013 , may be	About 100 Mt CO_2 in total for 201 3 - 201 5	Not released
Cap coverage	40% of the city 's total emissions: 543 companies (600 entities are expected) from heat supply , power generation, cement, petrochemical, car manufacturing, and public buildings	40% of Total Emissions covered: 242 companies, 6 sectors: electro-plated aluminum, metal alloy, calcium carbide, caustic soda, cement, steel & iron	55% of the province's total energy consumption: 21 1 firms are listed (power, cement, steel, ceramics, petrochemical, non-ferrous, plastics, paper)	35% of the province's total carbon emissions. 138 entities are listed (steel, chemical, cement, automobile manufacturing, power generation, non-ferrous metals, glass, paper and etc.)	57 % of the city 's total emissions: 190 entities are listed (steel, petrochemical, chemical, non-ferrous metal, power, building materials, textile, paper, rubber and chemical fiber industry)	38% of the city 's total emissions: 832 entities listed from 26 sectors which cover various forms of industry in addition to power, gas and water supply ; Participation open to any financial institution. 197 public use buildings	60% of the city 's total emissions: 114 entities Iron and steel, chemicals, electricity , heat, petrochemical, oil and gas mining, civil construction
Other sectors	Transport, Airport and banks	-	Transportation, textiles, and buildings	-	Airlines, ports, airports, railways, large commercial shops, hotels and banks	Public transport	-
Baseline years	2009 , 2010, 201 1	From 2008 to 201 2	2011 , 201 2	2010, 2011	2009 , 2010, 2011	2009 , 2010, 2011	From 2009 to 2013

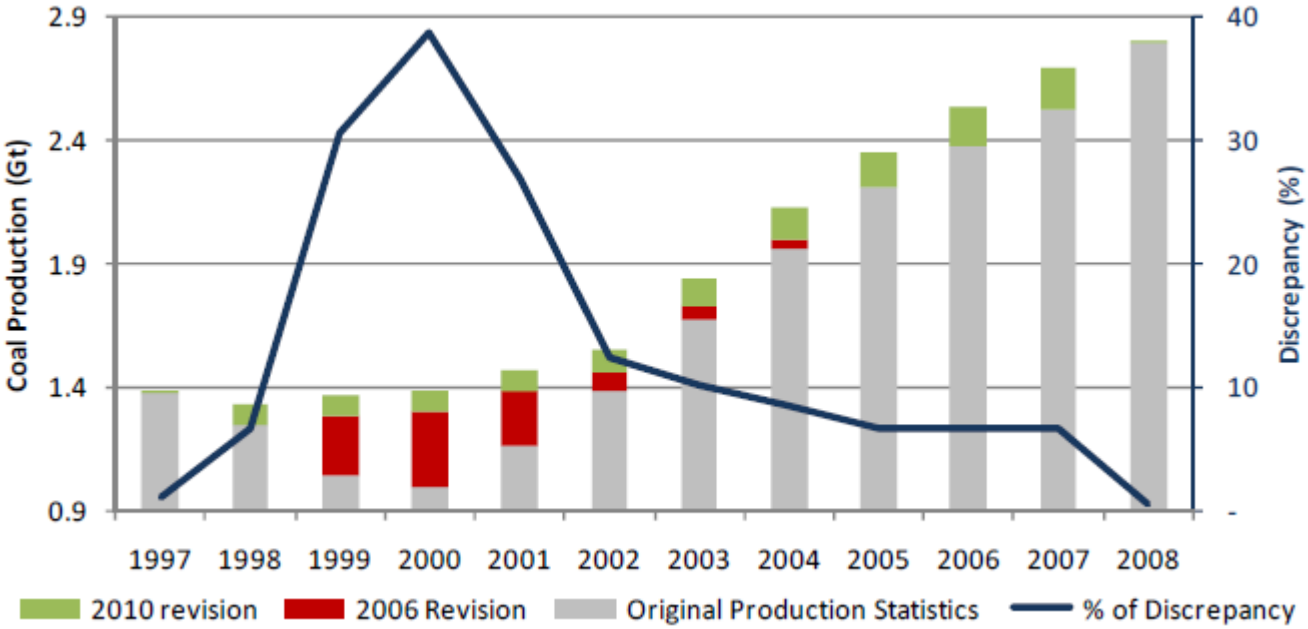
Source: IETA (2016)

National ETS in China

- Coverage
  1. Power (generation, heat-power cogeneration, and grid operators);
  2. Petrochemicals (crude oil refining and processing, ethylene);
  3. Chemicals (methanol, ammonia, carbide);
  4. Iron & Steel;
  5. Non-ferrous metals (copper smelting, electrolytic aluminium);
  6. Building production and materials (clinker, plate glass);
  7. Pulp & Paper
  8. Aviation (civil commercial, cargo, and airports)
- Threshold: enterprise with annual energy consumption greater than 10 ktce in any year between 2013 and 2015.
- The 7 ETS pilots are expected to opt-in to the national ETS starting in 2017.

Monitoring, reporting and verification (MRV) : Achilles heel?

Statistical revisions of Chinese coal output in 2006 & 2010



Statistical discrepancy of coal output in China once reached as high as 39% in 2000.

Closing remarks

- **Energy transition with Chinese characteristics?**
- **A broader approach to incorporate various policy drivers**
- **Is a reality check necessary to move the agenda forward?**
- **Emissions trading vs. emissions tax**
- **MRV is the foundation**