Low-Carbon Development in China:
Policy Implementation and Institutional Innovation

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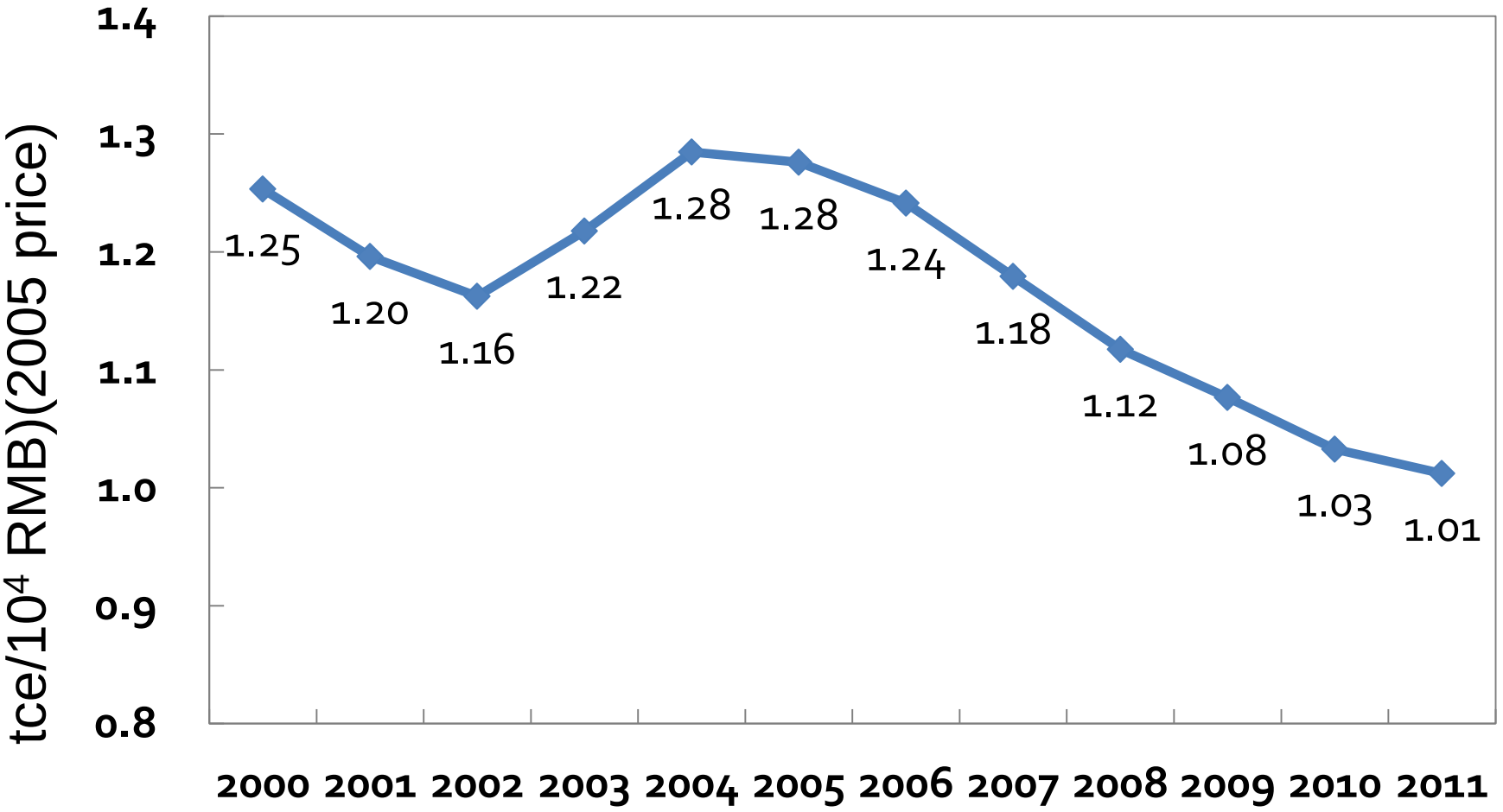
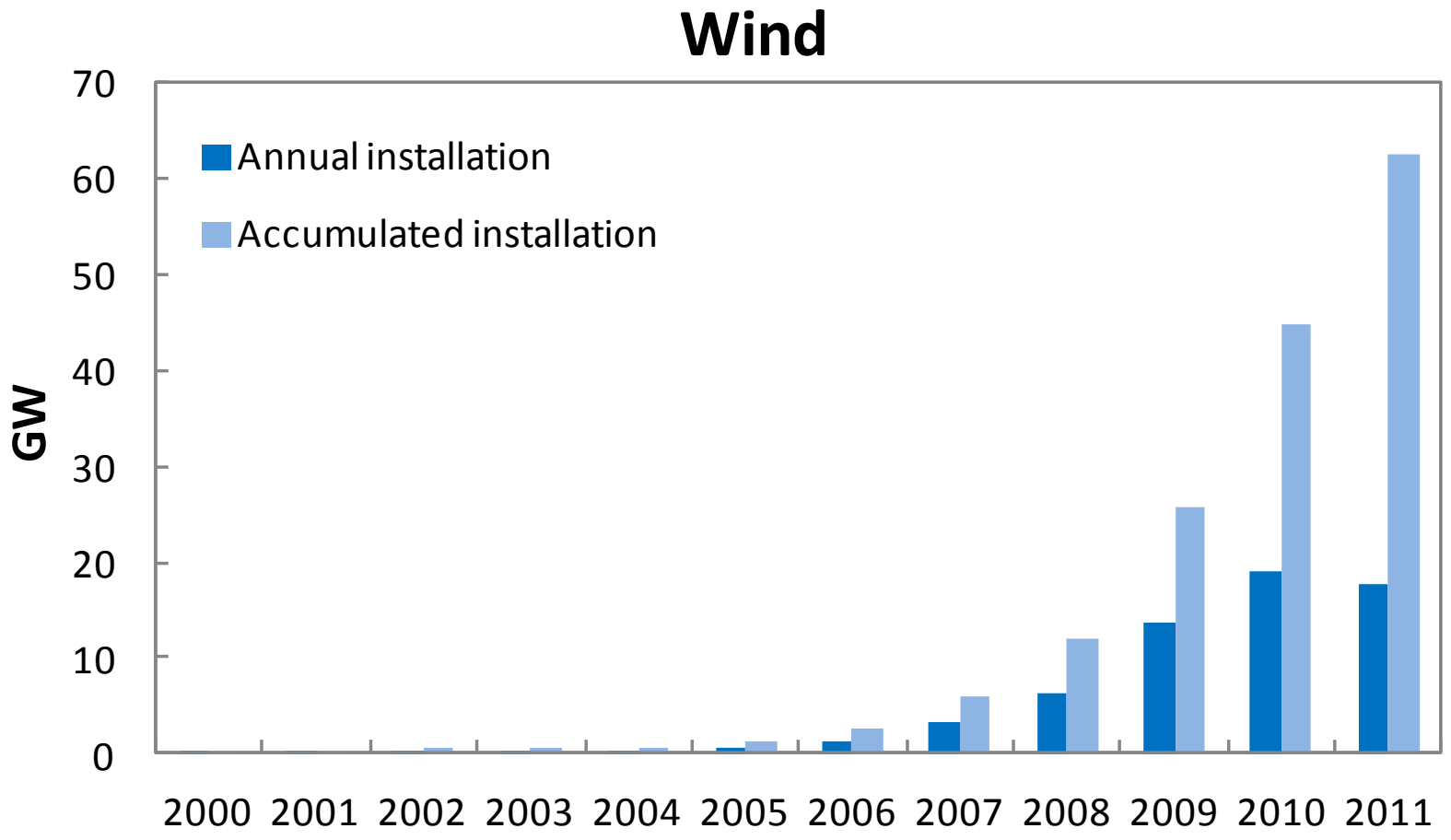
China's low carbon development puzzles

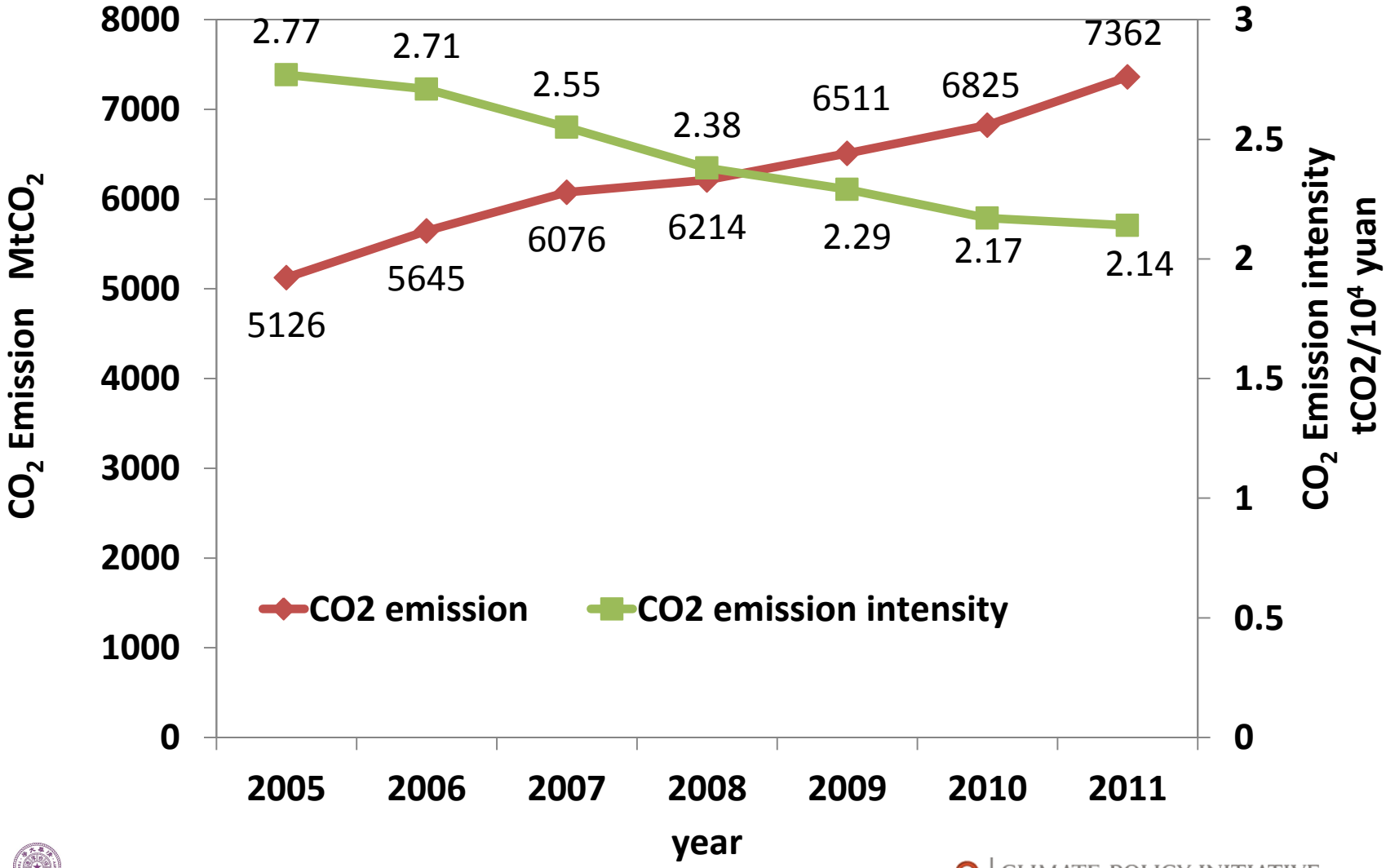
Puzzle #1: Why a sharp reversal in energy and carbon intensity since 2005?



Puzzle #2: Why renewable energy targets have always been overachieved?



Puzzle #3: What drives the x-shape curve:
Emission increase vs. intensity decrease



Our answer:

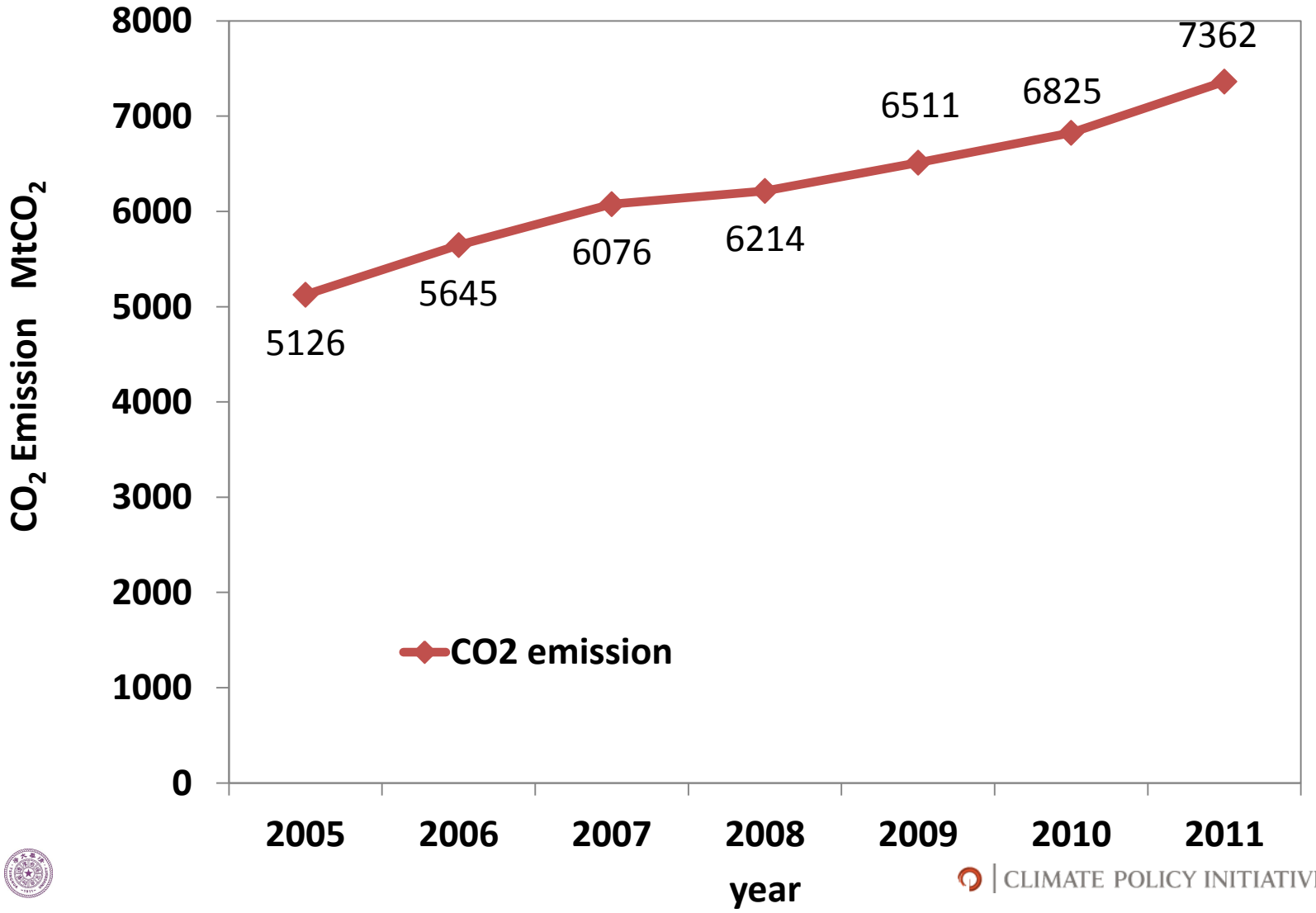
Economy +

Policy +

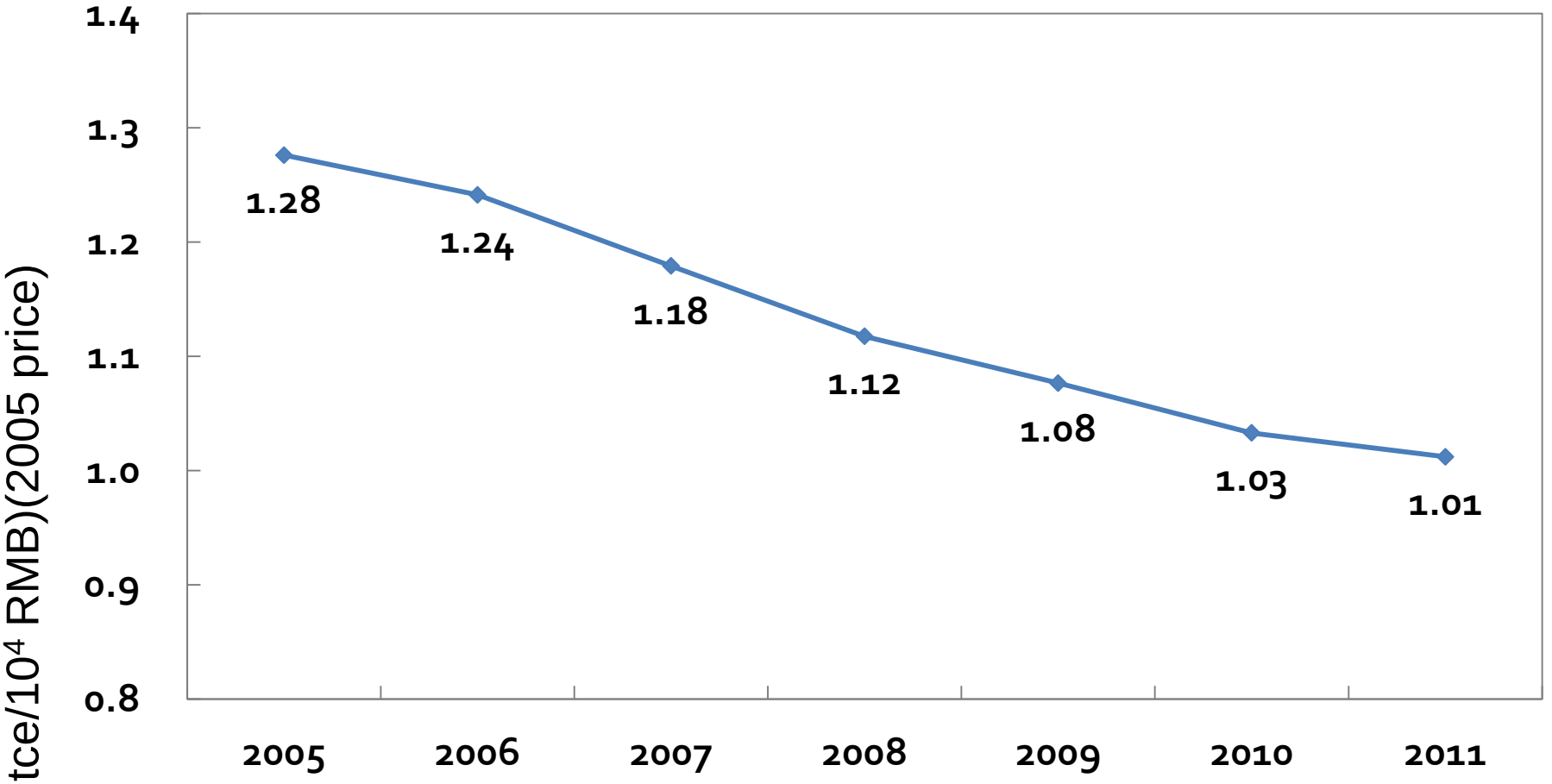
Implementation +

Funding

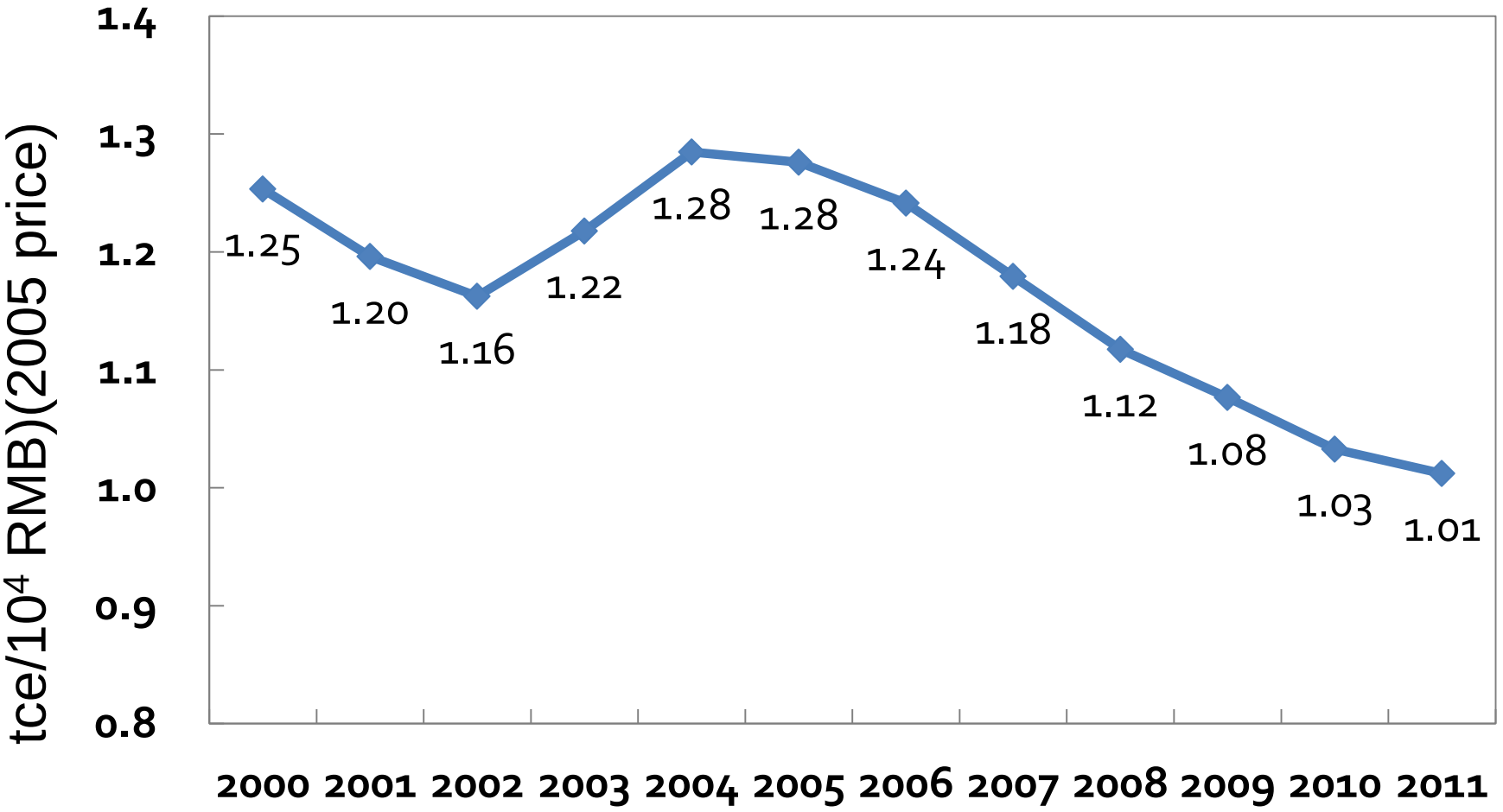
Emission increase is driven by the economy



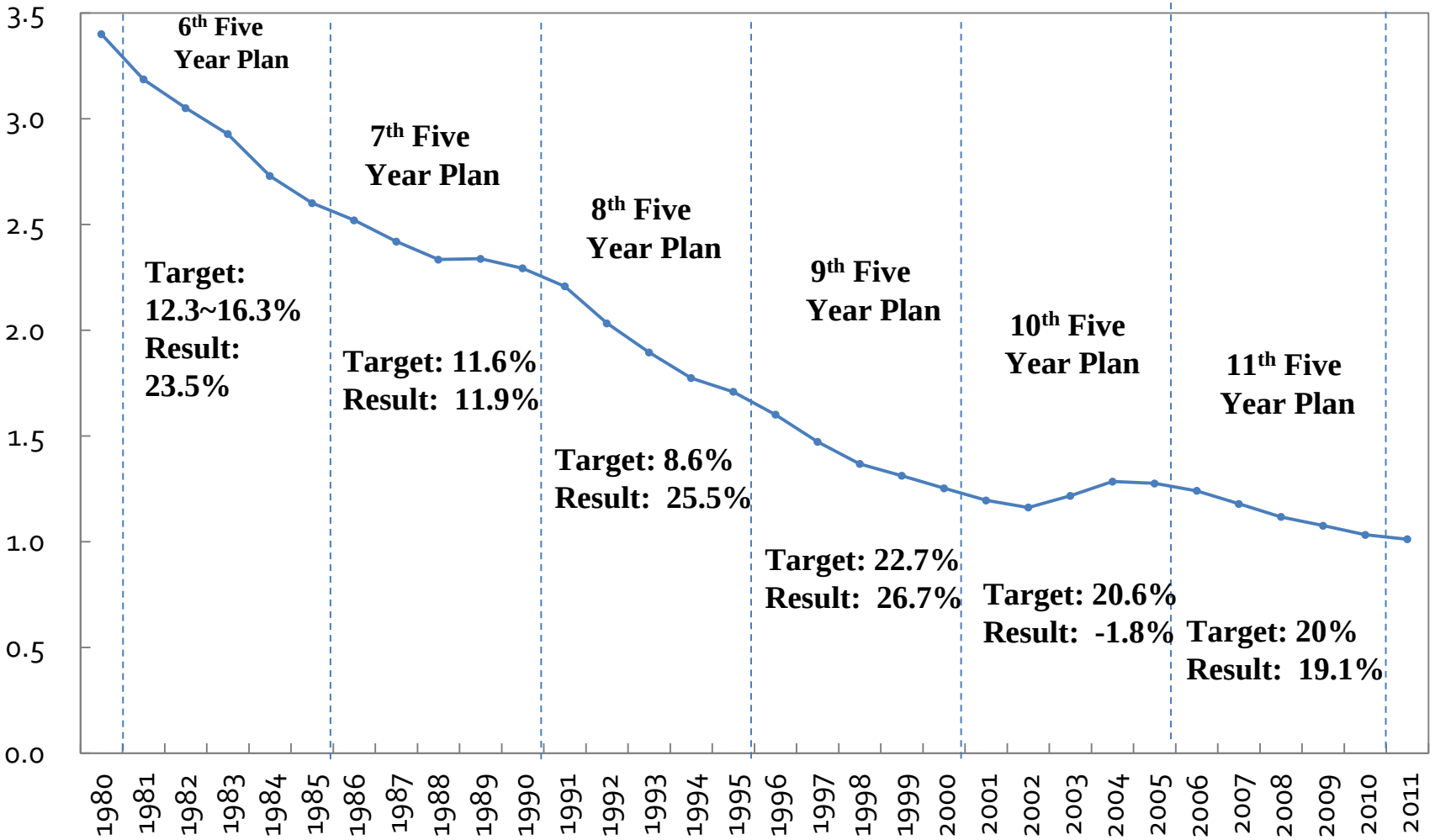
The decreasing trend of energy and carbon intensity was explained as effect of low carbon policies



The increase of energy and carbon intensity during the 10th FYP was considered as the effect of economy

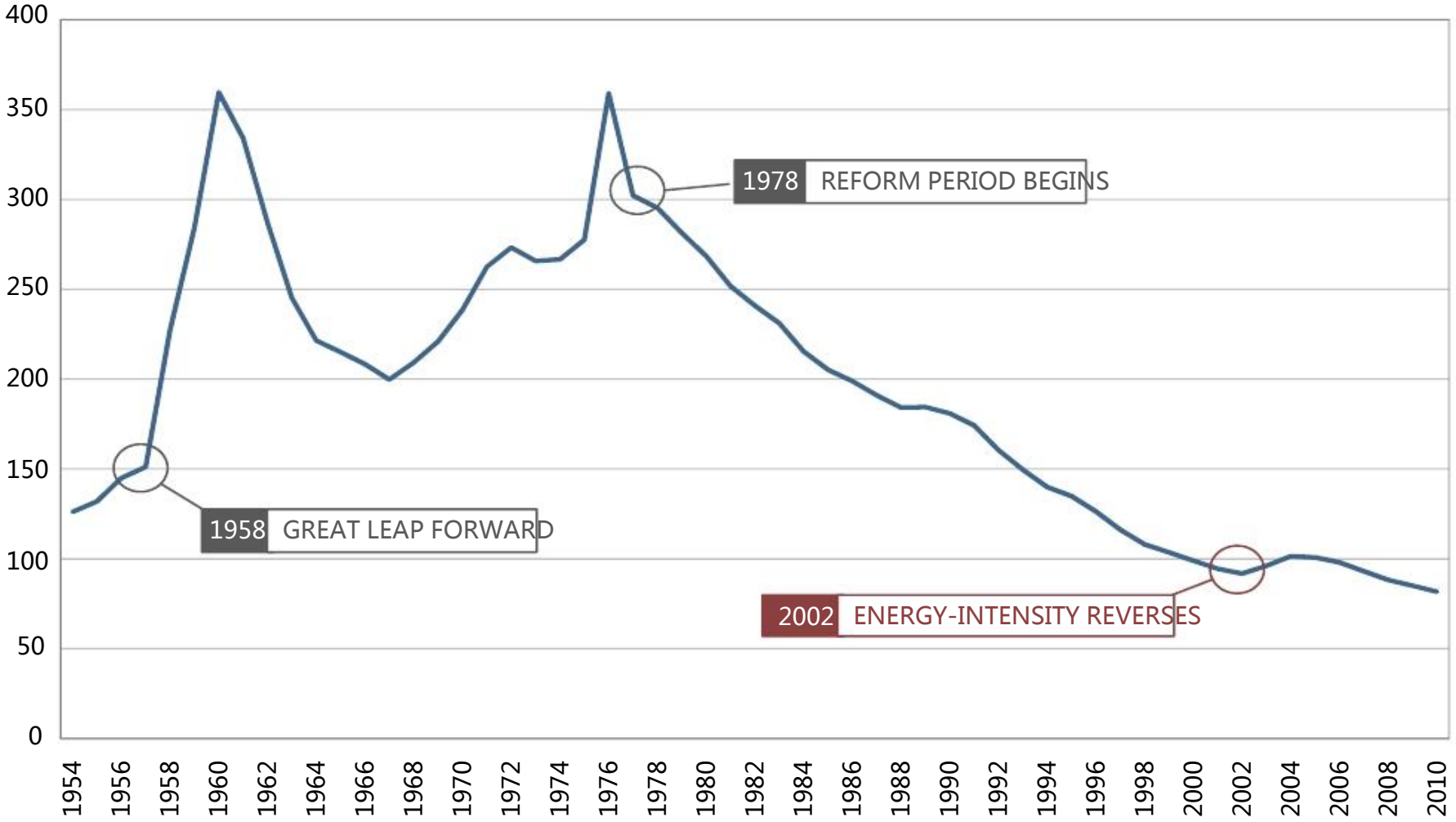


Energy Intensity (2000-2011) (tce/10^4 RMB)(2005 price)



Energy Intensity of China's Growth

Tons of coal equivalent per million real RMB



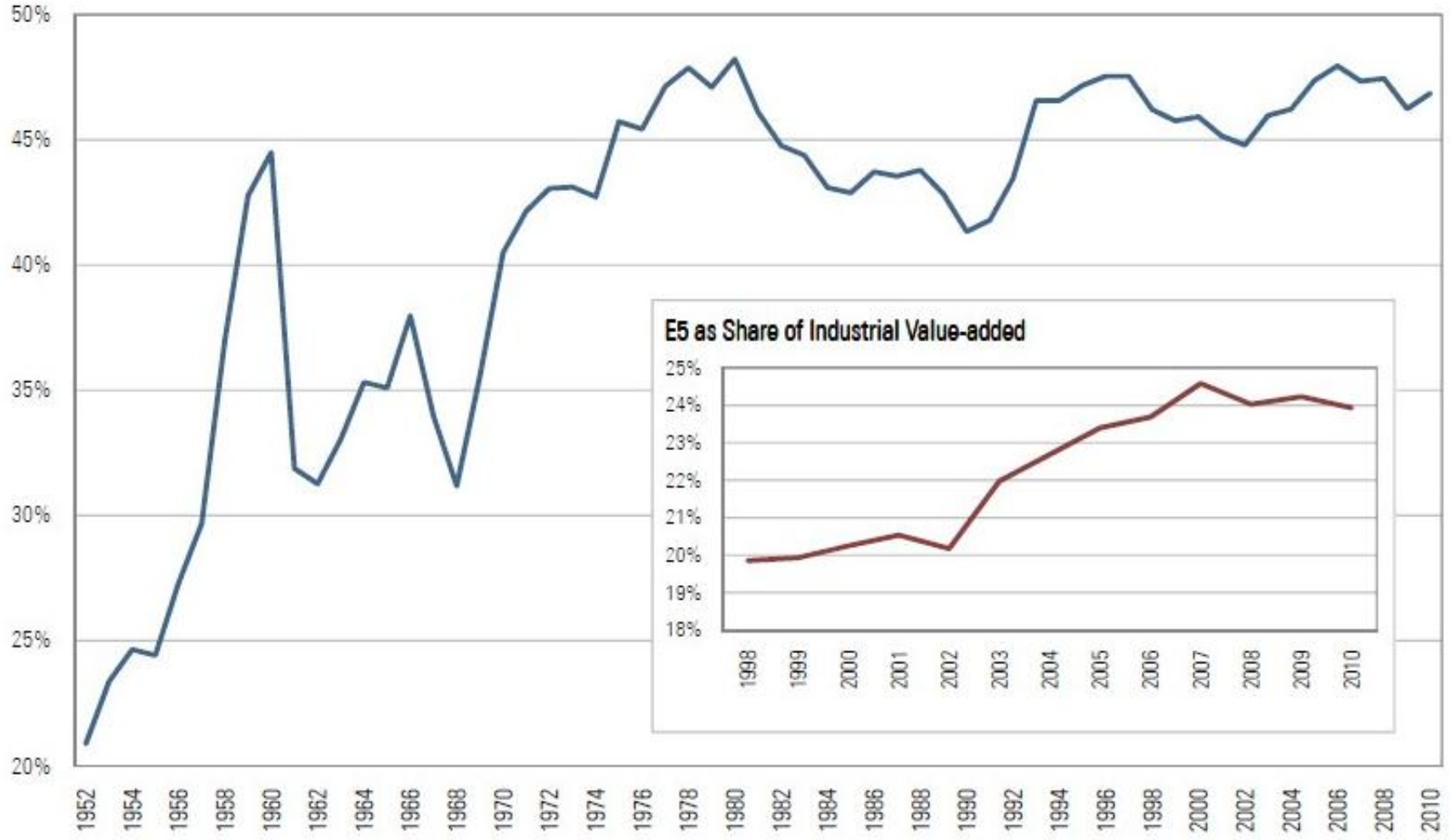
Source: NBS, RHG

Two Categories of Explanation Variables

- Economic growth
  - Export growth after WTO
  - Urbanization
  - Heavy industry growth
- EE Regulations
  - Energy-saving target
  - Energy-saving policies
  - Implementation system

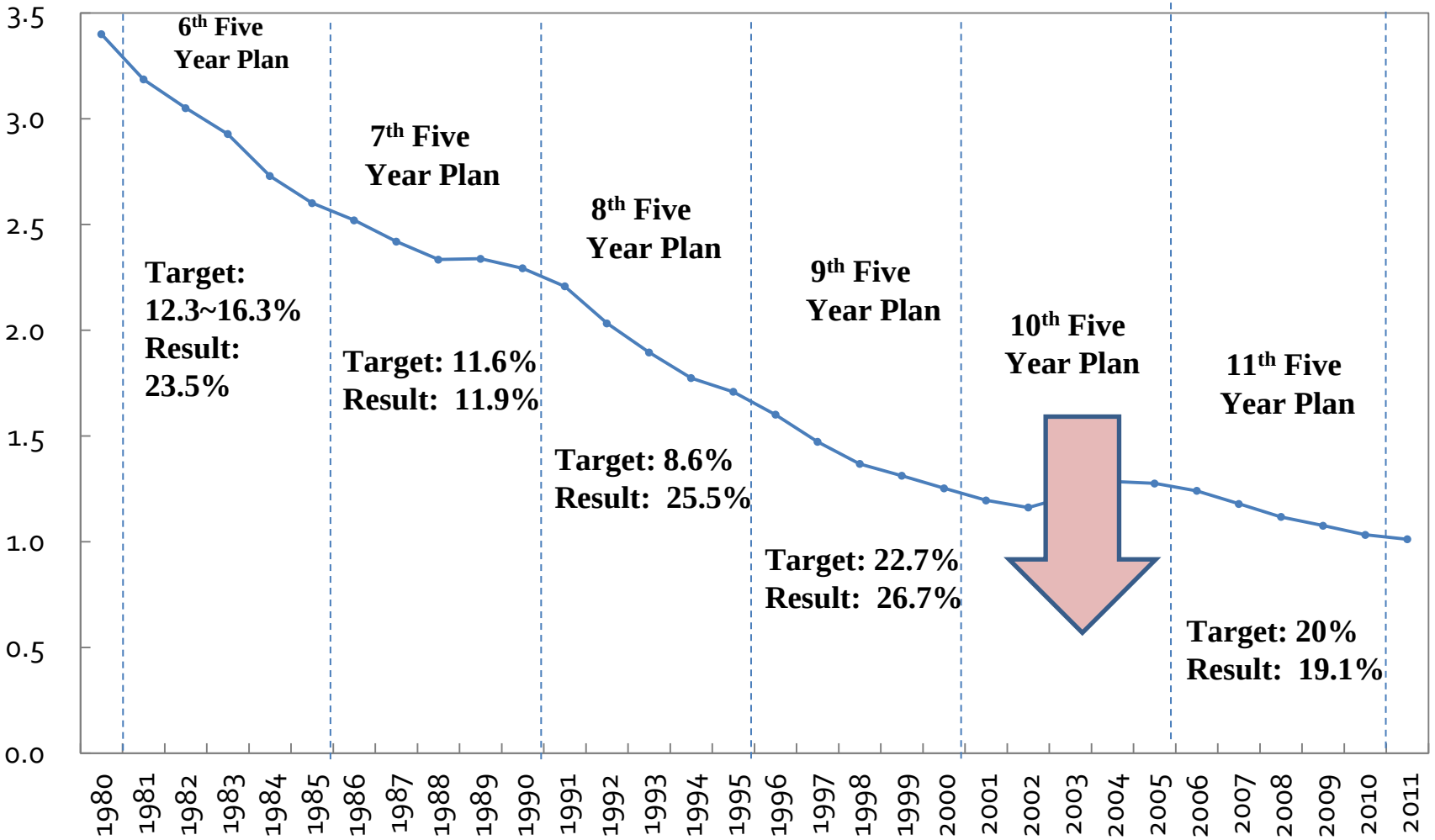
Industry as a Share of GDP

And E5 as a share of industrial value-added



Source: CEIC and RHG estimates

No policy target for EI from 2001-2005



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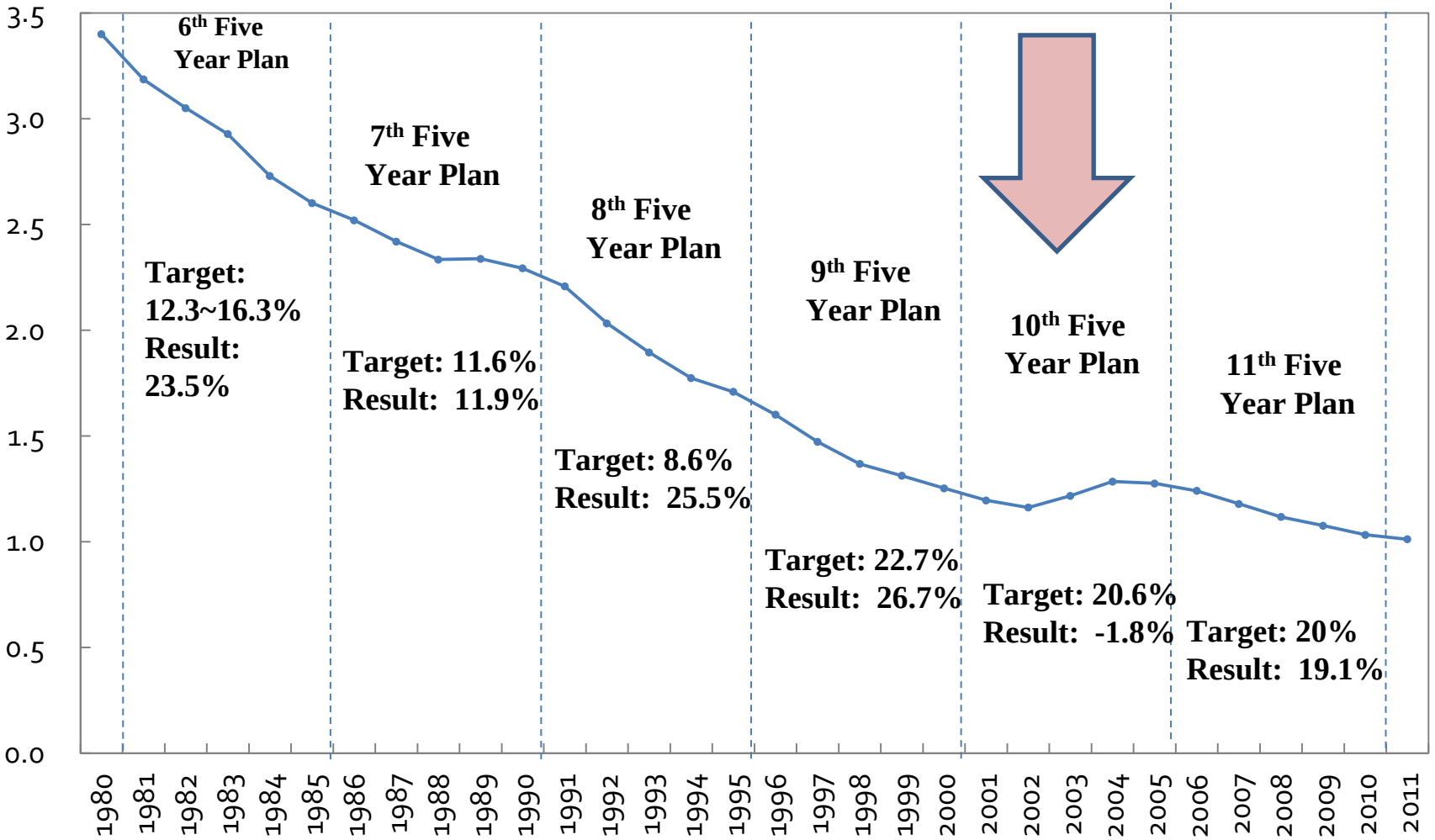
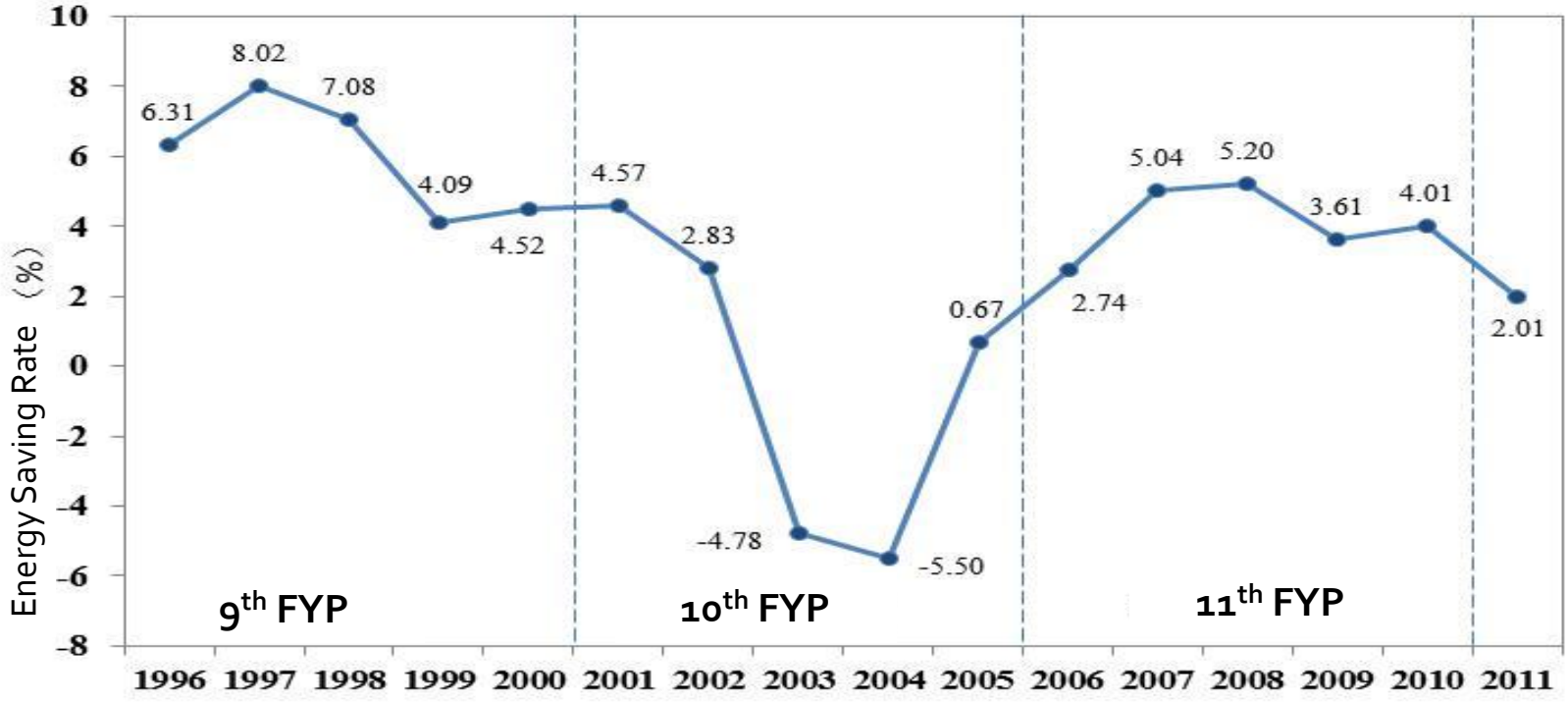


Economy vs. Policy Implementation



	9th FYP	10th FYP	11th FYP
GDP growth rate (%)	8.3	8.8	11.2%
Heavy industry growth (%)	10.7	15.6	15.7
Urbanization growth (%)	1.44	1.35	1.34
Export growth (%)	11	25	11
Energy target specified	In FYP	Not in FYP	In FYP
Enforcement agencies	**Industrial Ministries**	**No Industrial ministries**	**Local governments**

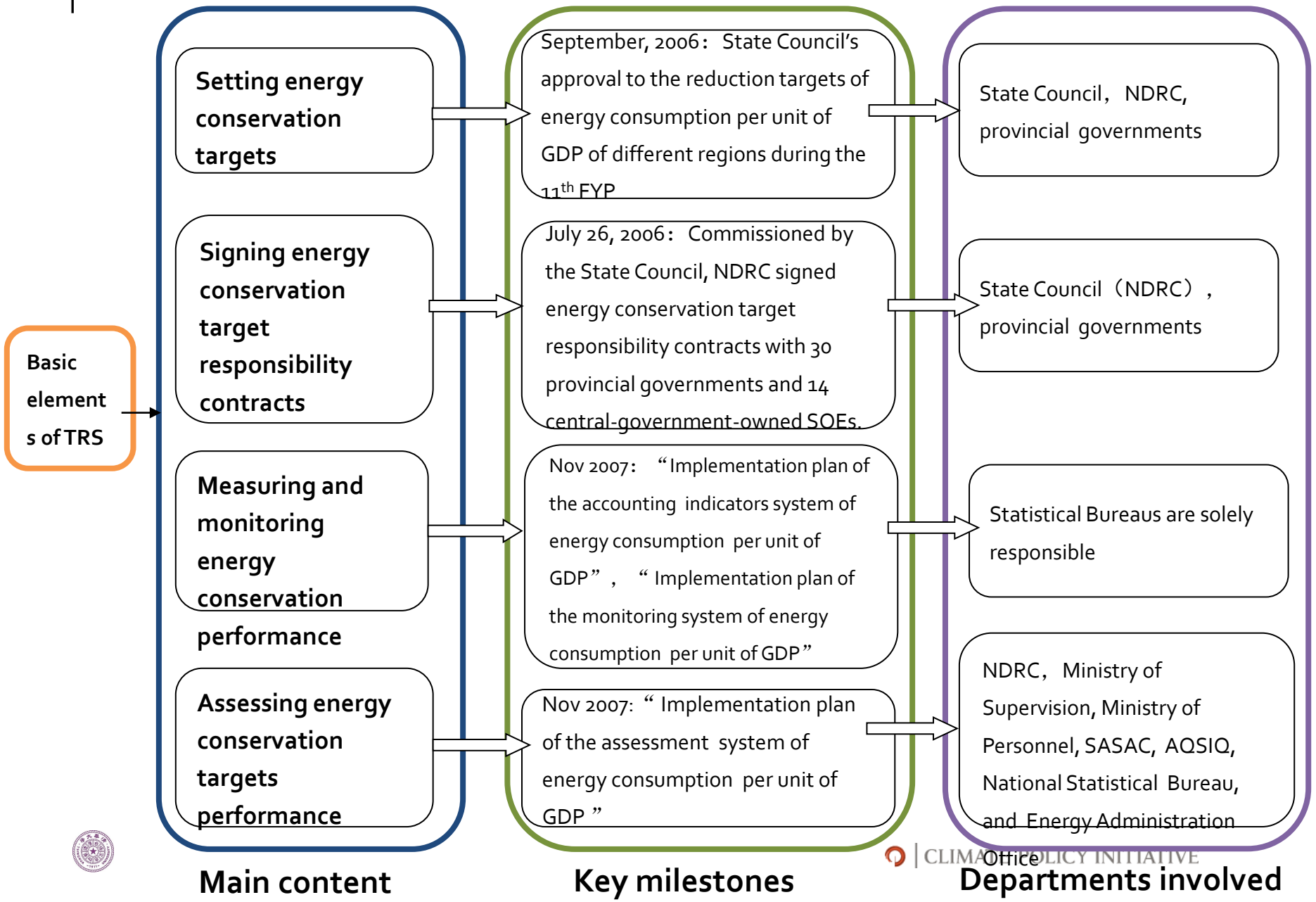
Policy target vs. implementation

	POLICY TARGET	IMPLEMENTERS	RULES	TOOLS
1995-2000	22.7% in FYP	Industrial ministries	Conventions	Command-control, incentives
2001-2005	No target in FYP	No specified implementers	Conventions	Command-control, incentives
2006-Present	20% mandatory	Local governments	Target responsibility system	Command-control, incentives

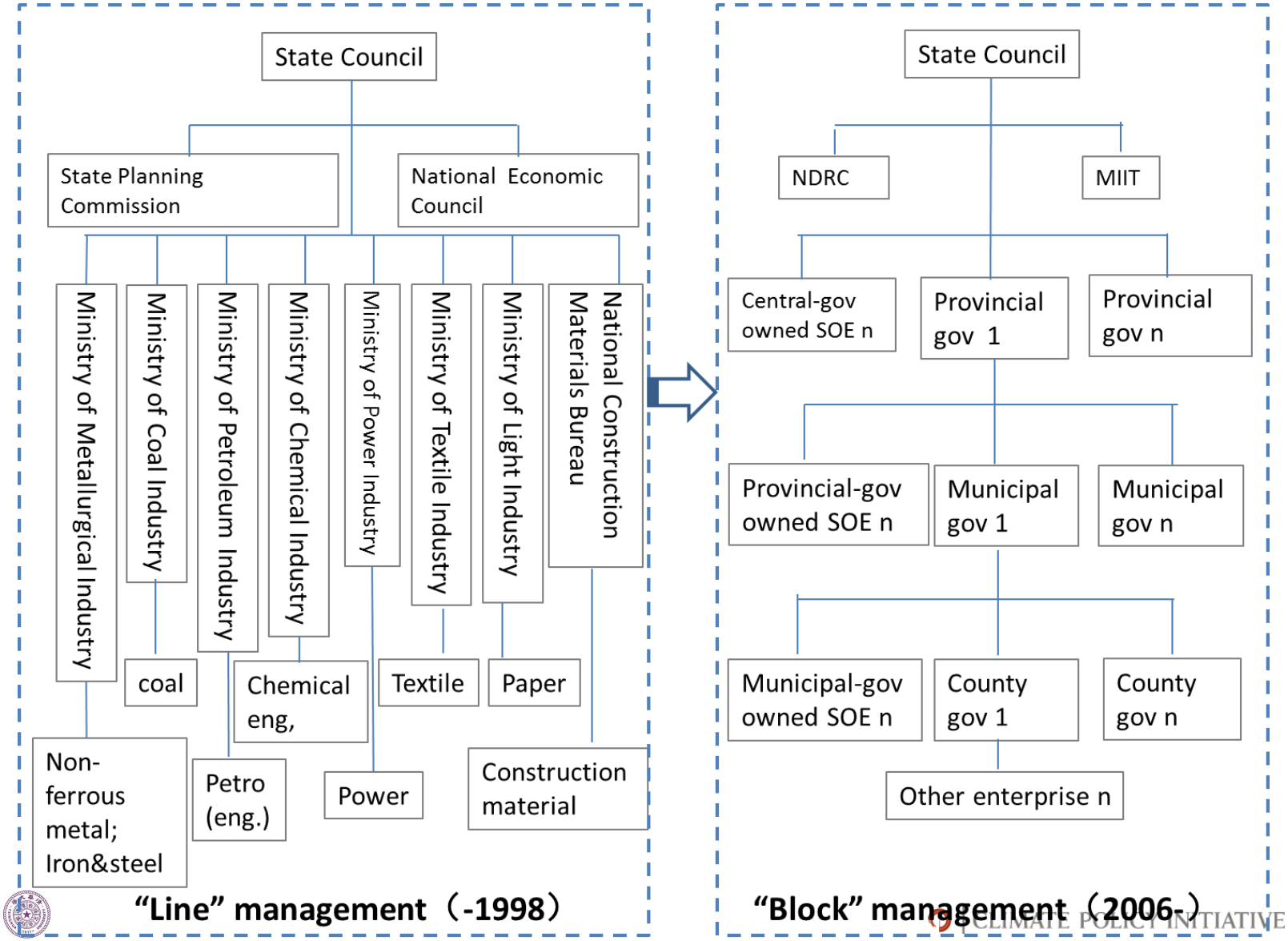
Changes in political and economic system

- Reform of State-Own Enterprises
- Organizational reform of the Central government
- Taxation reform
- Overall political system change

The Target Responsibility System



Implementation from Lines to Blocks



Energy-Saving Policy and Implementation

	POLICY TARGET	IMPLEMENTERS	RULES	TOOLS
1978-1992	Various FYP	Industrial ministries	Conventions	Command-control
1993-2000	22.7% in FYP	Industrial ministries	Conventions	Command-control, incentives
2001-2005	No target in FYP, 20.6% in plan	No specified implementers	Conventions	Command-control, incentives
2006-Present	20% mandatory	Local governments	Target responsibility system	Command-control, incentives

Energy Conservation Target Responsibility System is a major shift of the implementation mechanisms

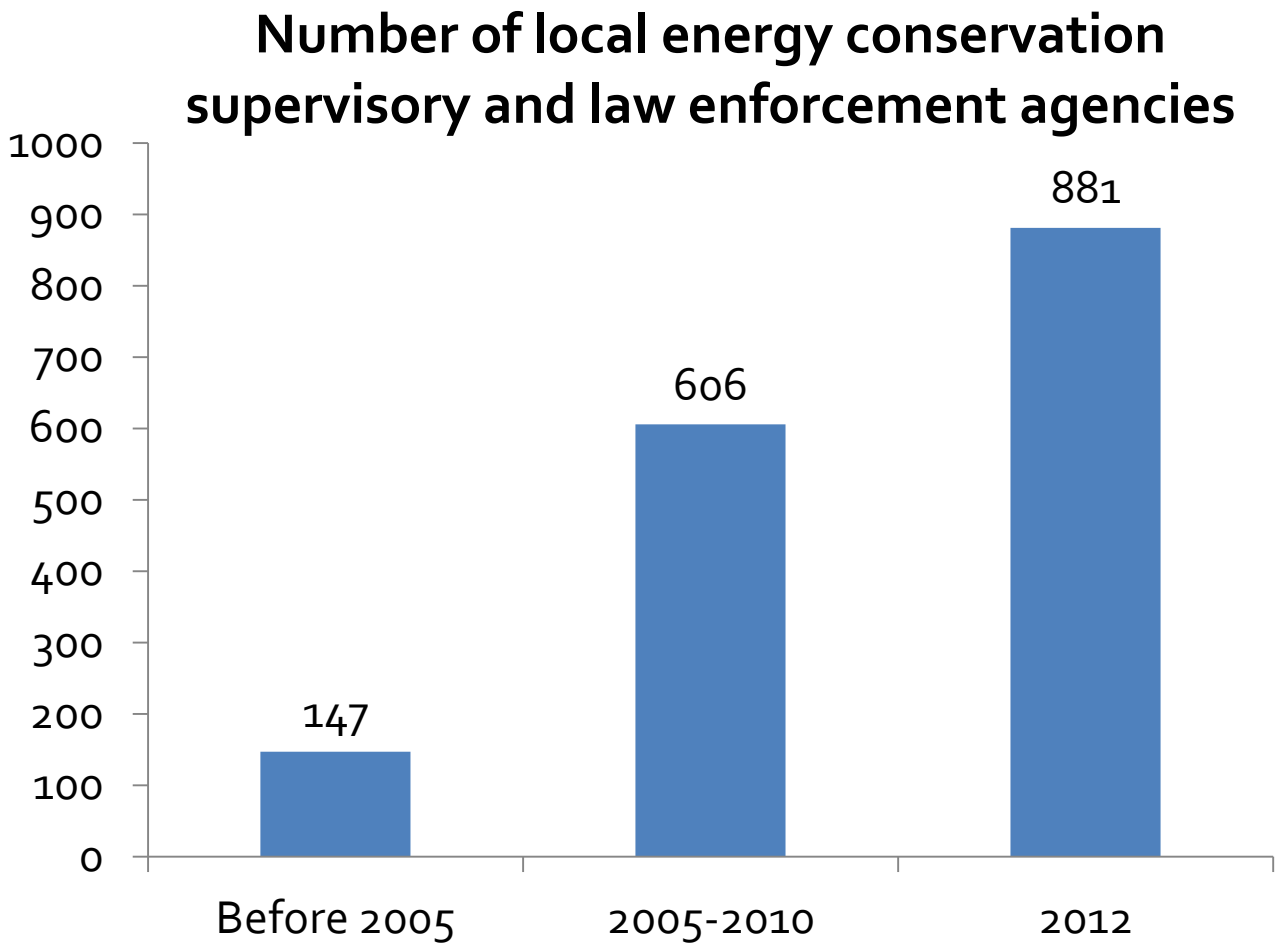
Target Responsibility System (TRS)

The TRS was established to achieve a national target of 20% energy intensity reduction by disaggregating it amongst subnational and local governments layer by layer, each government is held responsible to its upper level counterpart for achieving the target.

- TRS and complementary policies motivated local government and enterprises to reprioritize energy-saving, elevated leadership, build capacity, and increase funding.
- TRS is a “top-down” pressure transfer mechanism.

Local governments strengthened energy conservation capacity

All 31 provinces and major cities, 68% of prefecture-level cities, and 12% of counties have created energy conservation supervisory and law-enforcement agencies.

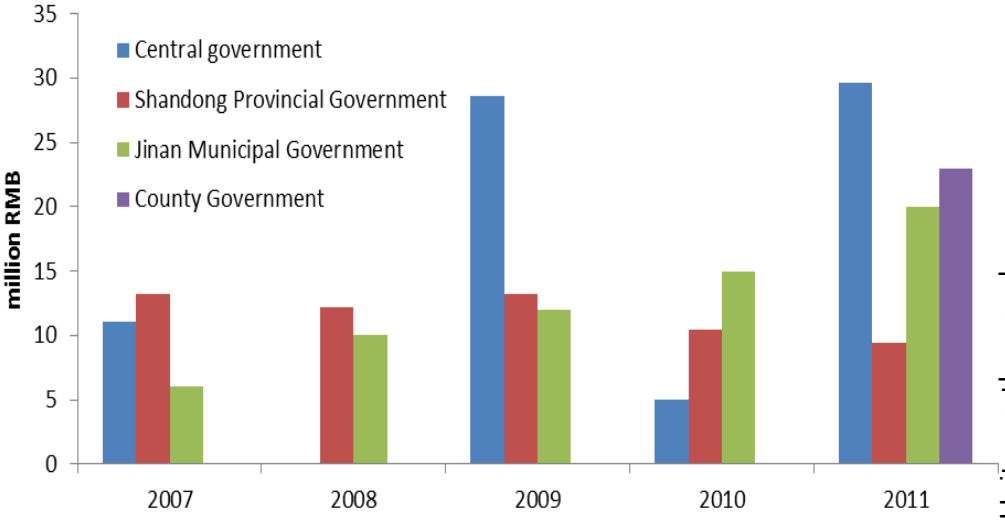


Source: Climate Policy Initiative at Tsinghua compiled and processed information from various sources. Part of energy conservation supervisory agency information was compiled by Xiamen Energy Conservation Center in November 2008 with original sources from National Energy Conservation Information Exchange and Collaboration Website.

Local governments increased fiscal support to energy conservation

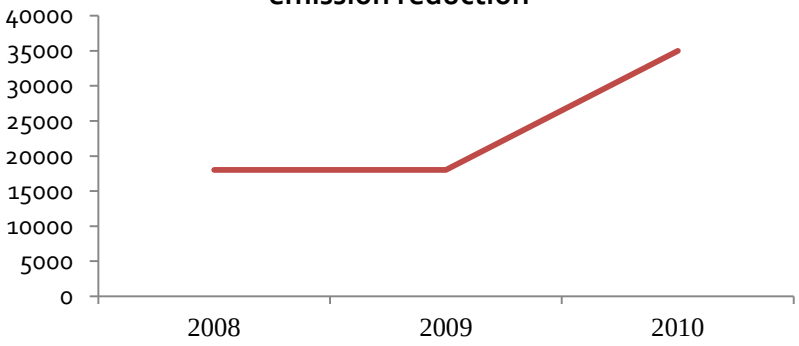
- Total fiscal funding to energy conservation from local governments amounted to 52.9 billion RMB, 7.4% of total.
- Local governments created special funds for energy conservation.
- Provincial fiscal funding directed to energy conservation grew

Fiscal funding to energy conservation from all levels of governments in Jinan, Shandong

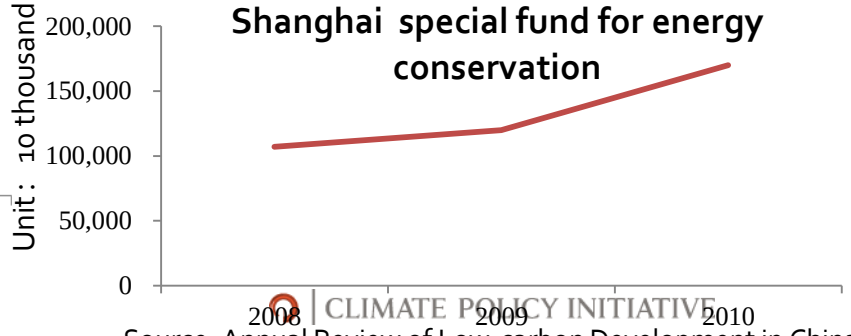


Source: Data are compiled and provided by ECO of Jinan City, Shandong Province.

Beijing special fund for energy conservation and emission reduction



Shanghai special fund for energy conservation



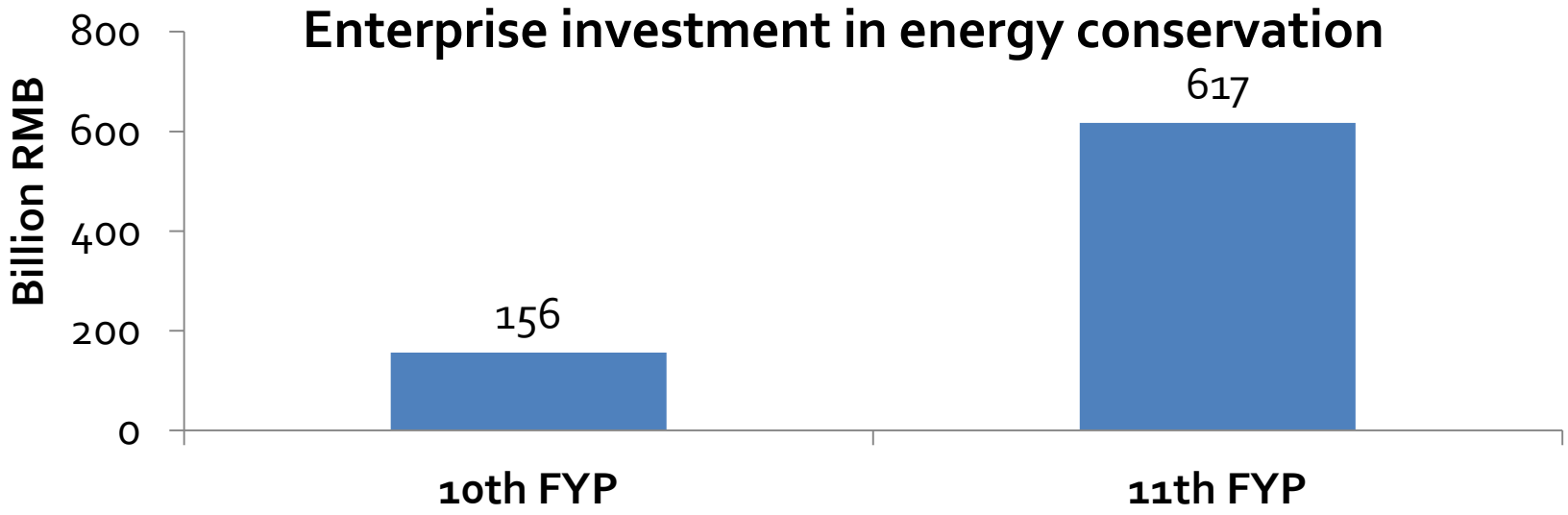
Source: Annual Review of Low-carbon Development in China (2011-2012)

Local governments expanded energy conservation policy innovations

Policy type	Policy	Complementary policies created
Incentive	Preferential policies for EPC	Provincial governments met or exceeded the minimum cash award requirement mandated by the central government at 60RMB/tce as a complement to the 240 RMB/tce award by the central government.
Restrictive	Energy audits	Many local governments expanded the coverage of the program to include not only the Top 1000 or 10000 enterprises but also all enterprises with energy consumption >5000 tce; Some provinces mandate periodic energy audits: Shandong, Gansu, Tianjin and Shanghai mandate energy audits every three years; Inner Mongolia and Qingdao every two years.
Informational	Energy conservation alert system	Shandong Province piloted the alert system, which later became a nation-wide institution.

Enterprises strengthened energy conservation management capacity

- redirected capital towards energy conservation



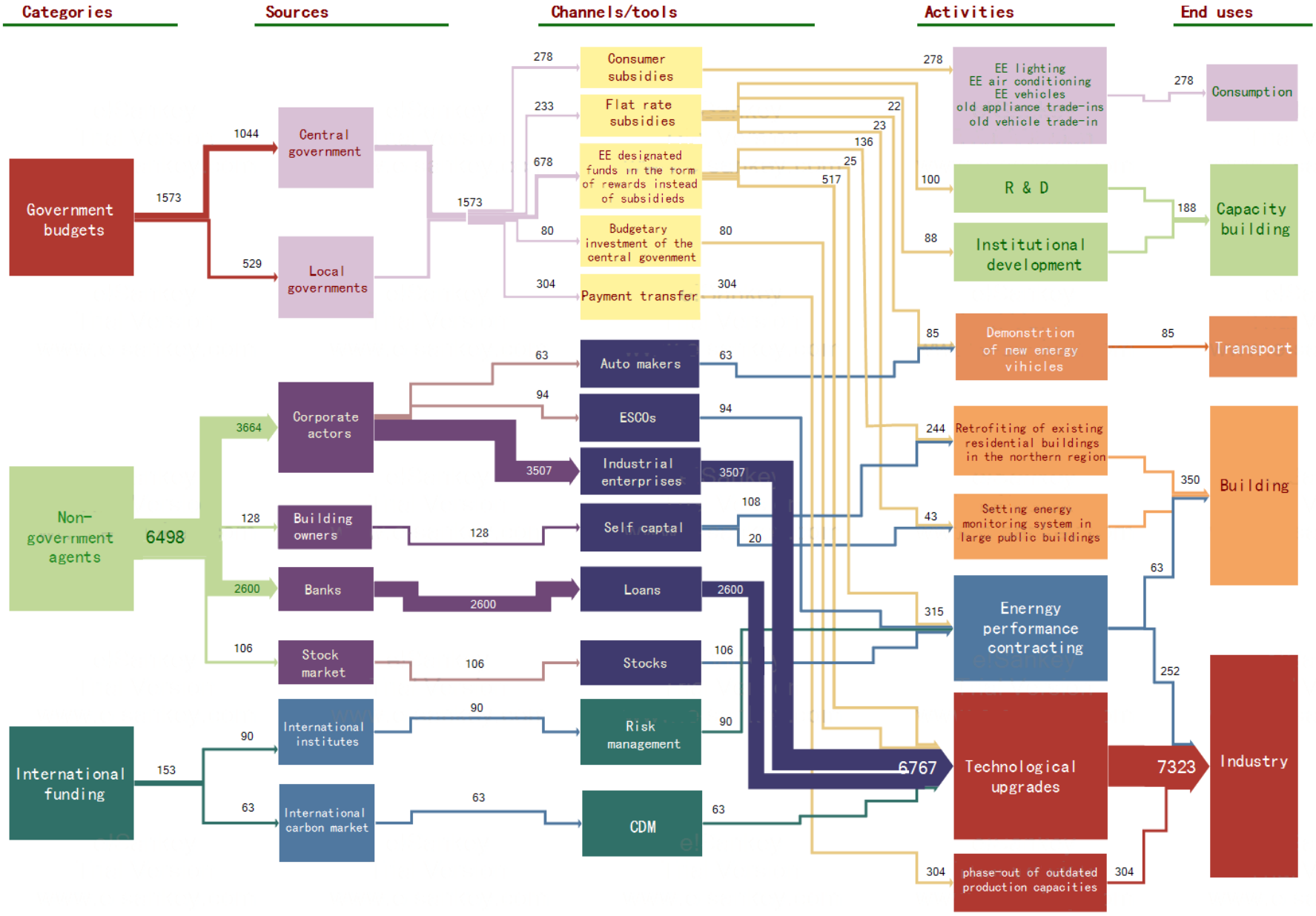
Source : Annual Review of Low-carbon Development in China (2011-2012); Annual Review of Low-carbon Development in China (2013)

Energy Efficiency Financing

- RMB 822.4 billion on EE during the 11th FYP.
  - Government: 160 billion,
  - International: 15 billion.
  - Enterprises: 650 billion.

- In the 11th FYP, energy efficiency activities achieved energy savings of 408 Mtce, accounting for 64% of the total energy savings.

Landscape of EE finance



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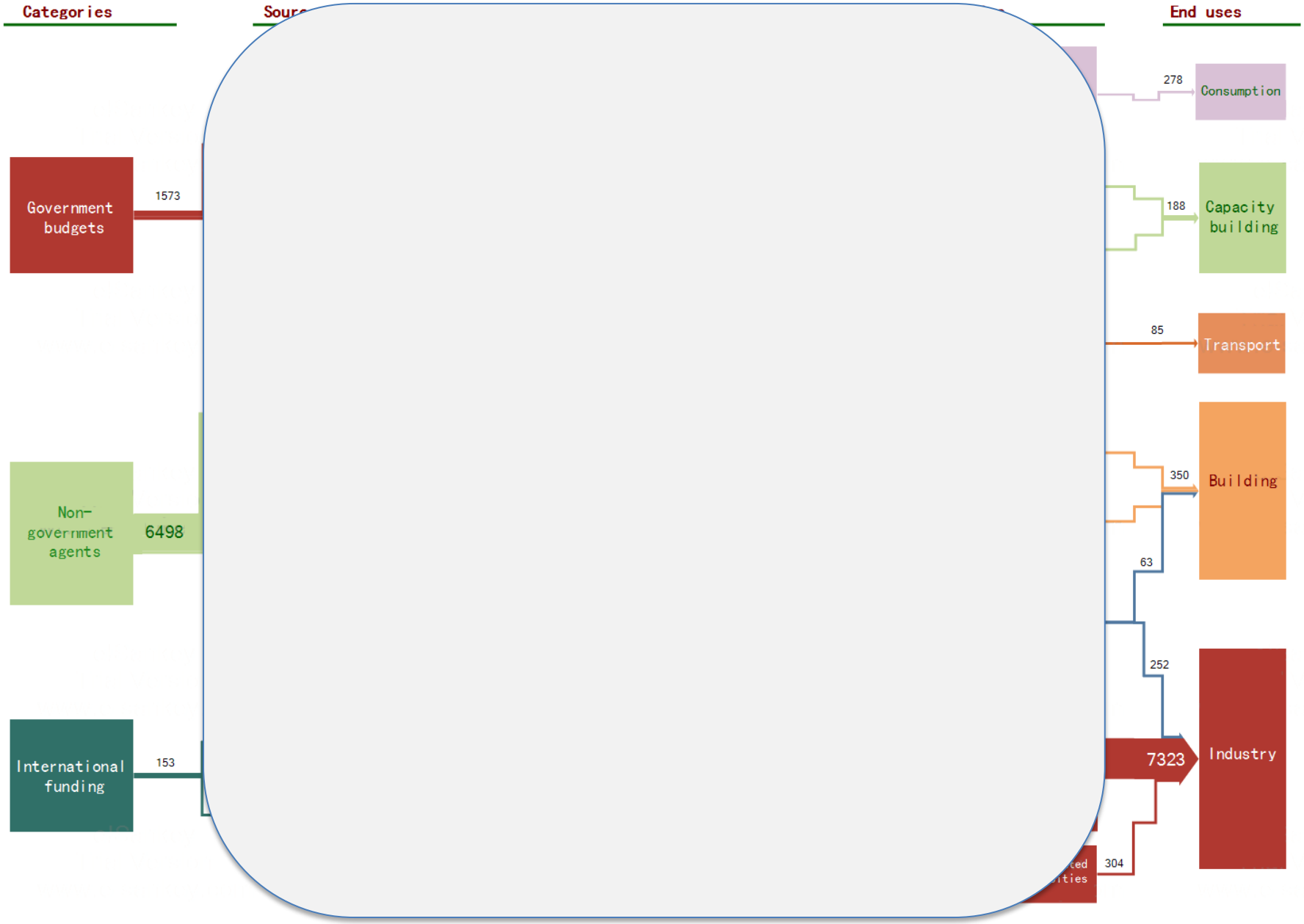


Renewable Energy Finance

Renewable Energy Financing

- State-Owned Enterprises (SOEs) are the main project developers,
- bank loan is the most important finance channel.
- Wind power finance is a government-led approach, while PV power finance is manufacturer-driven.
- The size of 12th FYP investment for renewable energy will increase by 37.5% compared with 11th FYP.

Landscape for the renewable energy finance

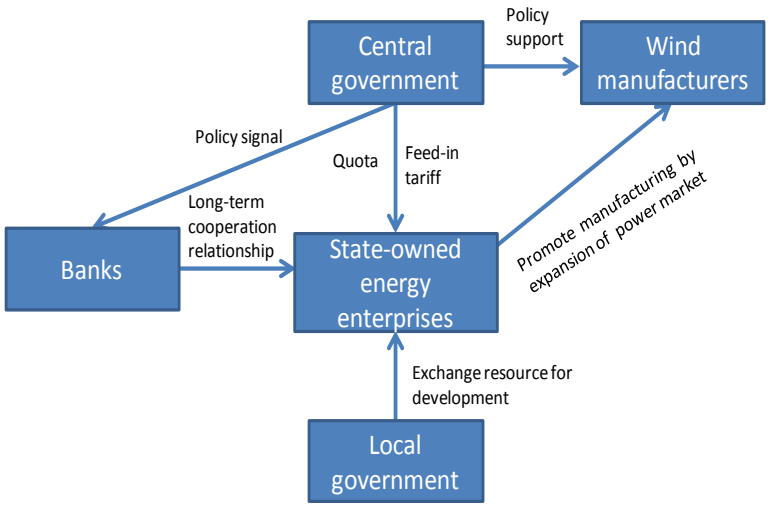
1) The SOEs play major role as project developers.

   Share in accumulated installation: wind-80%, PV-61%

2) Bank loan major source of finance for project developers, and accounts for more than three quarters of the total investment of wind and PV power projects.

Wind power and PV power finance approach

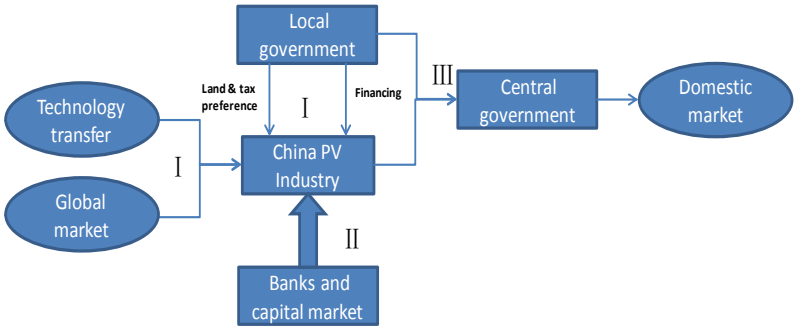
Wind



Characteristics of wind finance:

- The central government plays the most vital role in promoting the development of wind power sector in China.
- The main parties in wind power sector are either state-owned or with government backgrounds, and state-owned developers and banks are the main project investors.

PV



Characteristics of PV finance:

The financing approach for each phase is different.

Phase I : PV industry

-- local government-led finance

Phase II : PV industry

-- market-driven finance

Phase III : PV power

-- manufacturer-driven finance

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Comparison of Financing Patterns of PV Power and Wind Power

	PV power financing	Wind power financing
Financing pattern	Manufacturer-driven	Government-led
Central government	Passive leader	Active leader
Local government	Promoter	Participator
Effect of manufacturers	Promoter	Participator
Support of domestic market	None	Yes
Policy making	Bottom-up, pushed by manufacturers and local government	Top-down, clear strategy
Policy implementation	The central government is pushed to eliminate obstacles for distributed PV systems	Formed synergy

RE investment in 12th FYP will increased by 37.5% compared with 11th FYP

RE investment comparison between 11th FYP and 12th FYP (Unit: billion Yuan)

	11th FYP	12th FYP (prediction)
Hydropower	620.5	800
Large and medium scale hydro	560.3	620
Small hydro	60.2	120
Pumped power storage station		60
Wind power	421.8	530
Solar power	20	250
Biomass energy	154.5	140
Solar heater & shallow layer geothermal energy utilization	112.5	80
Total (in Yuan)	1329.3	1800
Total (in US dollar)	205.8	278.6

Note: the average exchange rate (6.46) in 2011 is used to change RMB into USD.

The Low-Carbon Pilots is a critical means for policy and institutional innovation

Encouraging results

	Nation	YN	CQ	GY	LN	TJ	BD	HZ	NC	SX	GD	SZ	XM	HB
Rate of decrease of energy intensity (%) during the 11th FYP	19.06	17.41	20.95	25.4	20.01	21	20.2	21.8	20.15	20.25	16.42	13.6	12.5	21.67
Rate of decrease of energy intensity (%) since 2010	2.01	3.22	3.81	3.11	3.4	4.28	3.5	4.42	3	3.56	3.78	4.3	3.11	3.79
Energy savings in 2011/ objective in the 12th FYP	11.3	18.6	18.6	14.7	---	18.6	---	15.9		17.6	17.7	18.1	---	13.5

Data source and notes:

1. Climate Policy Initiative at Tsinghua University collated and calculated the energy savings according to the pilots' statistical yearbooks, statistical bulletins, 11th FYPs and energy consumption per unit of GDP published in 2011, etc.
2. Yunnan: YN, Chongqing: CQ, Guiyang: GY, Liaoning: LN, Tianjin: TJ, Baoding: BD, Hangzhou: HZ, Nanchang: NC, Shaanxi: SX, Guangdong: GD, Shenzhen: SZ, Xiamen: XM, Hubei: HB
3. Data for Liaoning, Baoding, Nanchang and Xiamen haven't been collated.

Economy +

Policy +

Implementation +

Funding

What we have learned

- The political system and the hierarchy of administrative system was used as the basis for TRS, the new implementation mechanism for energy-saving regulations.
- Wind power development was due to the creation of a profitable market.
- Solar PV industry and policy resulted from pulling of the market.

Conclusion: Effectiveness is the priority in China's low carbon green growth.

Thank you!

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