

Updates on the Chinese Energy Sector

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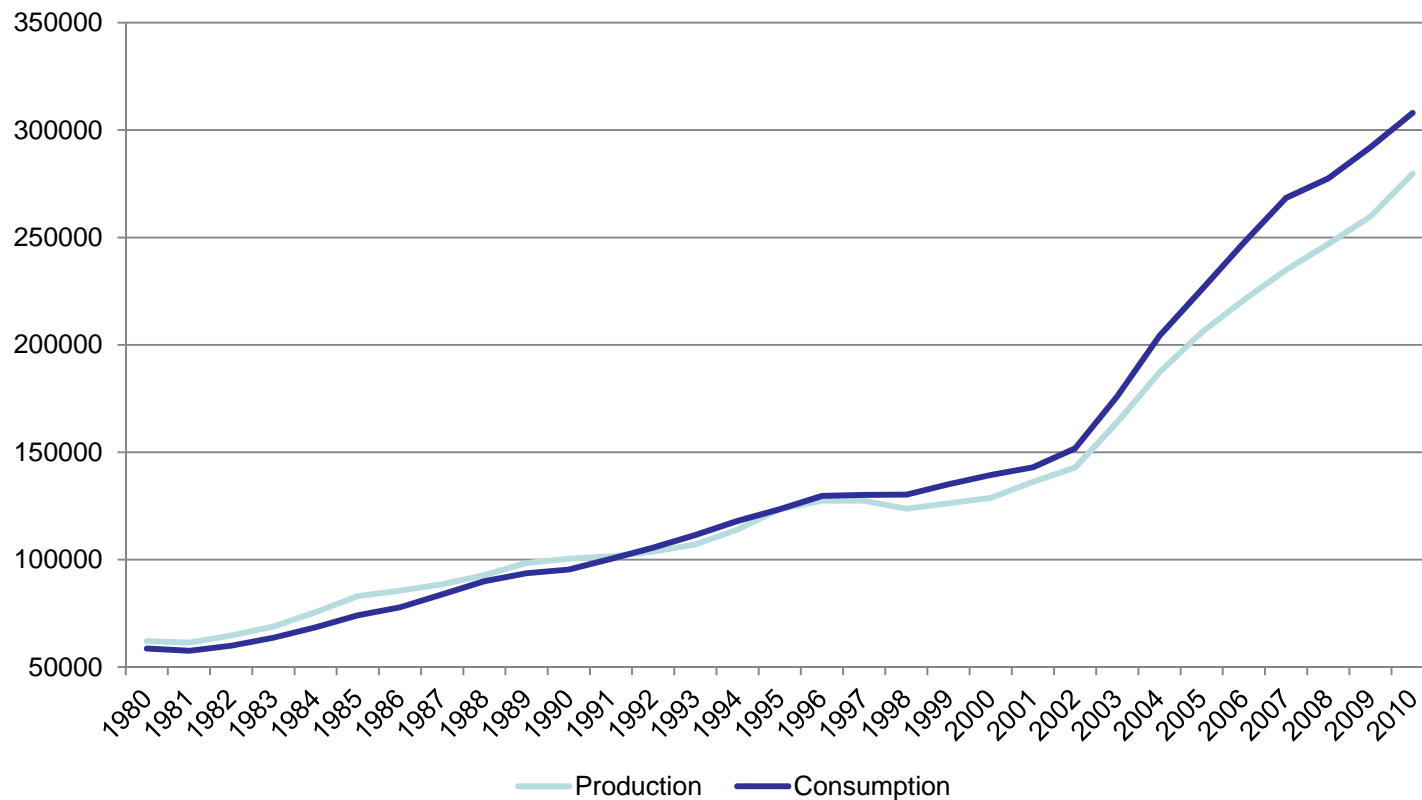
13rd April 2012, Korea

Outlines

- History of the Chinese energy sector and economy
- Recent development
- Policy changes in 2010-2011

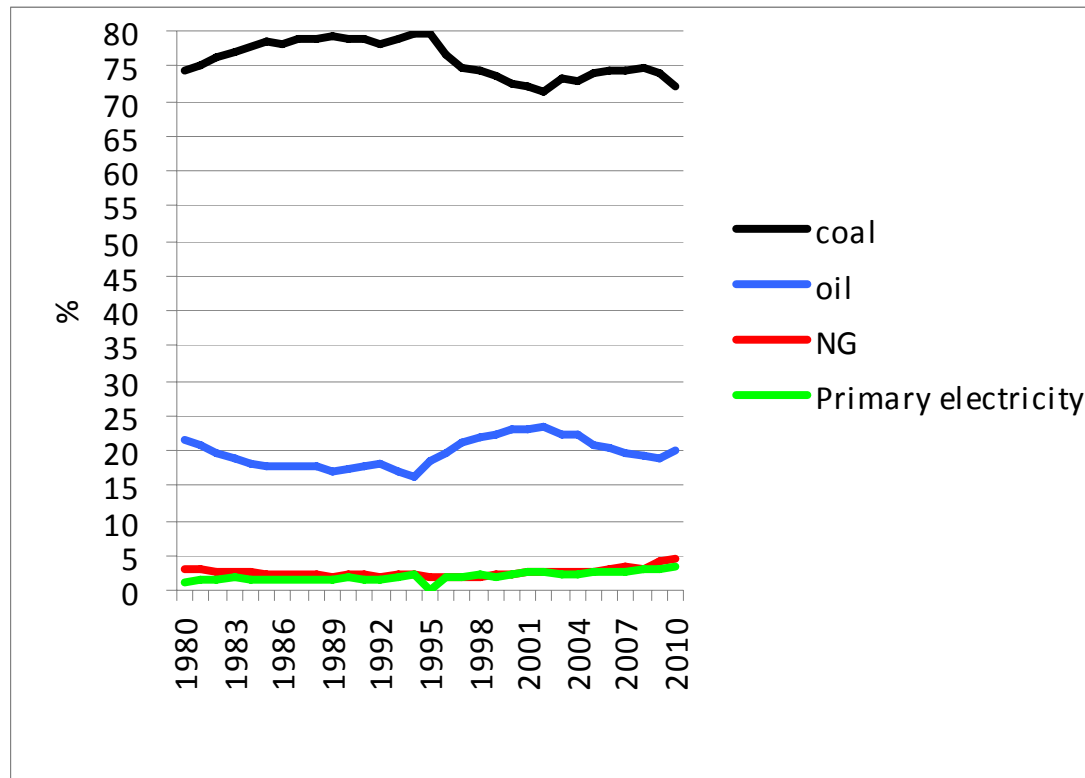
Energy Production and Consumption (10k tce)

Production increased 3.5 times and consumption 4.3 times in the past three decades



Source: China Energy Statistical Yearbook 2011

Demand met mainly by coal



Primary energy mix:

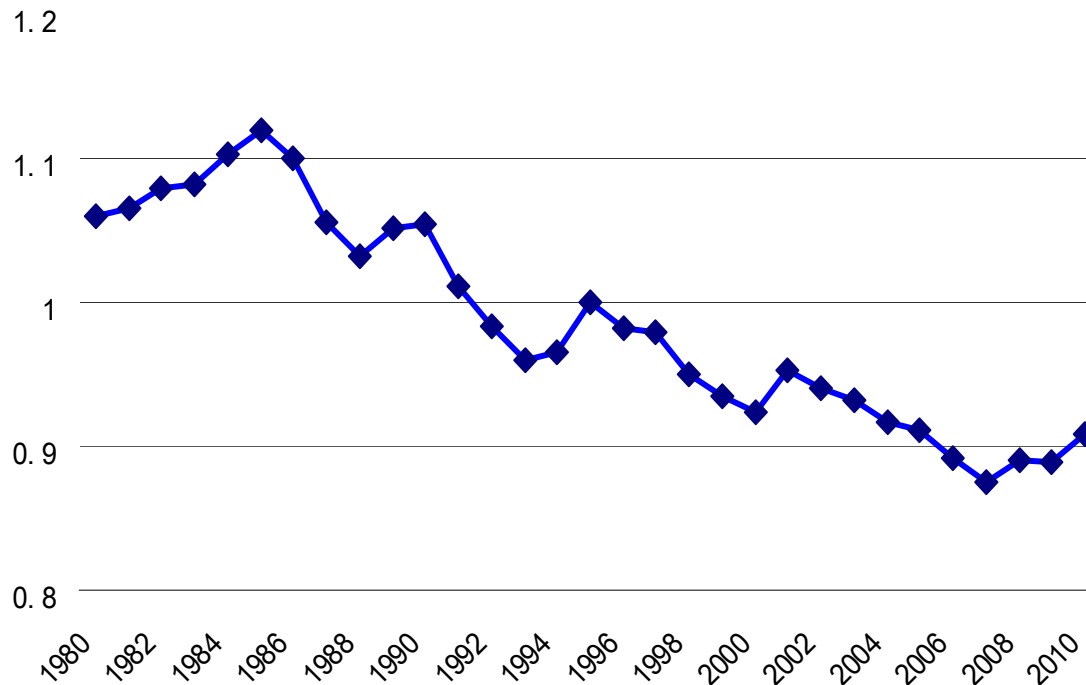
Coal: ~75%

Oil: ~20%

NG + Hydro + Nuclear: ~5%

Energy self sufficiency is on the decline

Self sufficiency=Energy production/TPES



Net import in
2010

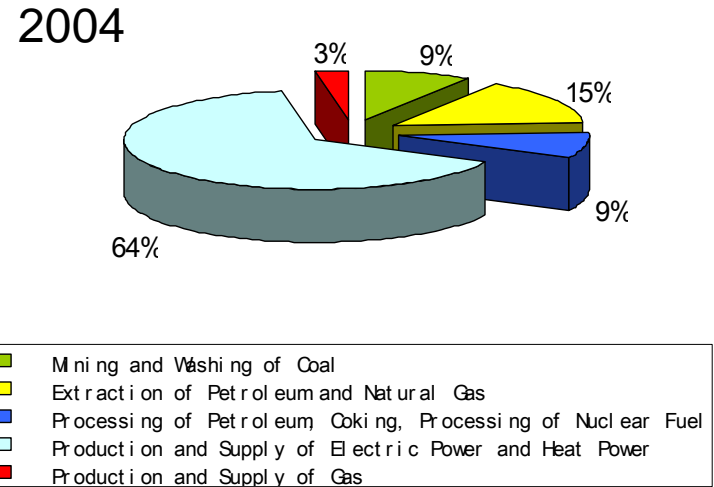
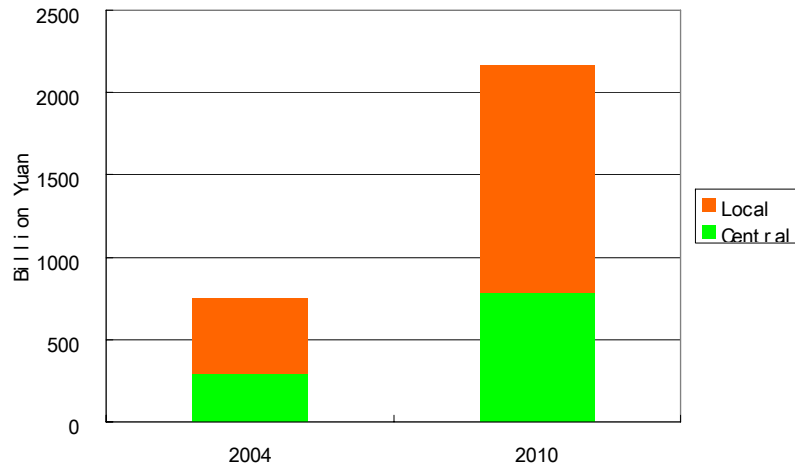
Coal 146 Mt

Crude oil 236 Mt

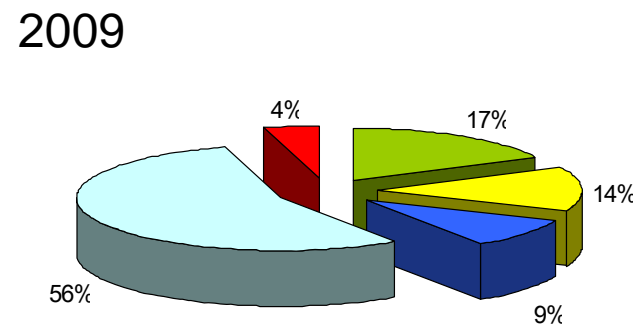
NG 13 B cu.m

Source: China Energy Statistical Yearbook 2011 (calorific value calculation)

Energy investment



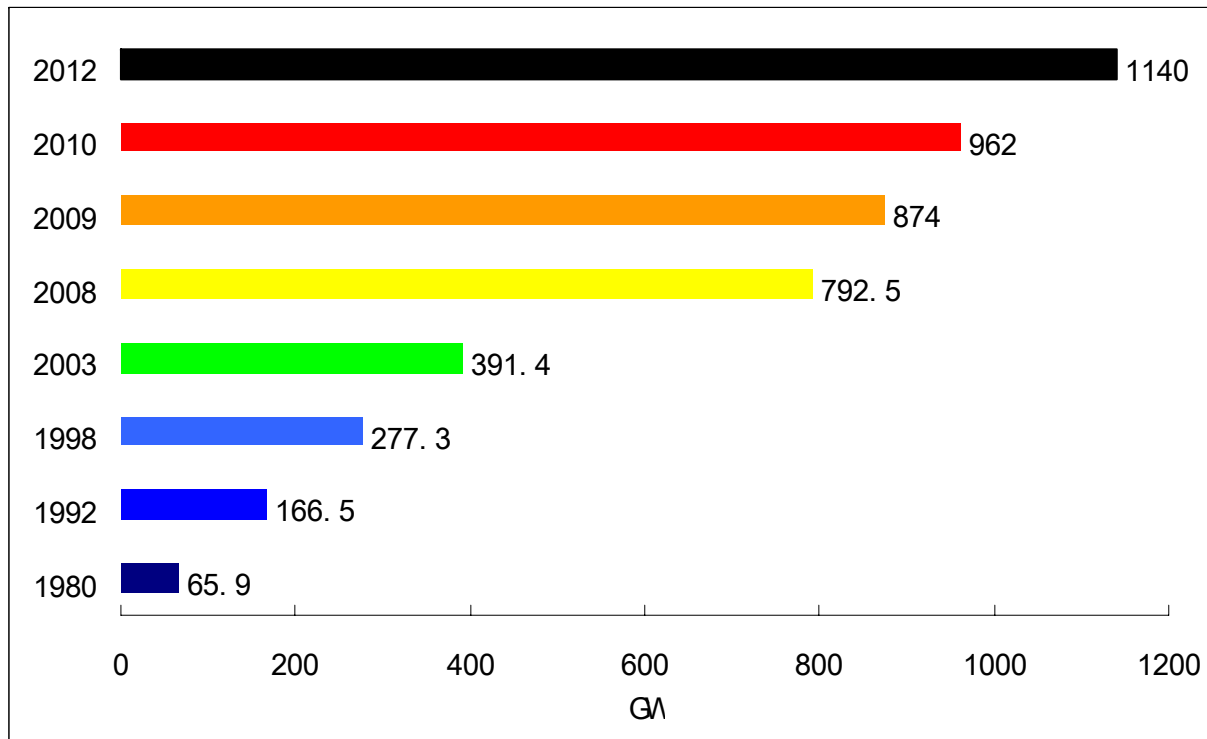
- Fast growth in investment ;
- Local investment dominate ;
- Power generation takes a larger share;
- Growth in coal sector.



Source : China Statistical Yearbook 2011, 2005

Installed capacity of power generation over 1TW

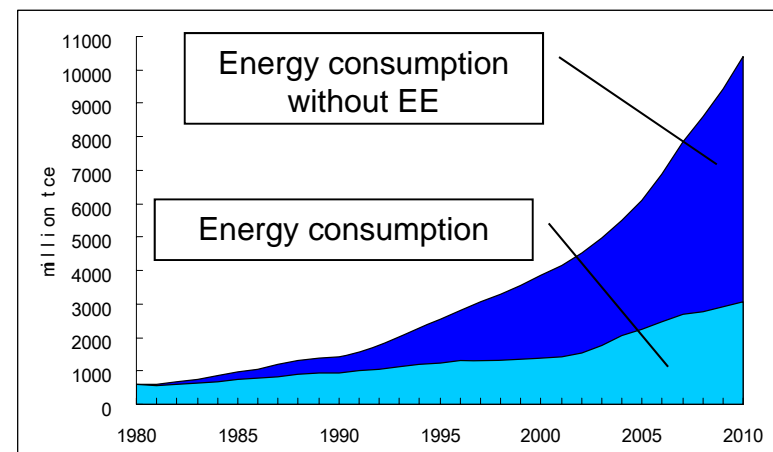
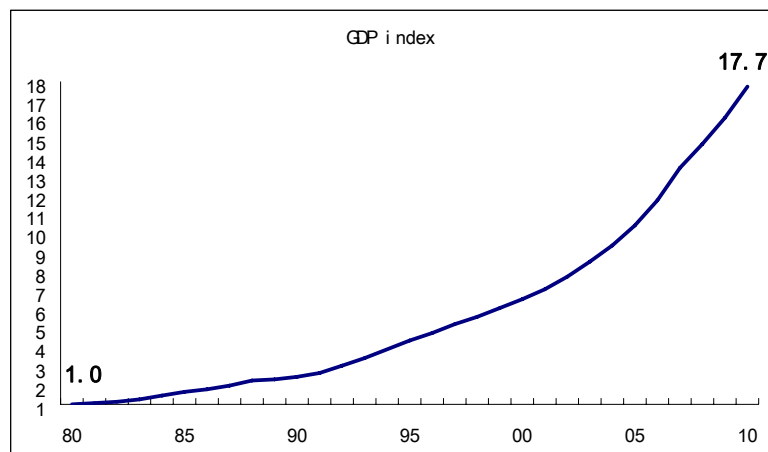
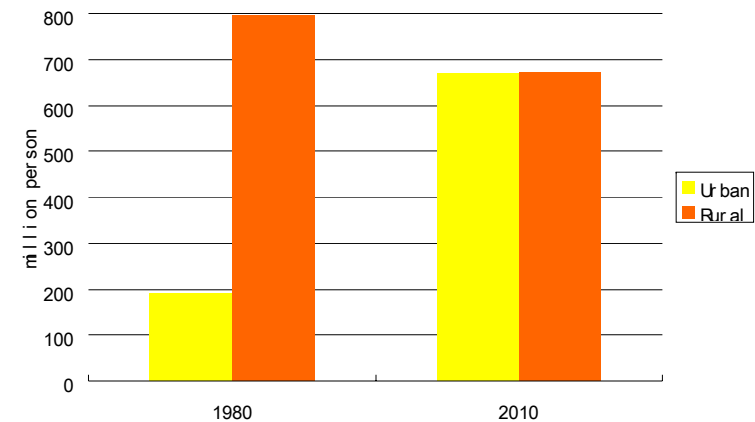
China Electricity Council: Installed capacity will reach 1140GW with 30-40GW shortage in 2012.



Source: China Electric Power Yearbook (series year)

Key drivers of energy sector trends

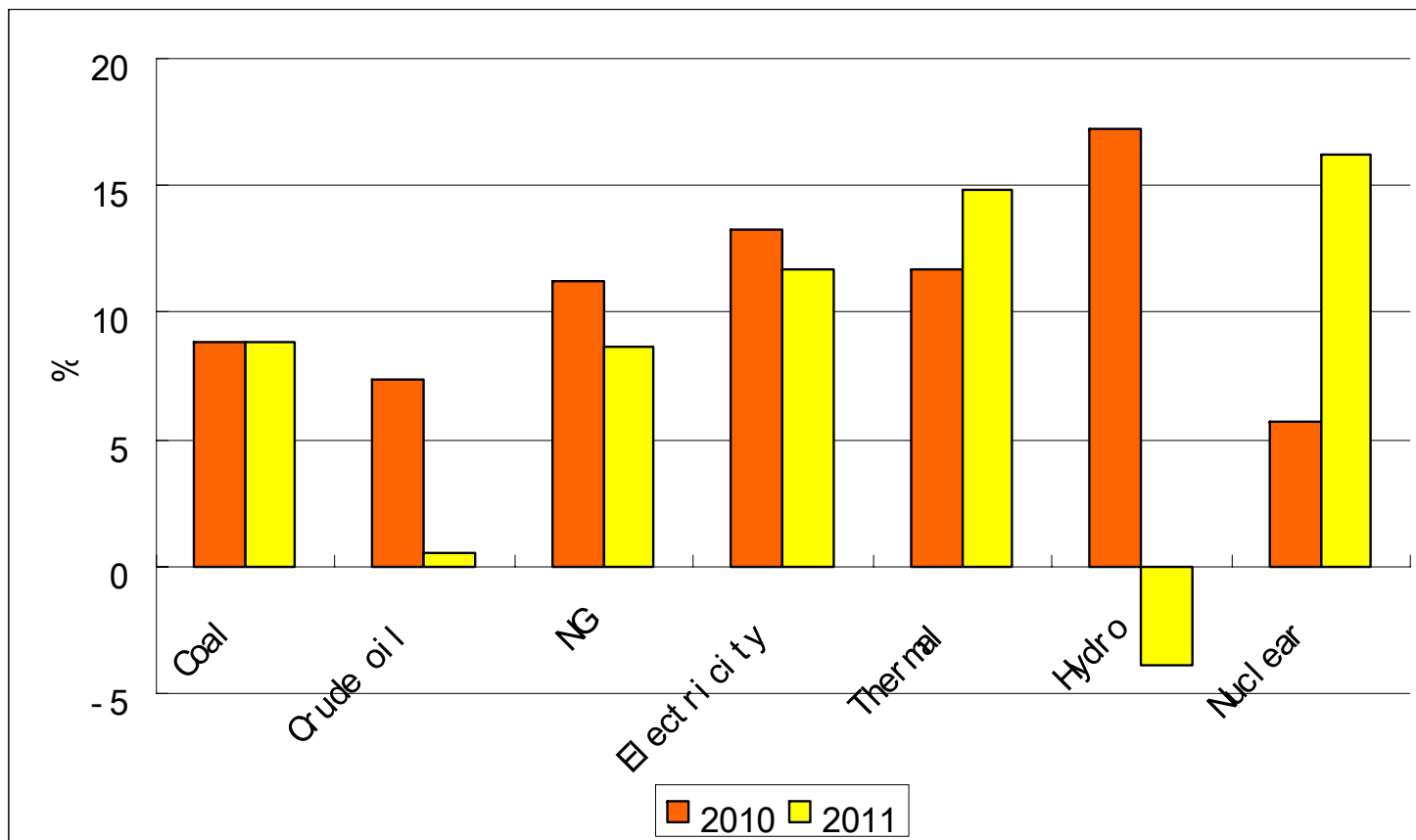
- Economic development: average annual GDP growth keep 10% in the past three decades
- Urbanization: % of urban population exceeded 50% in 2010 for the first time
- Efforts on EE: energy consumption would be triple without efficiency improvement



Source : China Statistical Yearbook 2011

Energy production growth

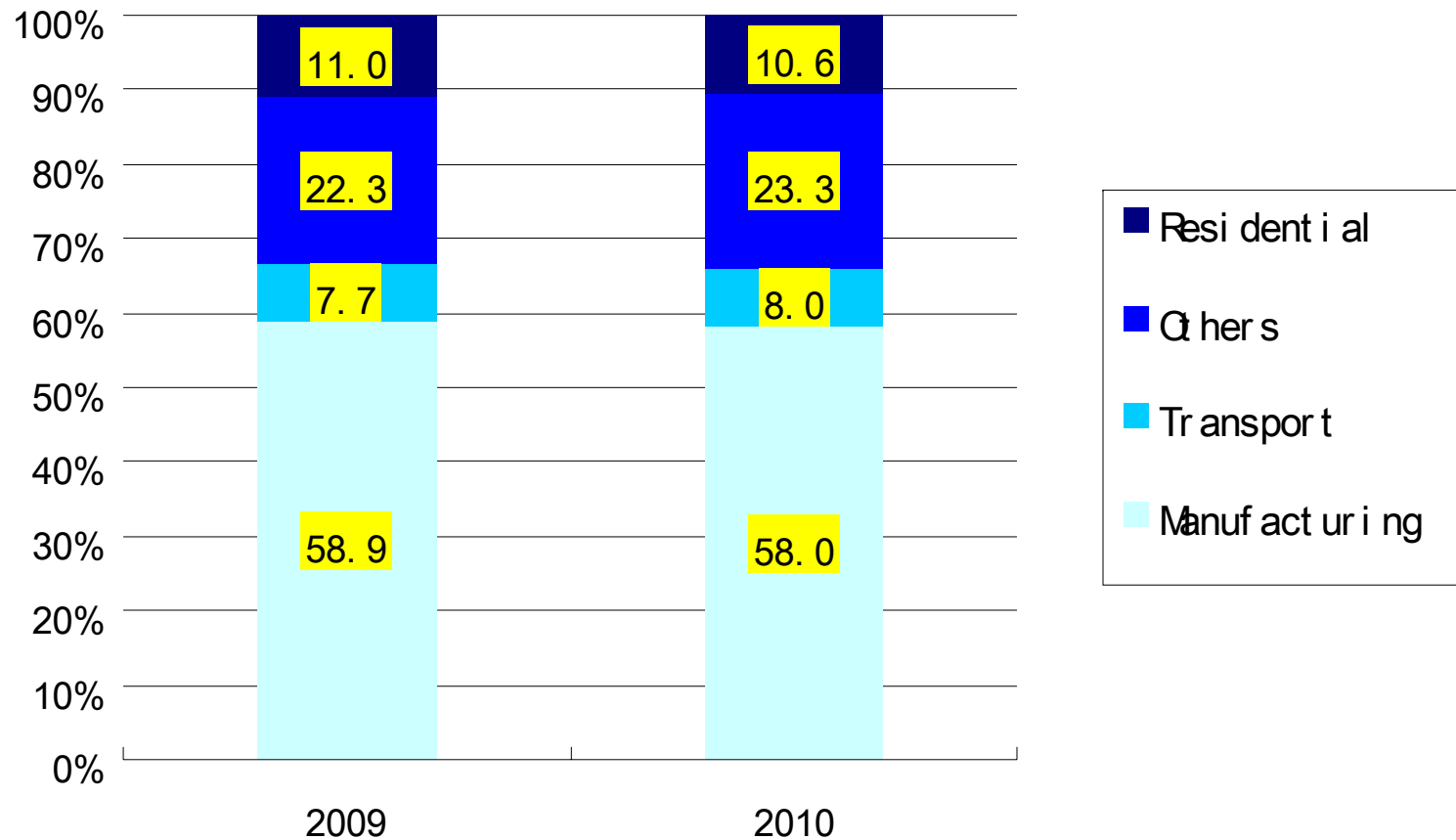
Steadily growing in coal; slow down growing in crude oil, NG & electricity generation; keep strong growing in thermal power and nuclear power; dry weather made hydropower generation decline in 2011.



Source: China Energy Statistical Yearbook 2011

Energy consumption

Consumption increased 6% in 2010 with modest changes in consumption structure and manufacturing sector dominated



Source: China Energy Statistical Yearbook 2011

2010 & 2011: reviewing and planning

Review 11th FYP (2006-2010) implementation

- Energy intensity of GDP (20% target vs. 19.2% achieved)
- Proposed nuclear power projects and safety issues (no big impact from Fukushima nuclear accidents)
- Efforts on EE
 1. Structure change— Development of hi-tech industry;
 2. Small Plant Closures;
 3. Top 1,000 enterprises program;
 4. Implement EE standards and minimum requirement for production capacity expanding;
 5. High tariff to low efficient plants
 6. Key EE program;

2010 & 2011: reviewing and planning

Make 12th FYP (2011-2015)

- Average annual GDP growth by 7% and GDP structure change
- Control total energy consumption at a reasonable level (4.1 billion tce in 2015?)
- Non-fossil energy accounts for 11.4% of total energy consumption
- Energy intensity of GDP decreases by 16% or carbon intensity of GDP decreases by 17%
 1. Industrial EE plan (saving 670 Mtce)
 2. Top 10,000 enterprises low carbon action plan
 3. Shale gas development plan (resource survey oriented)
 4. Coal industry development plan (3.9 billion tons of production ceiling)

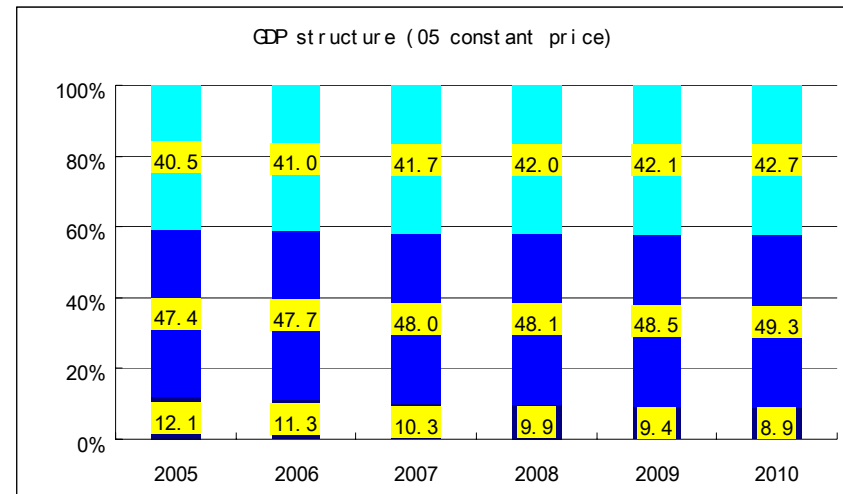
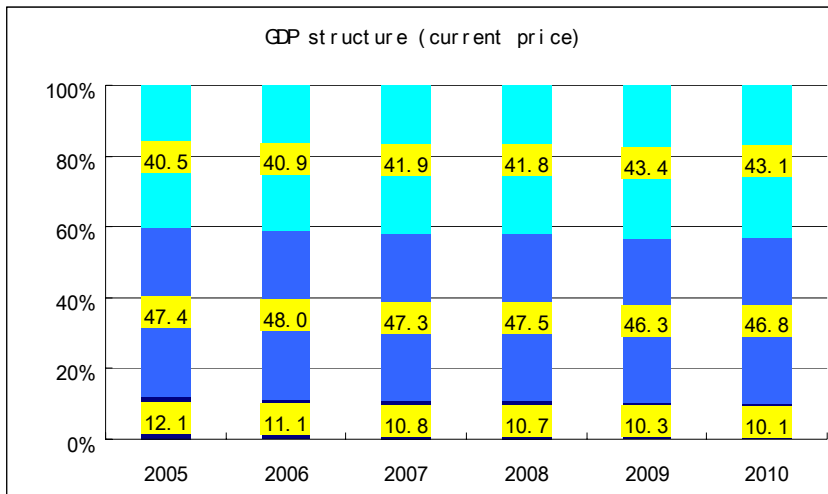
Highlights

1. Lower expectation of GDP growth
2. Consumption cap
3. Continual structure change (11th FYP: failure, 12th FYP: uncertain)

For achieving the uninfluenced carbon intensity decline 45% target by 2020

Modest changes in macro structure of GDP in 11th FYP

Secondary industry played growing roles.



■ Primary ■ Secondary ■ Tertiary

Source: China Statistical Yearbook 2011

Future energy demand?

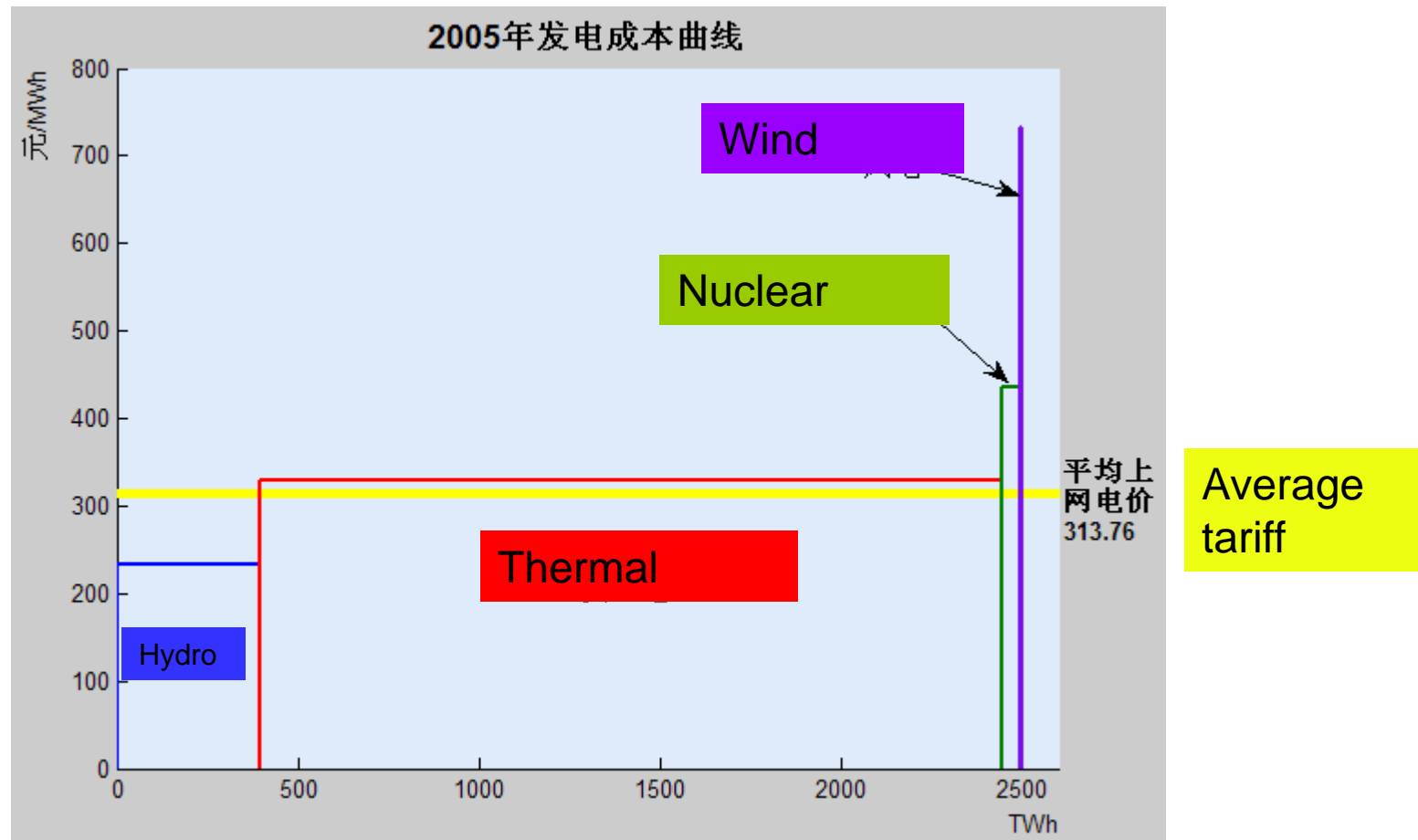
- Many projections/scenarios
- Based on large amount of assumptions
- Estimated/run by various models
- Heavily rely on successful in changing economic structure change and slowing GDP growth

Power industry (2005-baseyear)

2005	Installed Capacity		Generation	
	GW	%	TWh	%
Hydro	117.39	22.68	401	16.2
Thermal	391.37	75.63	2018	81.55
Nuclear	6.84	1.32	52.3	2.11
Wind & others	1.88	0.36	3.4	0.14
Total	517.48	100	2474.7	100

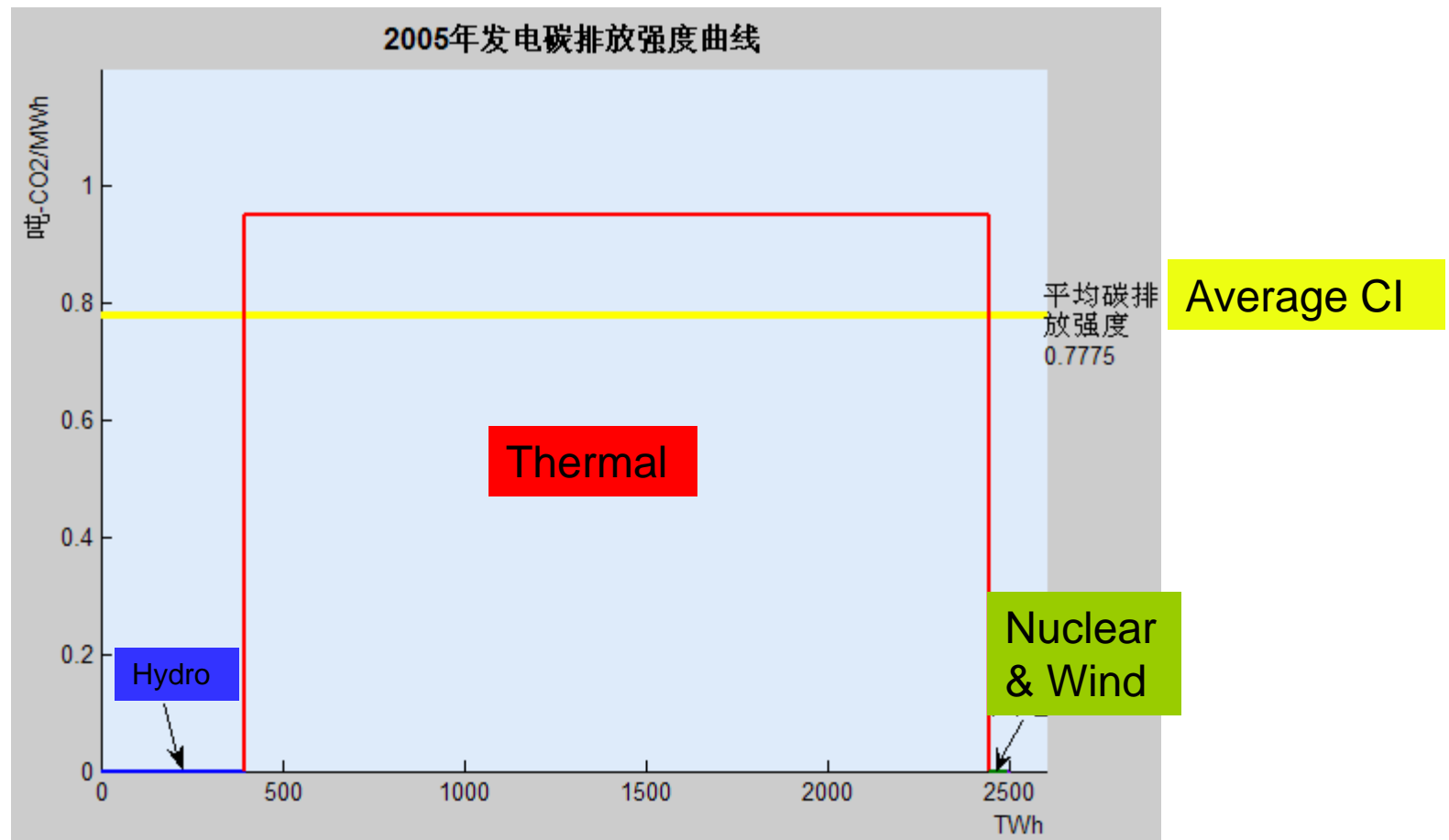
Source: Low Carbon Technology and Policy in China Power Sector. ISBN978-988-15498-1-5

Power generation cost (2005)



Source: Low Carbon Technology and Policy in China Power Sector. ISBN978-988-15498-1-5

Carbon intensity of power generation (2005)



Source: Low Carbon Technology and Policy in China Power Sector. ISBN978-988-15498-1-5

Electricity in 2020

- Final consumption: 7500TWh
- Consider transmission losses: 8021.4TWh
- Clear targets of non-fossil generation for 2020
- Other demands met by fossil (NG first and then coal)

GW	BAU scenario	Low-carbon scenario
Nuclear	60	78
Hydro	300	300
Wind	30	150
Biomass	30	30
PV	18	20

Source: Low Carbon Technology and Policy in China Power Sector. ISBN978-988-15498-1-5

Installed capacity in 2020 (BAU scenario)

	Installed Capacity (GW)	Availability (hours)	Sale (TWh)
Nuclear	60	7800	436.18
Hydro	300	3600	1063.8
Wind	30	2000	59.52
Biomass	30	4000	98.64
PV	18	1500	2.6784
Non-fossil sum	42.2	--	1660.8
Demand			8021.4
Thermal	--	--	6360.6

Source: Low Carbon Technology and Policy in China Power Sector. ISBN978-988-15498-1-5

Thermal power plant in 2020 (BAU Scenario)

Generator type	Unit	Installed Capacity (GW)	Generation (TWh)	Sale (TWh)
300MW-Subcritical	300	90	477	443.6
600MW-SC	420	252	1335.6	1251.5
1000MW-SC	420	420	2226	2110.2
1000MW-USC	450	450	2385	2261
300MW-NG	190	57	302.1	296.1
Total	1780	1269	6725.7	6363.4

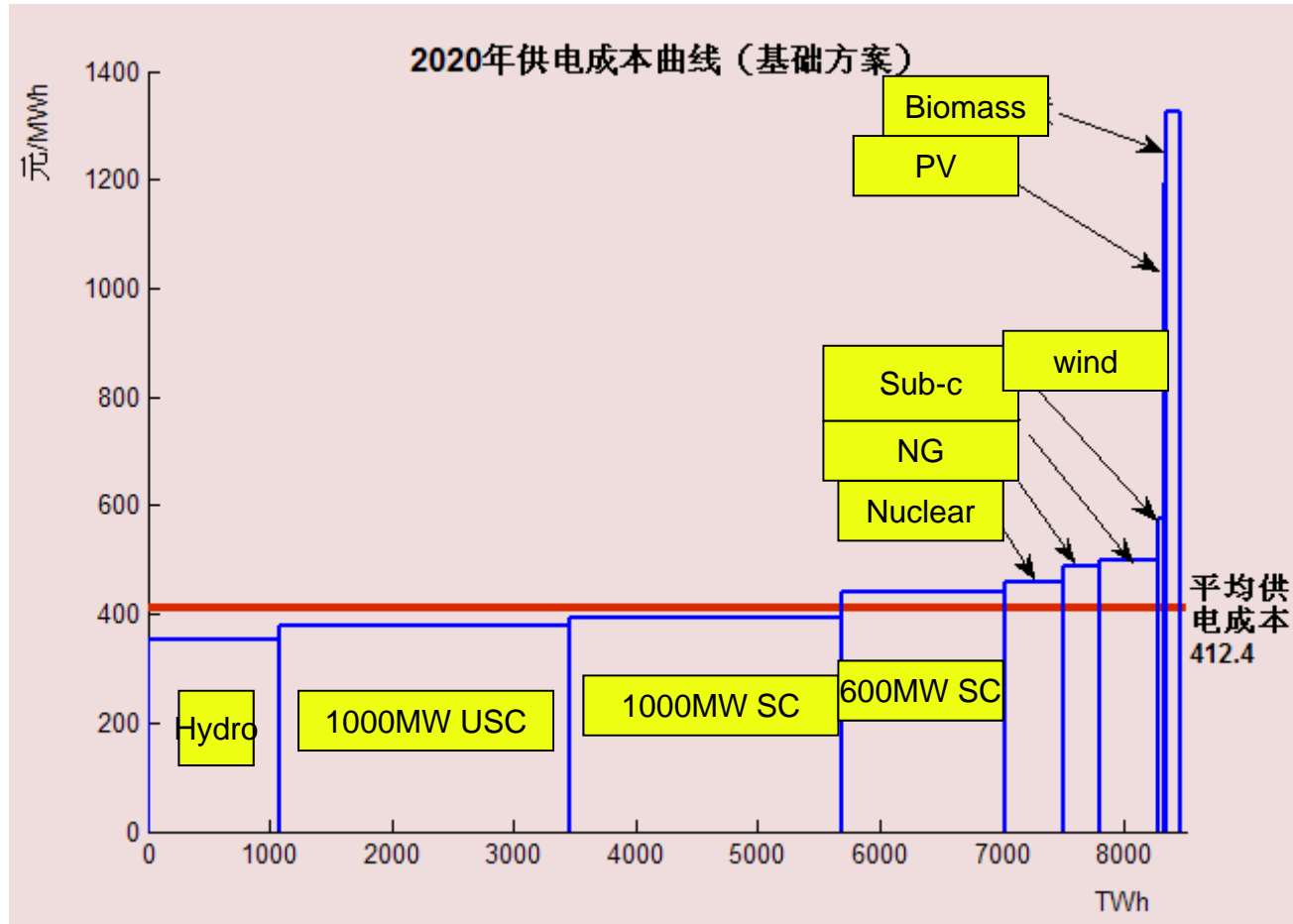
Source: Low Carbon Technology and Policy in China Power Sector. ISBN978-988-15498-1-5

Power sector in 2020 (BAU scenario)

Generator	Installed capacity		Generation		Sale	
	GW	%	TWh	%	TWh	%
Hydro	300	17.7	1080	1.5	1063.8	13.3
Nuclear	60	3.5	468	6.8	436.18	5.4
Wind	30	1.8	60	0.8	59.52	0.7
Biomass	30	1.8	120	17.8	98.64	1.2
PV	2	0.1	2.7	0.8	2.68	0
300MW-Subcritical	90	5.3	477	7	443.61	5.5
600MW-SC	252	14.9	1335.6	6.3	1251.5	15.6
1000MW-SC	420	24.8	2226	5.2	2110.3	26.3
1000MW-USC	450	26.6	2385	5.2	2261	28.2
300MW-NG	57	3.4	302.1	2	296.06	3.7
Non-fossil sum	422	24.9	1730.7	20.5	1660.8	20.7
Thermal	1269	75.1	6725.7	79.5	6362.4	79.3
Total	1691	100	8456.4	100	8023.2	100

Source: Low Carbon Technology and Policy in China Power Sector. ISBN978-988-15498-1-5

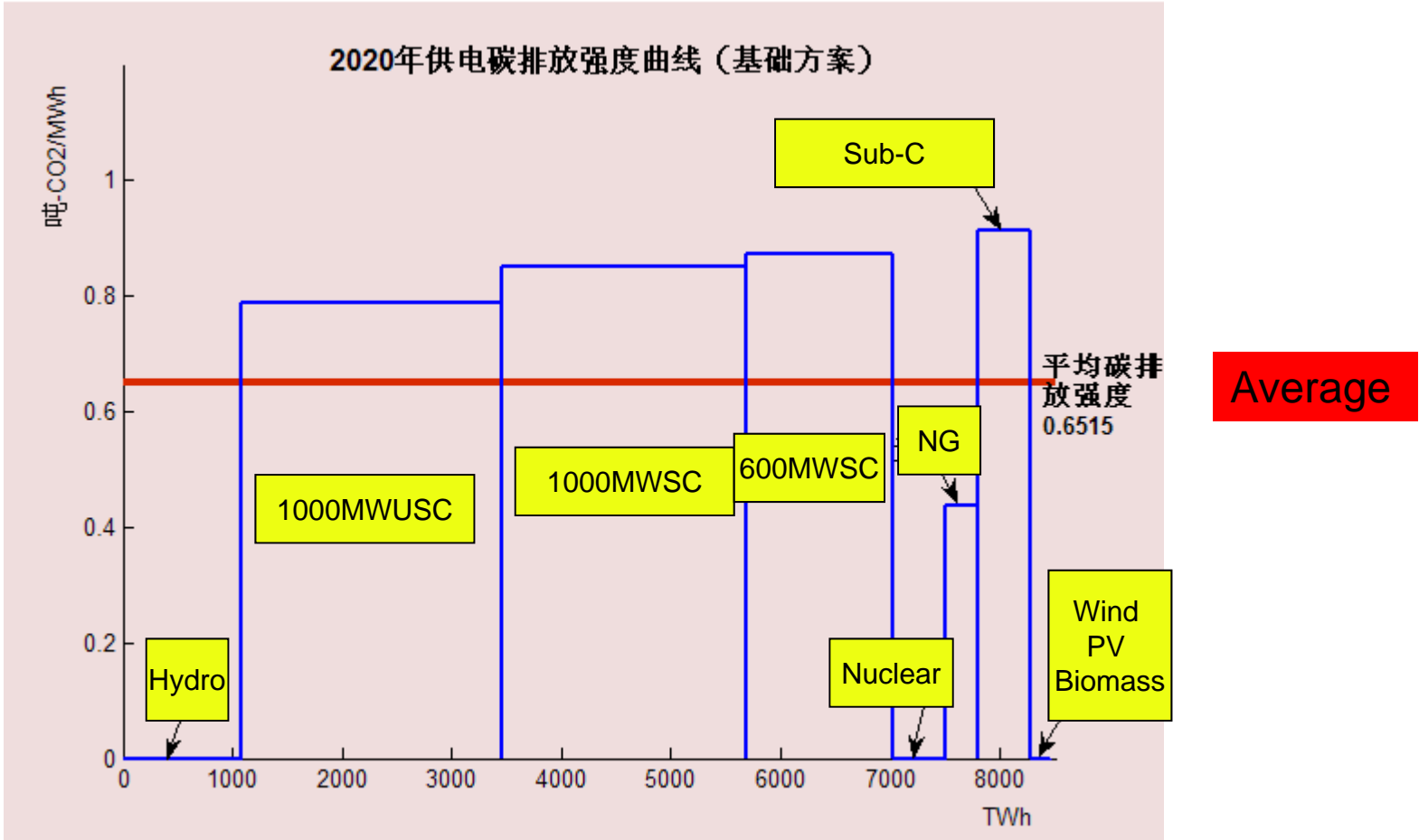
Electricity supply cost (2020 BAU)



Average

Source: Low Carbon Technology and Policy in China Power Sector. ISBN978-988-15498-1-5

CI of electricity supply (2020 BAU)



Source: Low Carbon Technology and Policy in China Power Sector. ISBN978-988-15498-1-5

Power sector in 2020 (low-carbon scenario)

Generator	Installed capacity		Generation		Sale	
	GW	%	TWh	%	TWh	%
Hydro	300	17	1080	12.8	1063.8	13.3
Nuclear	78	4.4	608.4	7.2	567.03	7.1
Wind	150	8.5	300	3.6	297.6	3.7
Biomass	30	1.7	120	1.4	98.64	1.2
PV	20	1.1	30	0.4	29.76	0.4
300MW-Subcritical	89	5	434.07	5.1	403.69	5.5
600MW-SC	234	13.2	954	11.3	893.9	14.5
1000MW-SC	390	22.1	2226	26.4	2110.2	24.4
1000MW-USC	420	23.8	2385	28.3	2261	26.3
300MW-NG	57	3.2	302.1	3.6	296.06	3.7
Non-fossil sum	578	32.7	2138.4	25.3	2056.8	25.6
Thermal	1190	67.3	6301.17	74.7	5964.9	74.4
Total	1768	100	8439.57	100	8021.7	100

Source: Low Carbon Technology and Policy in China Power Sector. ISBN978-988-15498-1-5