

China's Electricity Industry Reform: Economics and Institutions

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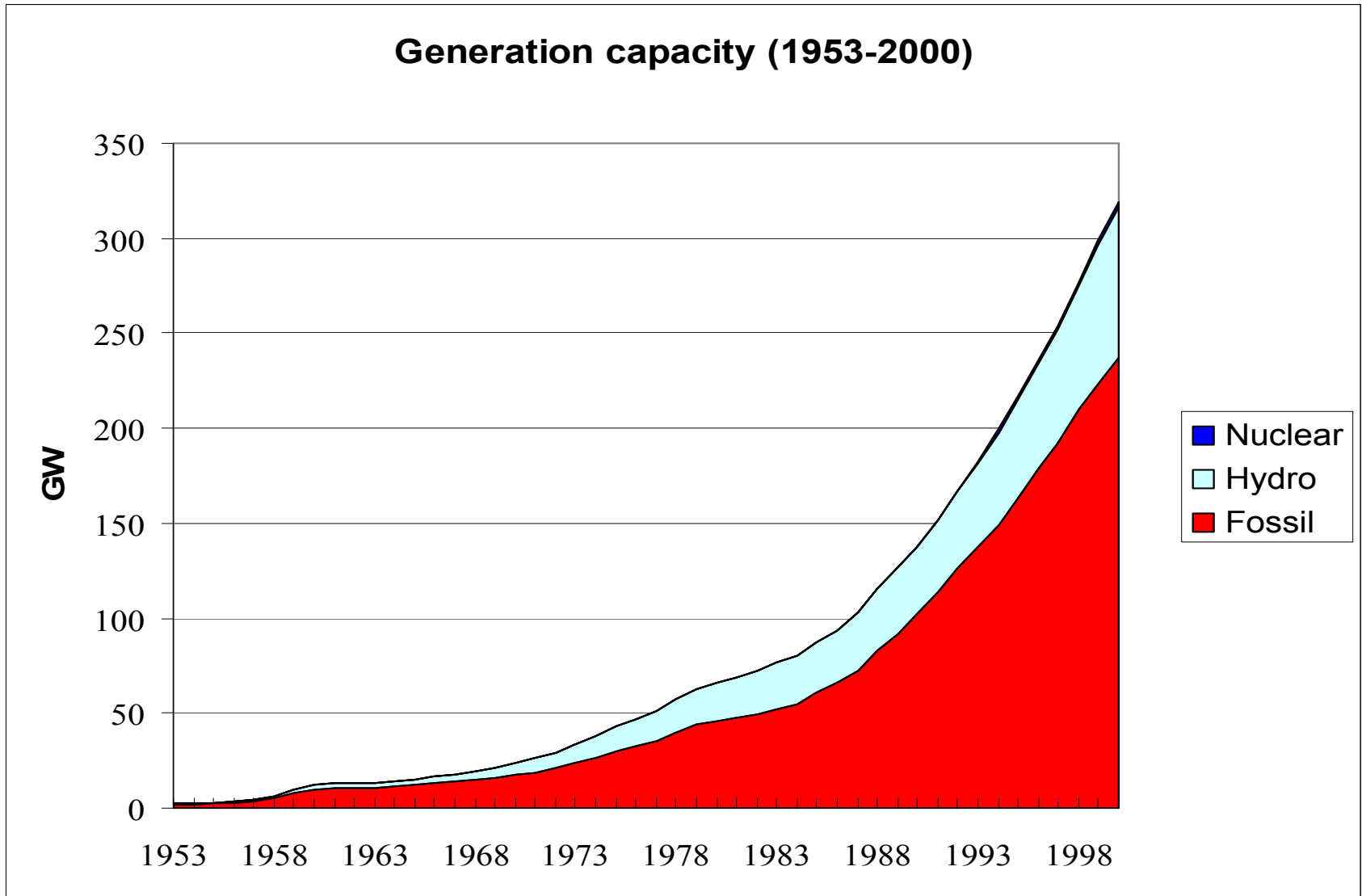
Outline

1. Industry Overview
2. Industry Reforms
3. Results
4. Conclusion

Overview

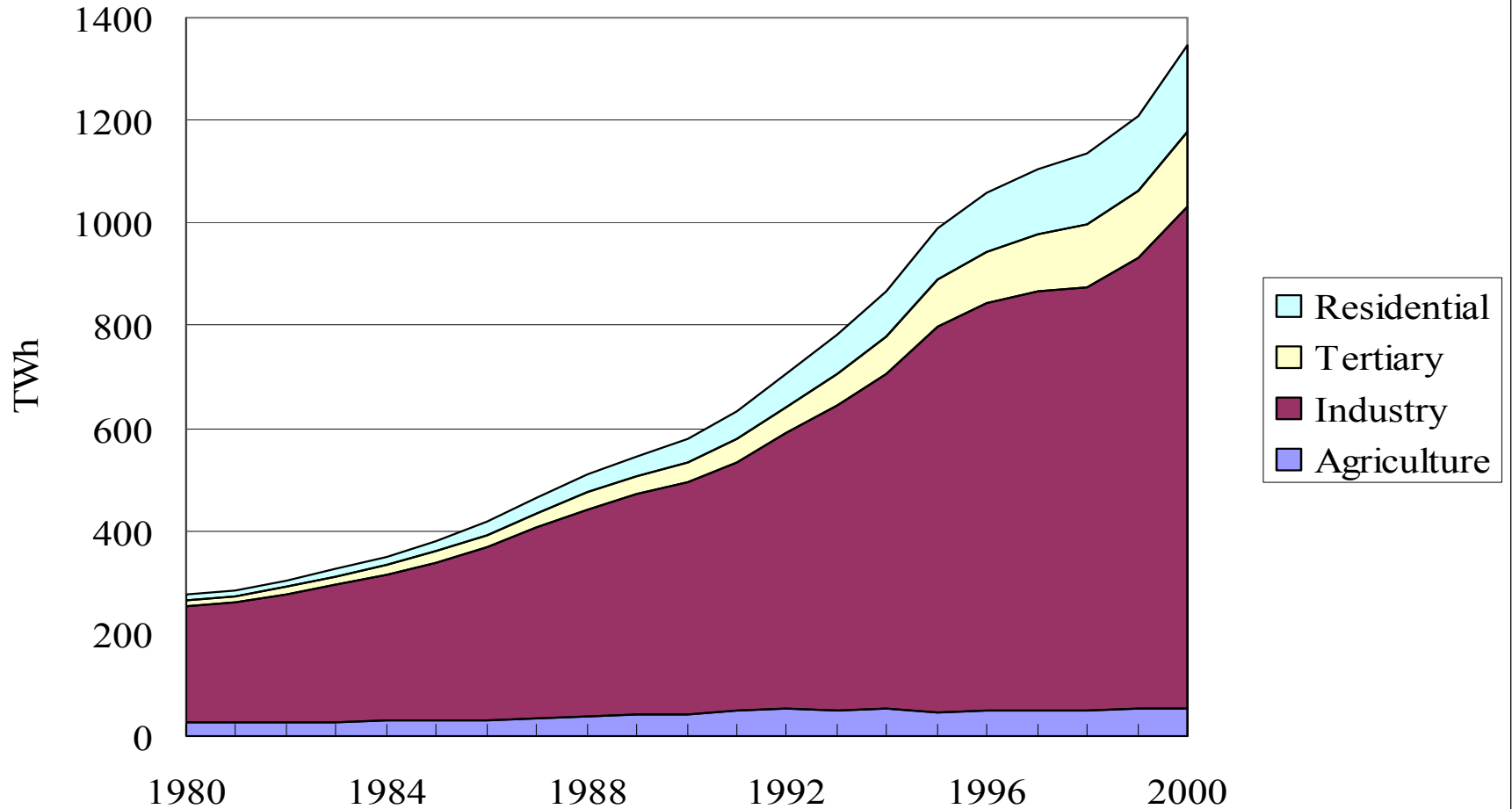
- Industry in steady growth over 50 years
 - 11.5% annual growth rate
 - 2.4 GW capacity in 1953, 338.6 GW in 2002
- Challenges to industry development
 - Capacity expansion and financing
 - Low per capita level of development
 - 5 – 6% annual growth rate for the next decade
 - Efficiency improvement
 - Sustainability

Overview - capacity



Overview - consumption

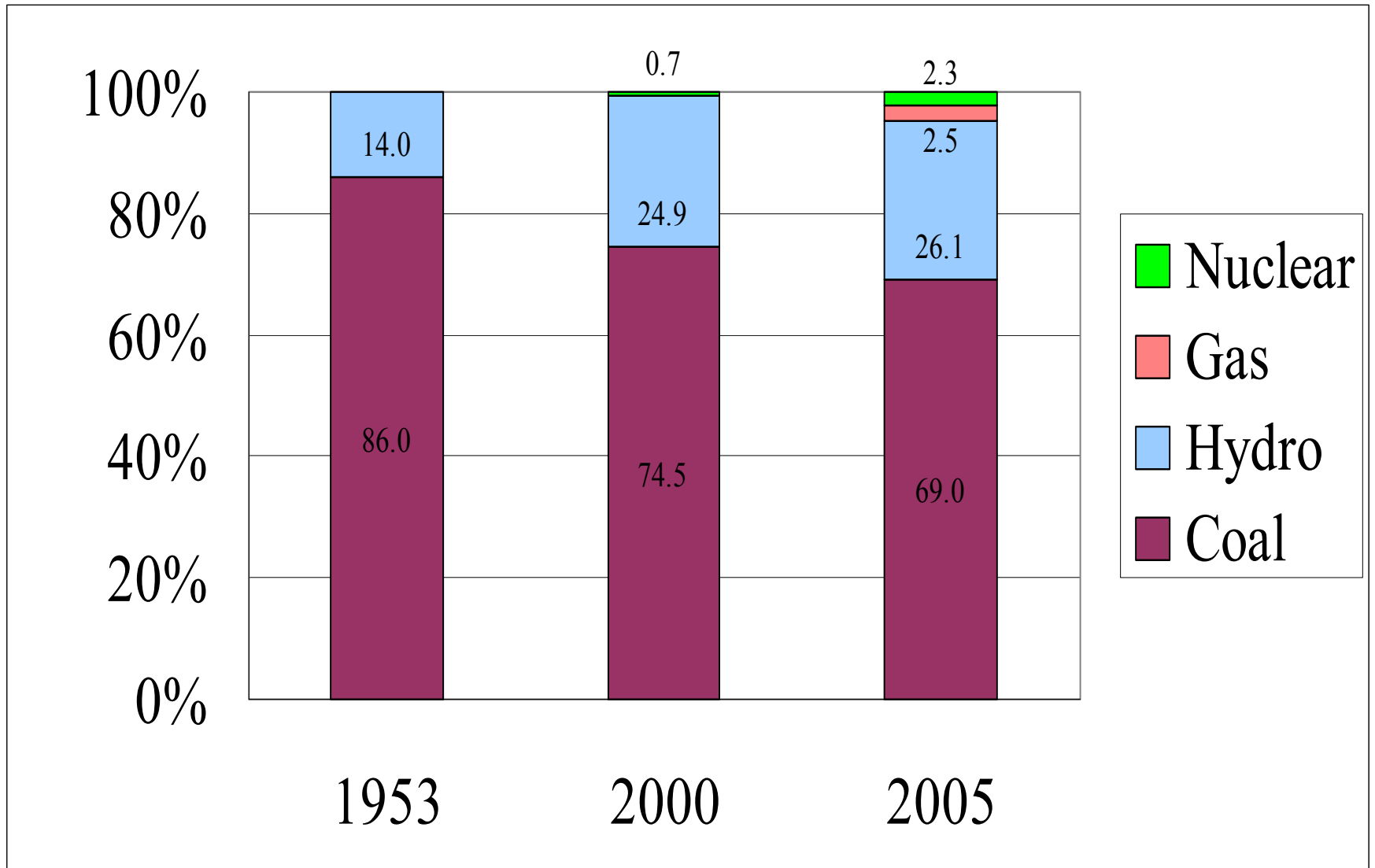
Power Consumption Structure



Overview - electricity grids



Overview – fuel structure



Overview – status in 2000

Population	1266 million
GDP	\$ 1,080 billion
GDP per capita	\$ 853
Installed capacity	319.3 GW
Electricity consumption	1346.6 TWh
Capacity per capita	0.25 KW
Consumption per capita	1,063.5 kWh

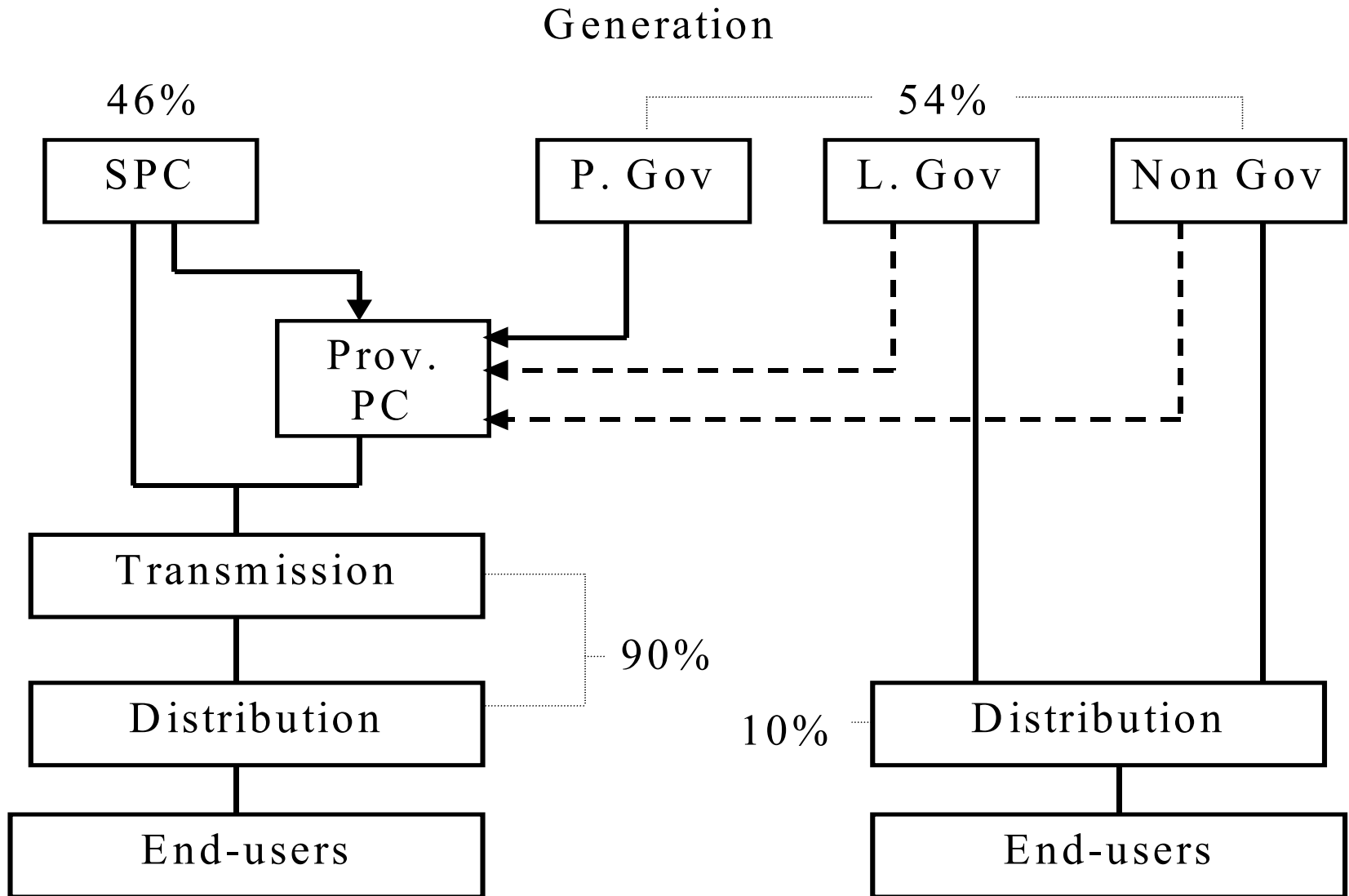
Overview – environmental impact

- Environmental Damages (1998)
 - Coal consumption: 450 mil tons (25% national total)
 - SO₂ emissions: 6.9 mil tons (30% national total)
 - CO₂ emissions: 228.5 mil tons (25% national total)

Reforms

- 1st Stage: Reform to raise capital (1986 –1996)
 - Problem: Lack of capacity
 - Open-up of generation to non-central gov. investors
 - Guaranteed rate of return
 - Tariff hikes to raise power construction fund
 - Tax rebate to strengthen utility companies
- 2nd Stage: Reform to improve efficiency (1997-2001)
 - Problem: Government involvement; slack market
 - Separation between government and business
 - Corporatization of public power companies
 - Experiment of wholesale mkt competition in 6 provinces
- 3rd Stage: Reform to break monopoly (2002 -)
 - Problem: industry monopoly; regional monopoly
 - De-integrate generation and transmission
 - Competitive wholesale market
 - Independent regulation

1st Stage Impact – system reorganization



1st Stage Impact – high tariffs

(Guangdong urban enduser rate, 1998)

\$/MWh

	Grid selling price	E.P. constr fund	Three Gorges fund	Exstra local fuel fee	City constr fee	Total
Lrg ind	65.30	2.41	0.84	13.73	1.69	83.98
Ord ind	79.16	2.41	0.84	14.34	1.69	98.43
Comm	110.60	2.41	0.84	15.06	1.69	130.60
Resid	72.29	2.41	0.84	3.61		79.16
Rice prod	37.35	2.41	0.84			40.60
Avrg	72.94	2.41	0.84	11.69	1.69	89.57

1st Stage Results – investment financing

- Success
 - Diversified source of financing
 - Raised \$20 billion per year
 - Financed 89% of US\$101.3 billion industry investment during 9th FY plan (1996-2000).
- Reasons for success
 - Huge domestic savings
 - Government ability to mobilize resources, and control the economy

1st Stage Result - financing by source (1996-2000)

	\$ billion	%
Central Gov. sources	31.4	44.6
Local Gov. sources	13.6	19.4
Enterprise internal funds	9.2	13.1
Foreign investment	12.2	17.4
Other sources	4.0	5.6
Total capital constr. investment	70.4	100.0

1st Stage Result - financing by type (1996-2000)

	\$ billion	%
Bank loans	29.5	42.0
Government special funds	9.6	13.7
Enterprise raised funds	9.2	13.1
Debt	0.8	1.1
Foreign investments	12.2	17.4
Unclassified	9.1	12.9
Total Capital constr. investment	70.4	100.0

* Central government direct grant

<5%

2nd Stage Result – efficiency improvement

- Government withdraw: little impact
 - State's control of investment, pricing and dispatching intact
 - Traditional institutions of central planning not changed
 - Both reflect difficulties of broader economic transition
- Market experiment: little impact
 - Small scale
 - Tight market, full dispatch

Results - main industry characteristics

	Old system (- 1985)	1 st Stage (1986-96)	2 nd Stage (1997-01)	3 rd Stage (2002 -)
Sector Structure	I.U.	I.U. with “IPPs”	I.U. with “IPPs”	De-integrated generation
Ownership	State	Gov. majority	Gov. majority	Gov. majority
Control	C. Gov.	C. Gov.; P. Gov.	C. Gov.; P. Gov.	Gov ?
Operation	C.Gov.	C.Gov.; P.Gov.	SPC; Prov.PC.	Natl Grid Company?
Regulation		C. Gov.	C. Gov	Independent?

C.Gov: central government; P.Gov: provincial government

Yellow: indicates changes

New Power Supply – Example of Guangdong, Shanghai

	Cents/kWh	
Nuclear	7	
Hydro	6 – 7	Three Gorges: 8.4 incl Transmission
New coal	4 – 5	2.8 set for Guizhou 600 MW (Dec 2002)
Natural Gas	4 – 5	Competitive if coal is \$35 ton, and gas is \$ 3-4 gigajoules. Shanghai gas: \$4.3; coal \$36 GD LNG: \$2.84 ex ship; coal \$38

Results – industry supply decisions

	Old ystm (- 1985)	1 st Stage (1986-96)	2 nd Stage (1997-01)	3 rd Stage (2002 -)
Resource Allocatn	Central Planning	Central Planning	Central Planning	Planning? Mkt?
Invest. Planning	C. Gov.	C.Gov; P.Gov; Private	C.Gov;P.Gov; Private	C.Gov; IPPs
Source of finance	C.Gov allocatn	Gov. funds, Policy finance; Small mkt	Gov. funds, Gov. policy fin; Small mkt	Policy? Mkt ?
Pricing	C.Gov	C.Gov	C.Gov	Gov.? Mkt?
Dispatch	C.Gov allocatn	C.Gov allocatn.	Multi Gov. Neg Comp.experimt	Government ? Competition?

C.Gov: central government; P.Gov: provincial government

Color: indicates changes

Conclusion

- Market and competition development may be slow and small-scaled, due to
- Difficulties
 - Continued huge capacity need.
 - Tight mkt, full dispatch
 - Co-existence of central planning and competition.
 - Institutions incompatible with markets
 - Dominant position of national and local governments
 - Lack of independence of “firms”
 - Weak rule of law
 - Stability policy constraint
 - 80% contract; Price cap