

Power Sector Reform in China: Experience and Future

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Outline

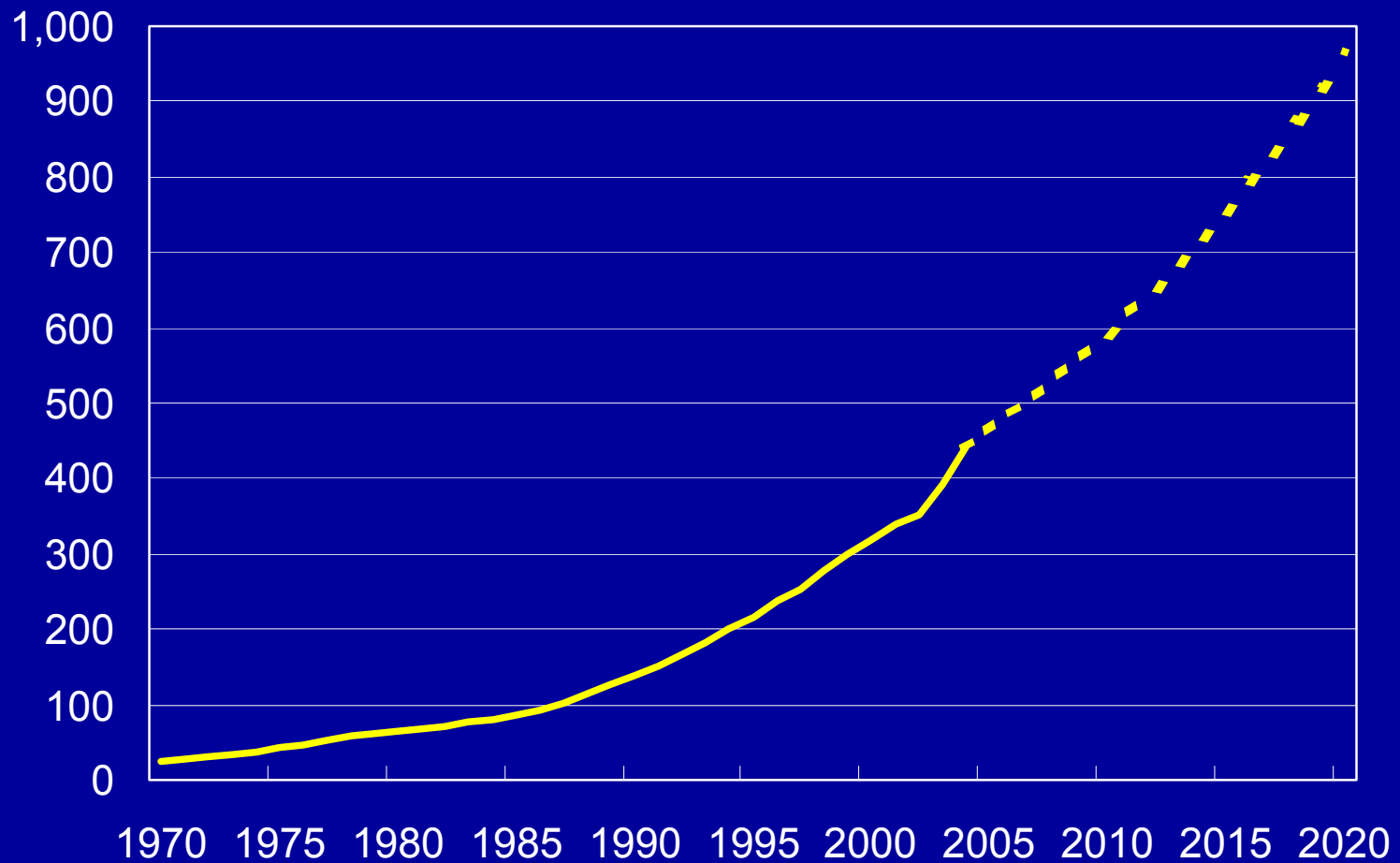
1. Industry overview
2. Reform experience
3. Reform forecast

1. Overview

- Industry in solid growth over 50 years
 - 11.5% annual growth rate
 - 2.4 GW capacity in 1953, 441 GW in 2004
- Evident short run boom bust cycles
- Government centered planning system

Overview - capacity

Chinese installed capacity (GW)



Overview -- 2004 Boom

	2004	2003	Growth %	Structure %
Installed capacity (GW)	441	391	13	100
Hydro	108	95	14	25
Thermal	325	290	12	74
Nuclear	7	6	11	2
Generation (TWh)	2187	1905	15	100
Hydro	328	281	17	15
Thermal	1807	1579	15	83
Nuclear	50	44	14	2
Consumption (TWh)	2174	1892	15	100
Agriculture	61	60	3	3
Industries	1626	1396	16	75
Services	244	211	15	11
Residential	243	225	8	11
Urban	147	136	8	7
Rural	96	88	9	4

Overview -- Challenges

- Capacity expansion and financing
 - Low per capita level of development (0.29kw)
 - 5 – 6% annual growth rate until 2020
- Efficiency improvement of resources allocation
- Environmental protection

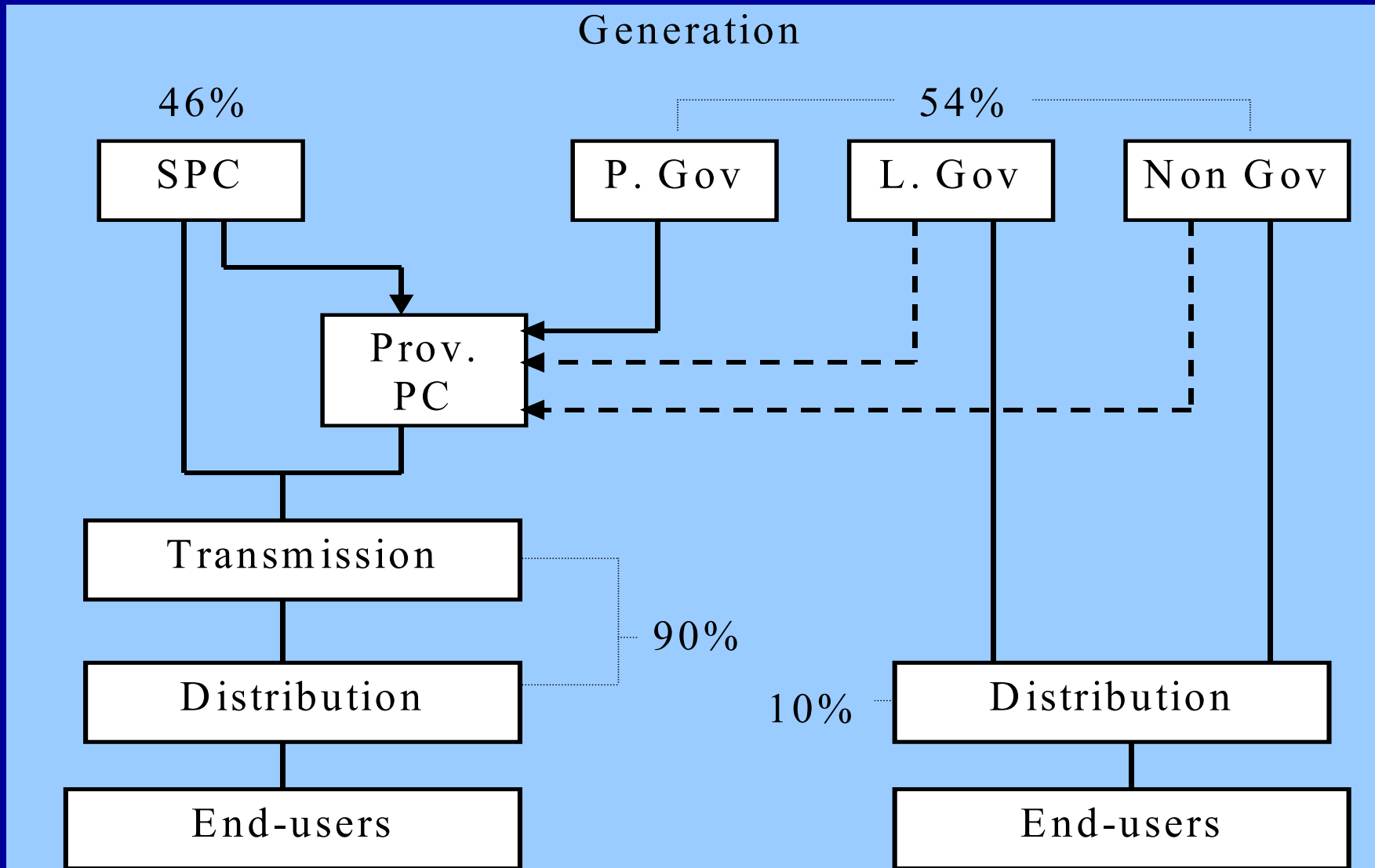
2. Power reform experience

- Objectives
 - Raise capital to expand the system
 - Blend planning with market to improve economic efficiency
- Three Stages
 - 1986 – 1996
 - 1997 – 2001
 - 2002 –
- Results
 - Good news: capital available
 - Bad news: inefficient hybrid of planning and market.
- Fundamental issue: planning and industrial policy or market and independent regulation

First state reform (1986-1996)

- Motivation: Raise capital
- Measures
 - Open-up of generation to non-central government investors
 - Guaranteed rate of return
 - Tariff hikes to raise power construction fund
 - Tax rebate to strengthen utility companies

1st Stage Impact – system reorganization



1st State Impact – high tariffs

National Average Retail Tariffs

	1996	2000	Increase %
Power sales (TWh)	714	905	26.7
Revenue (\$ million)	25821	35171	36.2
Fee collections (\$ million)	2951	2450	-17.0
Average retail tariffs (cent/KWh)	4.06	4.82	18.6
large industries	3.87	4.77	23.2
other industries	4.72	6.29	33.3
agricultural production	3.65	4.24	16.2
poor area ag irrigation	1.50	2.04	36.5
services	6.84	8.44	23.3
residential	3.62	4.85	33.9
non-residential lighting	5.20	6.96	33.6
cross provincial sales	8.11	2.09	-74.2
wholesale to ind. distributors	3.41	4.25	24.6

1st Stage Results – investment financing

- Success
 - Raised \$20 billion per year
 - Diversified source of financing
 - 1996 – 2000 new capital investment (\$70.4bil)

Central government:	44.6%
Local government:	19.4%
Enterprises:	13.1%
Foreign investment	17.4%
Other:	5.6%
- Reasons for success
 - Huge domestic savings
 - Government ability to mobilize resources, and control the economy

Second stage reform (1997-2001)

- Motivation: Reform to improve efficiency
 - Problem: Government involvement; slack market
- Measures
 - Separation between government and business
 - Corporatization of public power companies
 - Experiment of wholesale market competition in 6 provinces

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

Third stage reform (2002 -)

- Motivation: Break monopoly
 - Problem: sectoral and regional monopoly during slack market
- Measures: western de-integration model
 - 2002.12 de-integration between generation and transmission
 - 2003.3 State Electricity Regulatory Commission created
 - 2003.7 Wholesale tariff reform guideline issued
 - 2004.1 Regional wholesale market simulation began in Northeast
 - 2004.5 Same simulation began in East China
 - 2004.6 Six regional regulatory commissions created
 - 2004.12 Wholesale tariff reform plan due

Post-2003 reforms: Organization

- Dissolve State Power Company with assets transferred to 5 independent, but wholly state owned GENCOs and 2 GRIDCOS
 - Huaneng, CPI, Datang, Huadian, Longyan transformed into national holding companies (Guangdong and local or provincial outside)
 - State Grid Company and China South Grid Company
- All GENCOs continue to operate through assigned dispatch and state fixed tariffs, but have prospective autonomy in investment plans
 - Initial managers still appointed by political authorities
- New rules for limited competition under design by national level commission
- Independent regulator established at national and provincial levels with unclear authority on all major issues

3rd phase reforms: Supply growth

- National
 - Current installed capacity about 415 GW
 - 180 GW approved new capacity (3/4 Gencos)
 - 300 GW incremental filed for approval
 - 125 GW estimate (low since figures not available?) of unapproved plant being built
 - Free cash for other enterprises under financial repression
 - Quality of capacity known until approximately 2008 (in pipeline); open thereafter depending on price relations and federalism
 - Staged building flexibility
 - Threatened central restrictions as signals

Third phase reform: Demand

- GNP growth estimated at 8 – 12%
- Energy intensity: stability of .5 growth since 1990?
 - Price increases to end-users and one time pools
 - Efficiency becomes an issue of technology shifts
 - Service sector energy intensity growth
- Electricity substitution for other energy forms
- Regional variation is high
- Quality differentiation expanding

3rd phase reforms: Portfolio management

- Portfolio integration by old provincial utilities now recast as daughter GRIDCOs
 - Planning of plant type and scale
 - Non-price competition (unless side payments) by suppliers, including national generators
 - Local developers deal with localities and provinces in political negotiation for short run off-take quotas
 - Approval by NDRC now pro forma in shortage
 - Transmission increases (copper market) likely at provincial levels rather than national network interconnection

3rd phase reforms: Financing

- State bank loans
 - Financing for any project in plan and NDRC approved
 - Macroeconomic restrictions have not been applied to power infrastructure projects under shortage
- Local bank loans; reinvested industrial earnings
 - Local government and private sources
- Financial repression leaves banks with excess liquidity
- Effectively free cash investment
 - Negative interest rates (5.31%)
 - Non-foreclosure: State banks have always been paid in the power sector, but record in other SOEs suggests low enforcement if power prices are now allowed to rise in future as in past
 - Restrictions on alternative investments makes power return, even if risky, more than competitive

3rd phase reforms: Financing

- Stock issues onshore reduced by poor price levels, relative to cost of loan capital
 - CPI: 3 billion yuan in 15 year bonds issued and sold
- FDI beyond offshore Chinese capital until now questionable
- Securities issues offshore (Hong Kong)
 - Subsidiaries of national GENCOs with new issues
 - Problem of corporate governance, particularly with international (listed) subs' purchase of assets from other group members at uncertain valuations
 - No control issues with state shareholder control and wholly owned holding companies (SASAC) implies further free cash

3rd phase reforms: Federalism

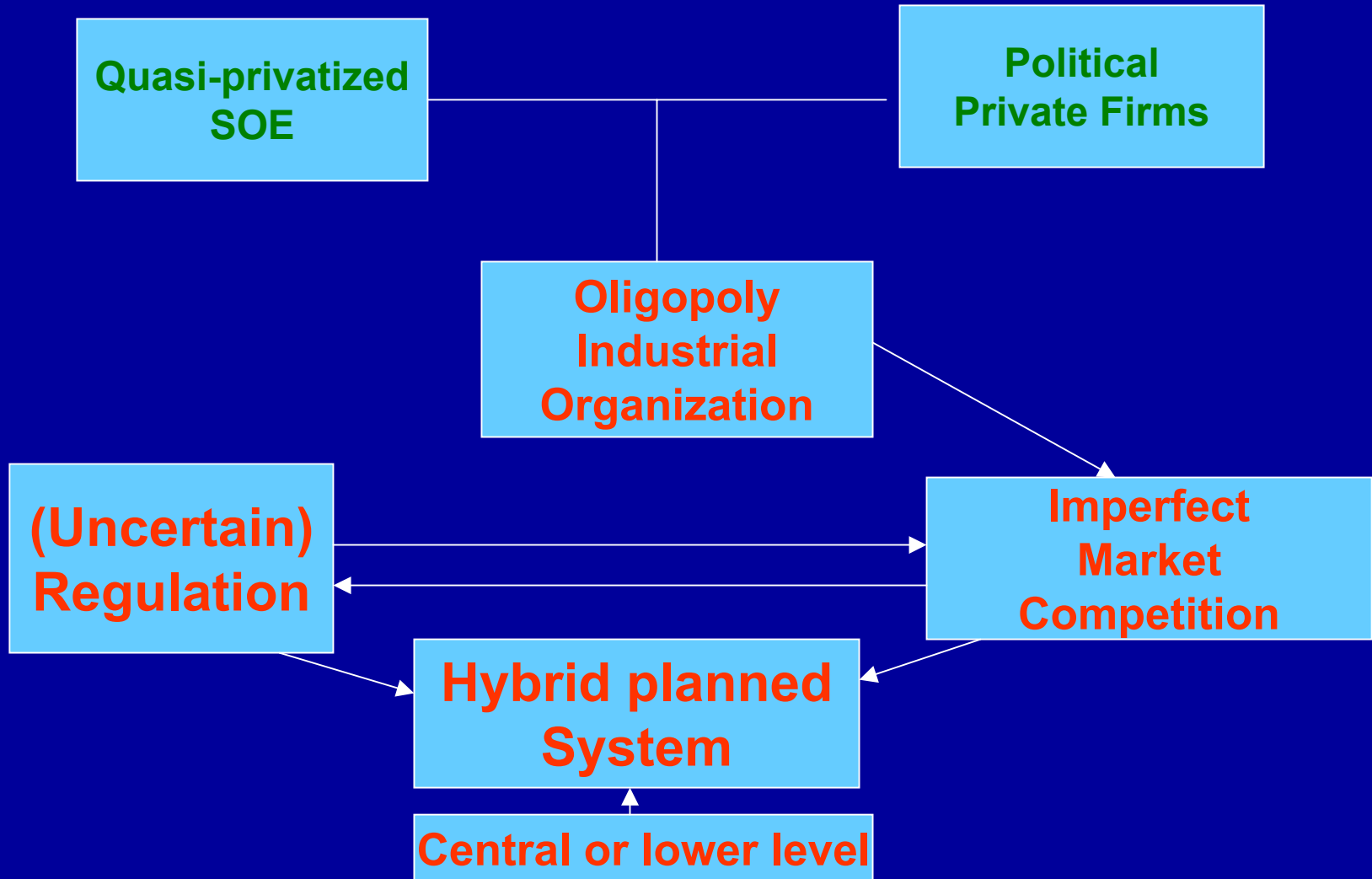
- Provincial autonomy strategies and the center: quality and autonomy
 - National: West to East power flows for regional development
 - Guangdong: 40 GW to 100 GW in 2020
 - Imported power through dedicated lines and mandated hydro contracts (insecure back up) less sought than internal gas and coal
 - Capacity to pay but unclear ability to set own tariff rules
 - Differential estimates of demand with central planning
 - Shanghai and West-East pipe, LNG

3rd phase reforms: Security

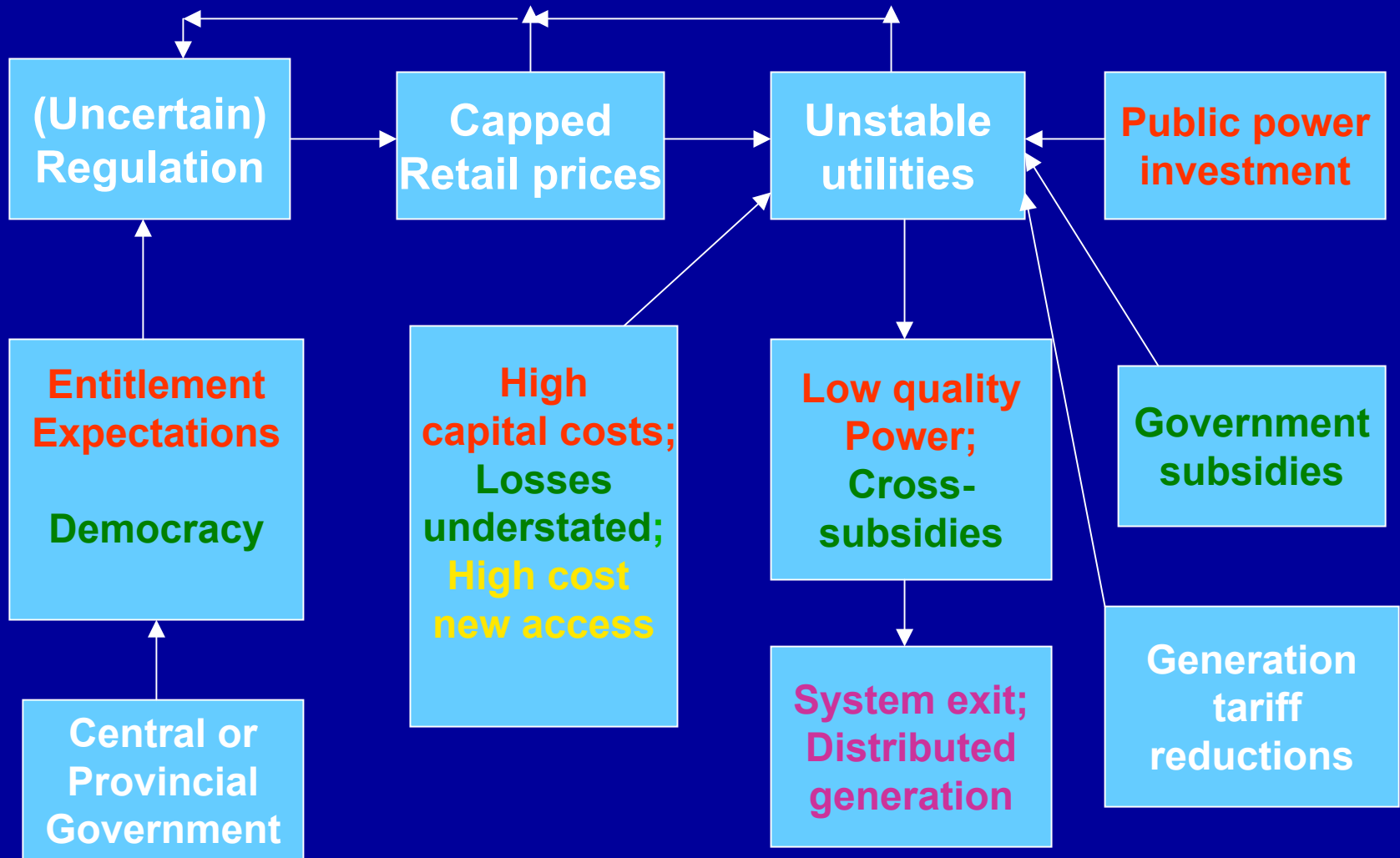
Energy security and internationalization

- Petrochina, CNOOC as multinational asset holders?
- Gas resources competitive, but offshore whether pipe or LNG
 - Guangdong differentiates regional from mid-east resources
 - Russian gas resource transfer less economic than security and Gazprom as partner
- Long run planning features conservation, nuclear, and coal gasification with polygeneration

3rd phase reforms: Regulation



3rd phase reforms: Regulatory Instabilities



3rd phase reforms: Regulation

- Expected behavior of central government under supply overcapacity: reform with central assets on-line
- Rules and contracts setting payments to generators will remain unstable: old tariffs/new costs tension
 - Reduced ability to pass wholesale through to higher tariffs as in China's past
 - Emerging political protest and transparency issues make end-user tariffs sticky
 - Resistance more like other nations have experienced

Investment in Hybrid Markets?

- Who can best manage the experienced risks of incredible (political) markets?
- Who can best manage the (re)writing and implementation (interpretation) of rules?
- Key is neither the fuel market contracts nor the wholesale (generation) contracts, but credibility of the retail market contracts that drive the political dimensions of electricity
- Credibility complicated by weak information in markets, corruption, popular expectations of price, and higher costs of incremental capacity
- Strategy: political assets and corporate governance
 - Political assets key in political allocation of on grid sales
 - Placement of better assets into international listings
 - Intra-group sales of weaker assets by state control shareholder