

# Chinese Energy Reform

Thomas C. Heller

Rio de Janeiro

April 4, 2004

# Political Economy of Power

- 3 phases of reform 1985-2004
  - Low reform of core system (partial release) 1985-97
  - Reaction (attempted re-integration) 1997-2002
  - Re-reform but structural problems remain and results problematic 2002--
- Three research studies: (PESD)
  - Two papers (Chang, Heller & May) on Chinese energy reform in three provinces (*Energy Policy*, 2004)
  - A five country study of electricity sector reform (China, India, Mexico, Brazil and South Africa)
  - Case studies and analysis of FDI (1990-2003)

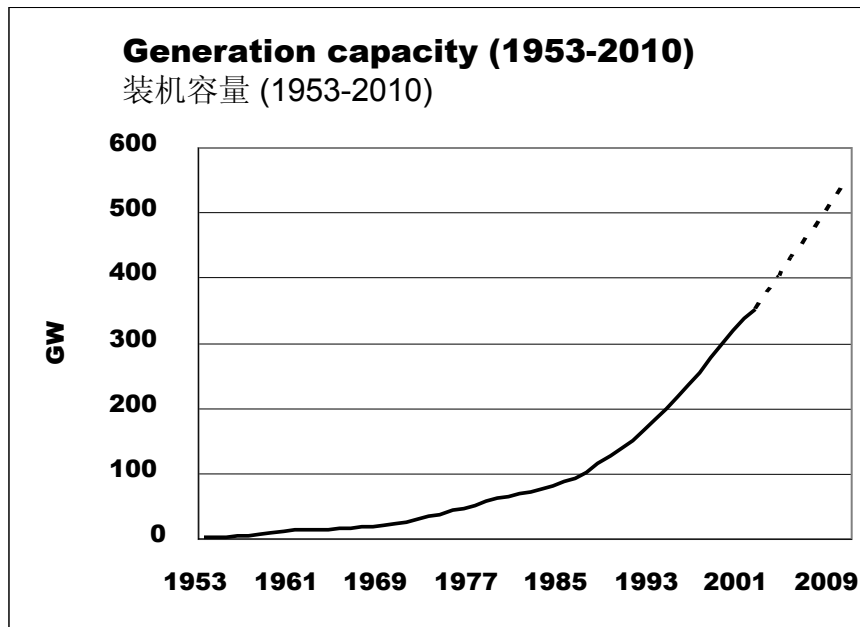
# Chinese Overview

- **Accomplishments**
  - **Installed capacity grew from 1.9 GW (1949) to 63 GW (1979) to 320 GW (2002)**
  - **Most of the world's gains in access are in China**
  - **Energy intensity (E/GDP) has fallen at unprecedented rates for any fast growing nation**
- **Concerns**
  - **Uneven growth and composition by province**
  - **70%+ of energy production remains coal fired (oil 18%; gas 2.2%; hydro 6.7%; 1.5 nuclear)**
    - **World's leading emitter of CO<sub>2</sub> in absolute amounts by 2020**
  - **Planned growth (low per capita installed capacity [.25 kw] 50% world average) is 20 GW annually until 2010**

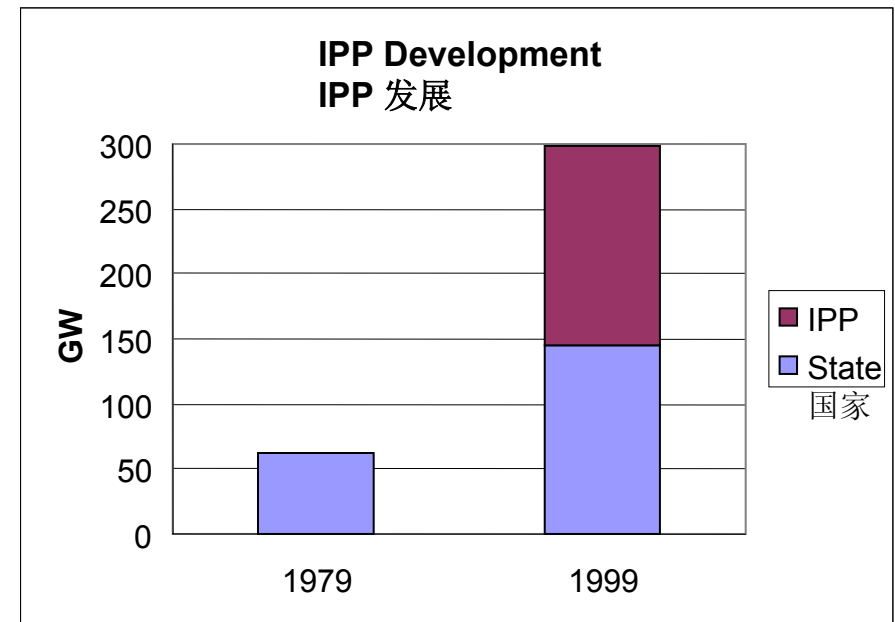
# China's Capacity Development

## Increased Role of the Non-State System

### Increase in Generation Capacity



### Ownership



# Standard Reform model

- De-integration of generation ownership from transmission, distribution and retail ownership
- Competition in wholesale (generation) markets (contract, day ahead, spot markets; differentiated quality and pricing)
- Independent regulatory commissions to manage reliability, market rules, residual monopoly (T&D)
- Portfolio management decentralized
- Privatization

# Reform model: Motivations

- Efficiency of system (price reductions from less overcapacity (AJ) and political (mis)regulation) relative to state monopoly or cost-plus regulation
  - Market integration in US and EU
- Environmental controls
- Quality improvements through product/service differentiation (decommodification) and reliability
- US reforms cap a process of deregulation of fuel markets, IPP competition, environmental management and integrated resource planning begun in 1978

# Pre-reform Baseline

- **State system in China**

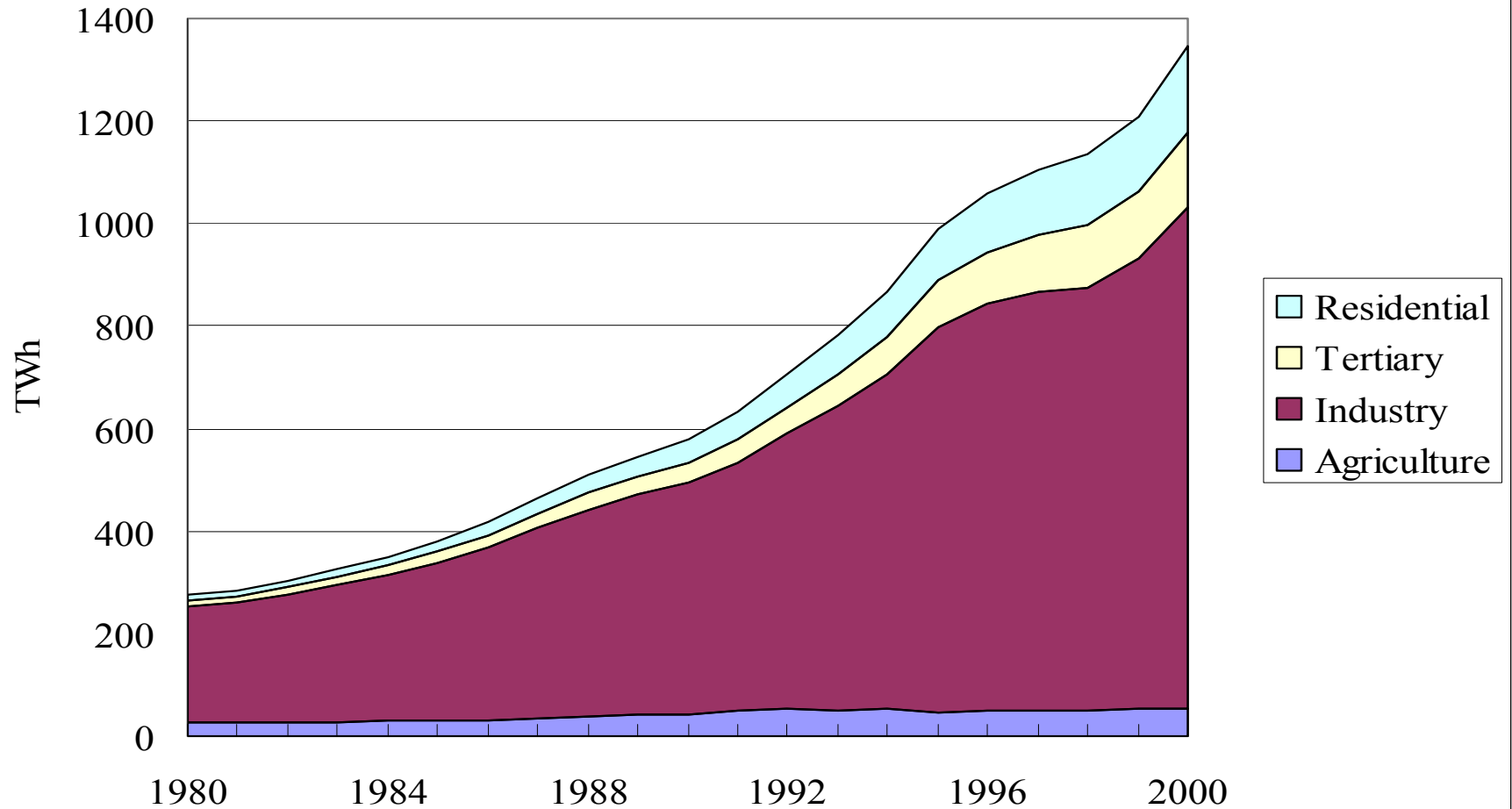
- Nationalist project at core of development and public sector (security)
  - Coal as the dominant national fuel; hydro secondary
- Centralized monopoly with political control and administrative execution of policy
  - Centralized planning with qualitative (political) allocations of power and tariffs
  - State financing through grants and later bank loans of low credibility
  - Political negotiation of capacity additions
  - State Planning Commission on system design and tariffs; Ministry of Energy more implementation than policy

# Pre-reform baseline

- SOEs fully vertically integrated utilities, with political and economic assets, an engineering culture and management, opaque accounting and transparency
- Costs of revenue base and cross-subsidies spread unclearly
  - Multiple and complex tariffs by region and end-use
- Electricity as political asset: entitlement and currency (social contract, rather than a market commodity)
  - Costs of power generation low with no effective capital cost and low priced indigenous fuel
  - Low prices aimed principally at industrial state enterprises
  - Low priority for rural or urban consumers who faced relatively high tariffs with no electoral pressure
  - Profits high leaving utilities solvent with low arrears in sector from high volume end users

# Power Consumption in China

## Power Consumption Structure



# Chinese motivations for reform

- **Disturbance** (of SOE system)
  - Marketization and organization reform (corporatization; privatization)
    - Price stability, especially for favored users
    - Access growth
  - Financing of capacity growth
  - *Professional networks*
  - *Technical by-pass (telecom)*
  - *Politically organized interest groups disserved (price or quality)*
  - *Environmental management*

# First phase Reforms

- 1985-1992 capacity expansion by allowing a peripheral track to supplement core planning
  - Restrictive monetary policies on state credit and bank reform
  - Build out by local governments, SOEs, FDIs; IPPs and some local distribution grid extensions with high costs
  - Multiplication of fragmented tariff rates under national and local price controls, but average prices remain relatively high for leading developing countries
  - Decentralization of some financial means (retained earnings, fees) to provincial utilities
  - Quota allocations of dispatch not tied to marginal cost

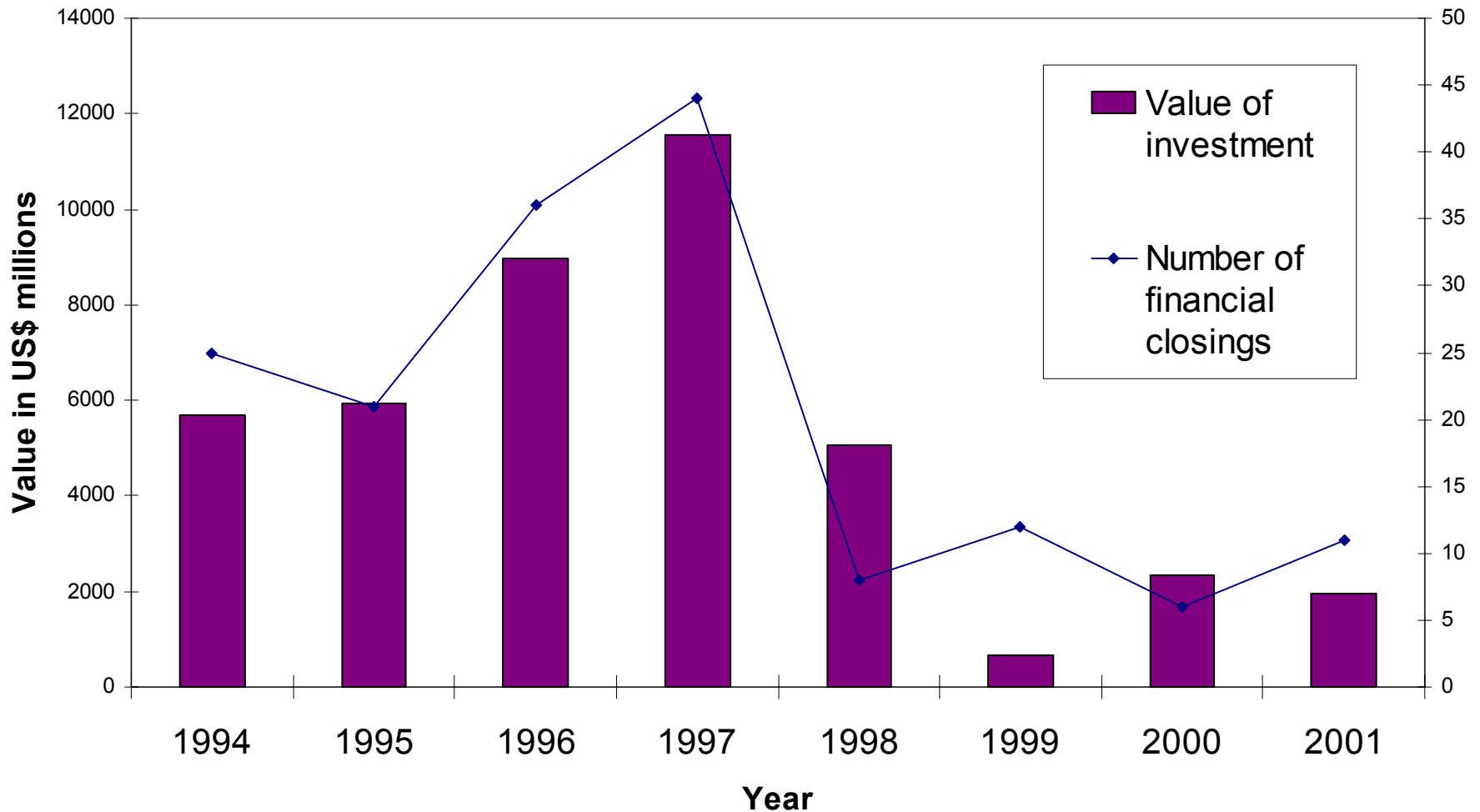
# First phase Reforms

- 1992-1997: stalled comprehensive reforms
  - Core track is state planned and bank-financed, standard nationally produced, 300 MW coal-fired unit on unreformed SOE model
    - Improved efficiency (heat rates) on standard model
    - State owned IPPs with daughter company international financing and access to national securities markets
      - Rolling mill 4 or Hubei unit 4 as separate listed firms
      - Ownership of new capacity by state IPPs, but political offtake
    - Limited FDI large scale investment: Shajiao B&C, Shandong Power, Laibin B, Meizhouwan, Yangchung, developed on power purchase agreement model with Laibin B competitive bid

# First phase reforms

- Peripheral track is composed of smaller and less efficient/clean (oil fired) plants
  - Bimodal development pattern emerges in fast growing provinces with high demand and local retained earnings to finance outside of state loan or licensing system
  - self-generation to avoid unreliable provincial dispatch
  - Stable political off-take allocations (quotas) in provincial systems at controlled prices with local price committee review and approval
  - Some financed as joint ventures with offshore China investors in *political merchant* market (Zhujiang 1&2)
  - FDI largely below the regulatory thresholds of national state (with offshore Chinese capital)

# Value and Number of Financial Closings of Greenfield Electricity Projects in East Asia and the Pacific



# Second phase reforms

- 1998-2002: reorganization and (re)integration
  - Asian financial crisis slows growth rates and surplus capacity develops
  - Wider state reforms have proceeded in other sectors with competition (autos), but weakly mirrored in electricity sector
  - Post 1998 pressures from center to close small and dirty plants, resisted by local and provincial interests
  - Provincial re-integration of local distribution and fees used for local government financing

# Second phase reforms

- Corporatization of State Power Company with separation from Ministry of Power (dissolved)
  - Nameplate changes of agencies
  - SETC as new regulator with effective power in State Council
  - No competition allowed except for experimental marginal production in six provinces
  - Moratorium on new plant building in coastal areas (only completions)
  - Struggles over ownership distribution of plants
  - No new foreign investment with PPA repudiation or renegotiation in all large installations
    - Example of Meizhouwan case of wholly owned
    - Yangchung (AES) corporate governance risk

# Second phase reforms: policy goals

- Development of interior regions as industrial policy
- Reduce local protectionism
  - Fujian Formosa Plastics
- National projects
  - Three Gorges (spinning reserve?)
  - West-East pipeline
  - AES coal by wire project not controlled by center
- Renewables, nuclear and Agenda 21 separately institutionalized; oil and gas firms corporatized; new state agency-corporatized firm alliances
- Macroeconomic policy shifts and FDI independence

# Third phase reforms? 2002--

- Dissolve State Power Company with assets transferred to 5 independent, but wholly state owned GENCOs and 2 GRIDCOS in North and South China
  - Huaneng and CPI transformed into national holding companies
- 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
  - 80% supply through fixed contracts with 20% spot?
  - Level of decentralization to be allowed is murky for both the wholesale and retail markets
- Independent regulator established at national and provincial levels with unclear authority on all major issues
- Growth needs and performance at 20GW annually from 2002

# Third phase reforms? 2002 --

- Market structures
  - Competition and oligopoly power of major generators (Rule of Law/Competition agency)
    - Preferential access to capital markets by GENCOs, with state firm investment in non-listed shares
    - Foreign capital likely needs partnership with national majors
    - Hybrid market (political assets retain value) with national players
  - Network integration remains unclear under new GRIDCOs and uncertain T&D investment
  - Price pressures from consumers, private firms under competition in other sectors and state firms with harder budgets from reforming state banks

# Third phase reforms

- Financial markets and reforms
  - Macroeconomic policy may not be sustainable, requiring new capital sources
  - Low cost capital in repressed domestic savings markets may fall through liberalization and internationalization
  - New growth demands in coastal areas with established prior pattern of peripheral (non-core) development
  - Chinese capital markets speculative and unstable with weak corporate governance and law
  - New access to onshore banking, but uncertain behavior of Chinese banks still state dominated
  - FDI memory and contracting credibility (JVs and corporate governance problems with state partners)

# Third phase reforms

- Federalism
  - Provincial autonomy strategies and the center: gas and environment
    - Guangdong: 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 terminals diffusion
- Energy security and internationalization
  - Petrochina, CNOOC as multinational asset holders
  - Gas resources competitive, but offshore as pipe or LNG
  - Nuclear will grow but at low percentage

# General Questions

- 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