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China's energy challenges and restructuring options

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Outline

- Energy use in China
- Electricity industry structure in China
- Future trends
- Restructuring options

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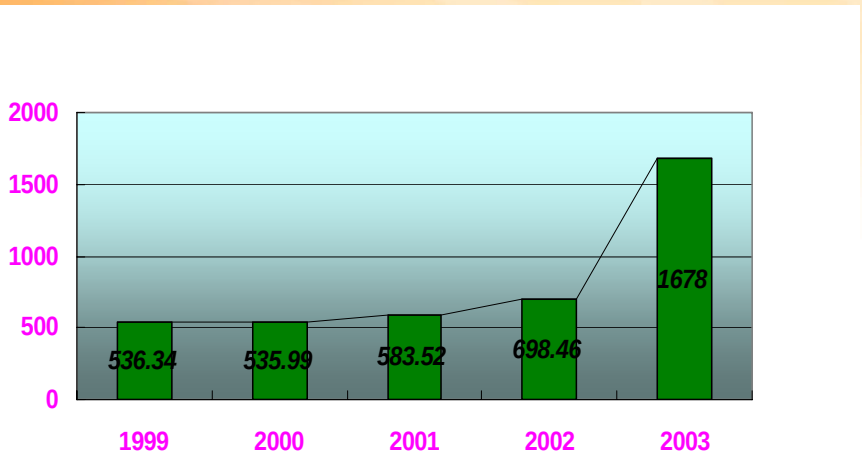
Energy consumption in China (MTCE eq)
(Zhang, 2004)



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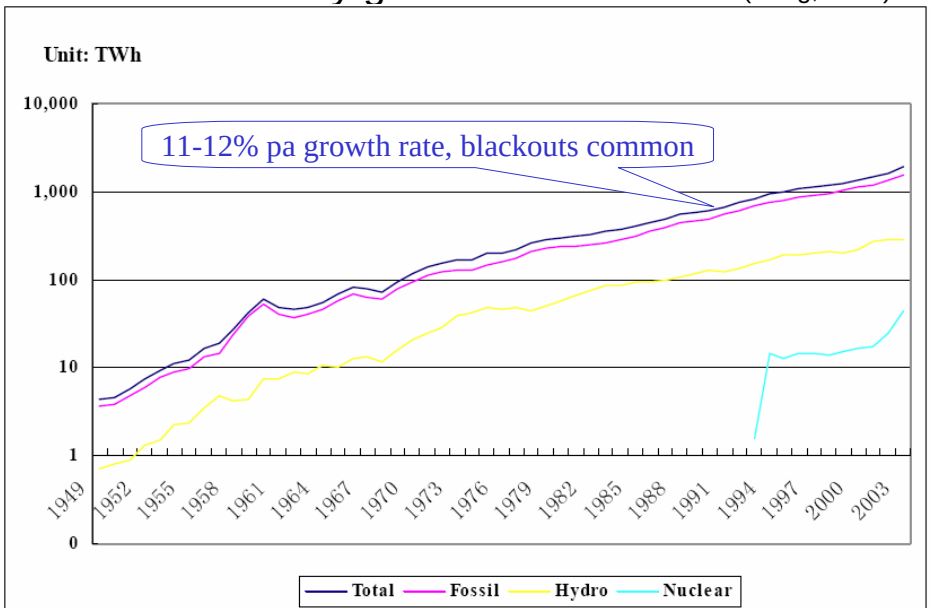
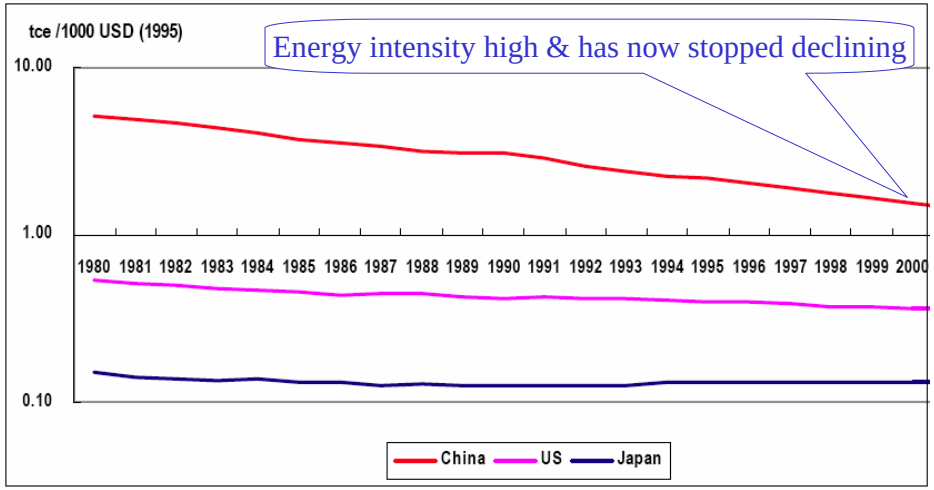
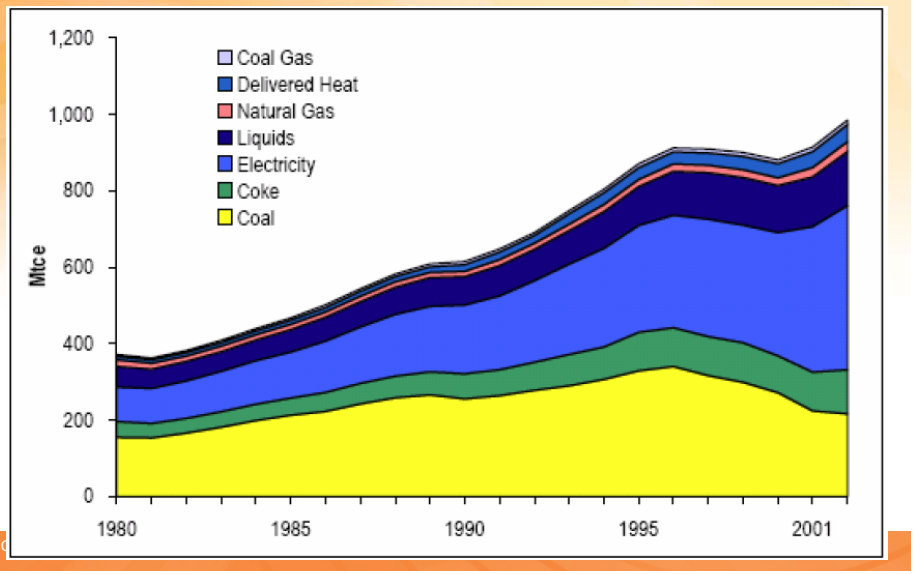
Annual electricity generation in China (Yang, 2006)



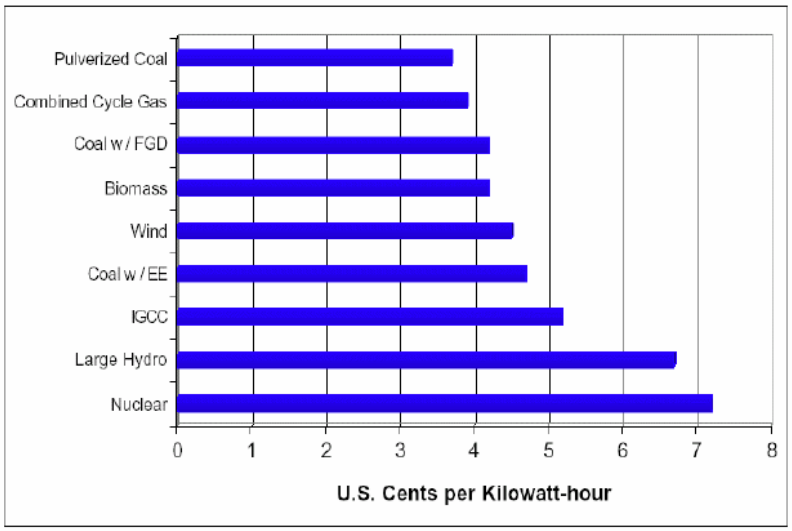
Energy intensity trends for selected countries (Yang, 2006)



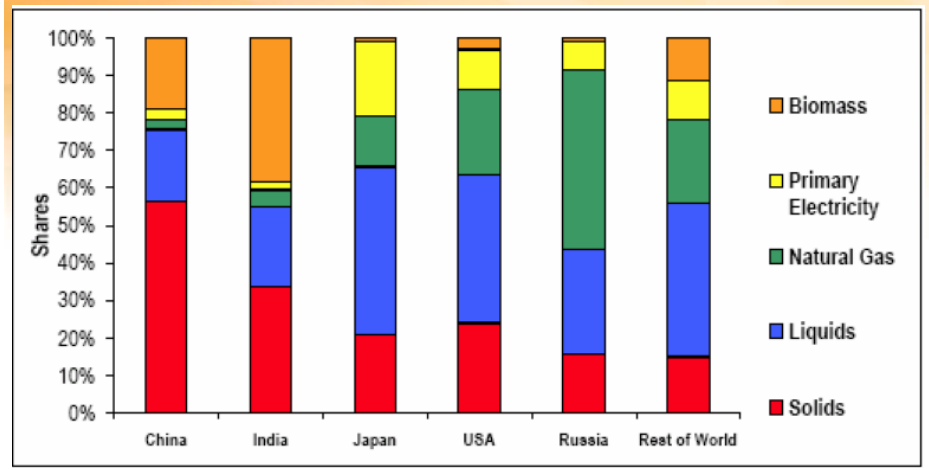
Chinese industrial end-use by energy type (Yang, 2006)



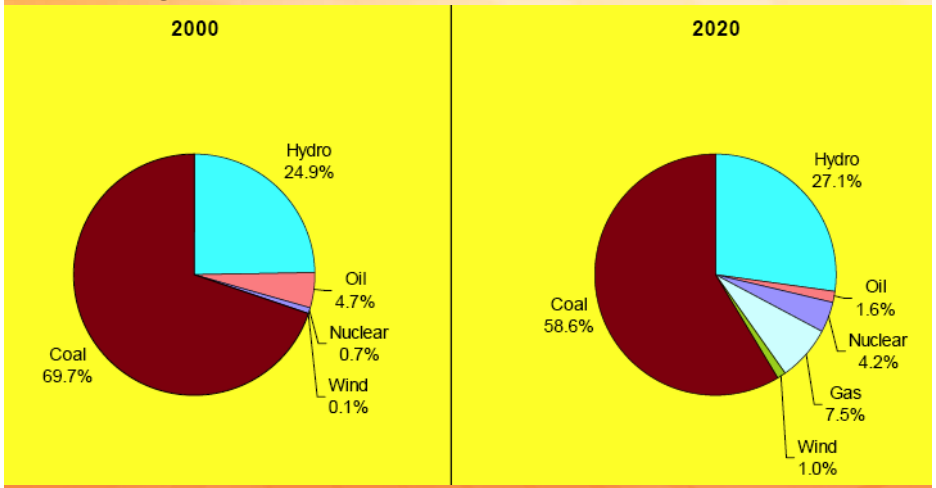
Electricity generation costs, Southern China, 1998 (Yang, 2006)



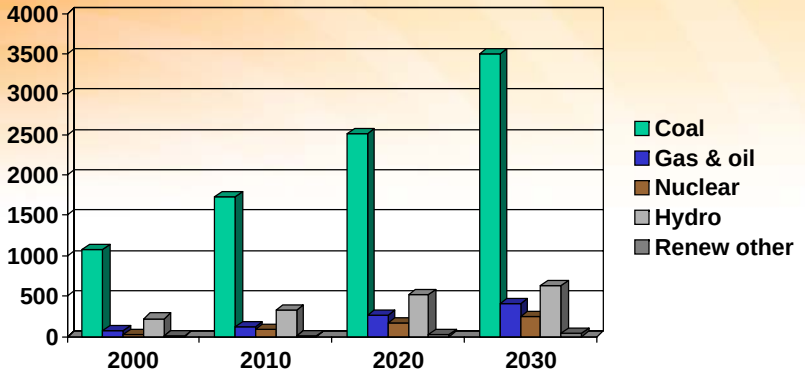
Primary energy resource shares for selected countries (Yang, 2006)



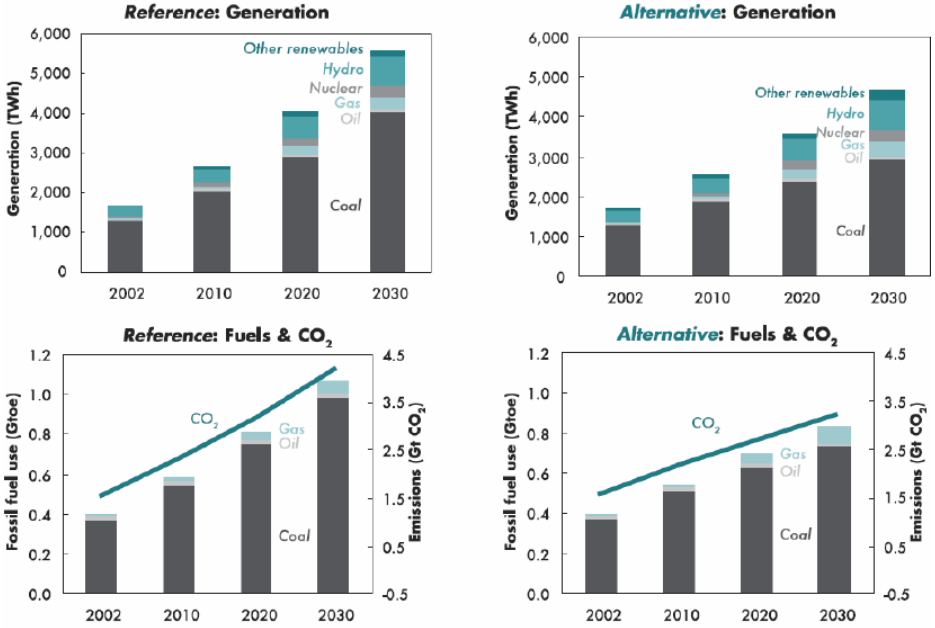
Installed capacity for electricity generation in China (Zhang, 2004)



Electricity generation (TWh) in China by fuel type (Asian Electricity Outlook, Platts 2006)



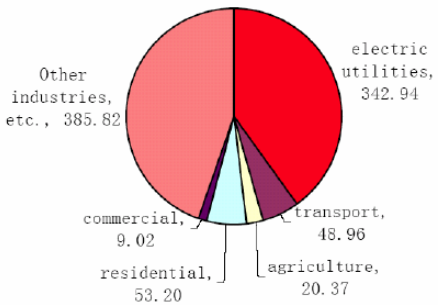
Generation scenarios for China (IEA, 2006)



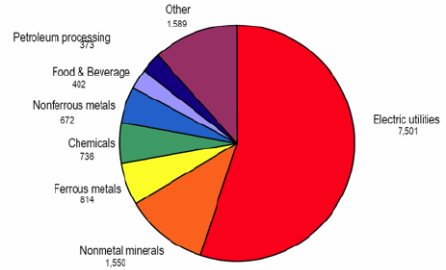
Atmospheric emissions in China for 2004

(Yang, 2006)

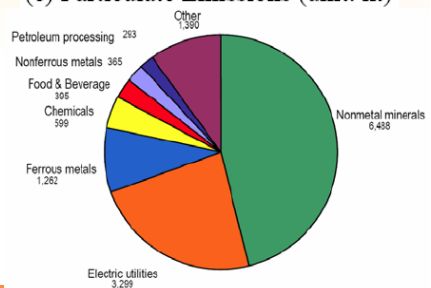
(a) CO_2 Emissions (unit: million ton)



(b) SO_2 Emissions (Unit: kt)

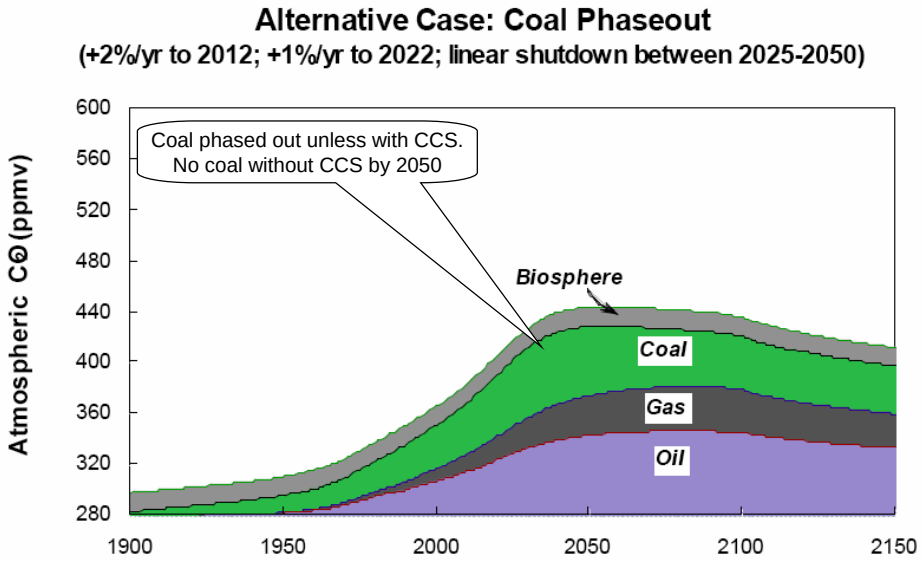


(c) Particulate Emissions (unit: kt)

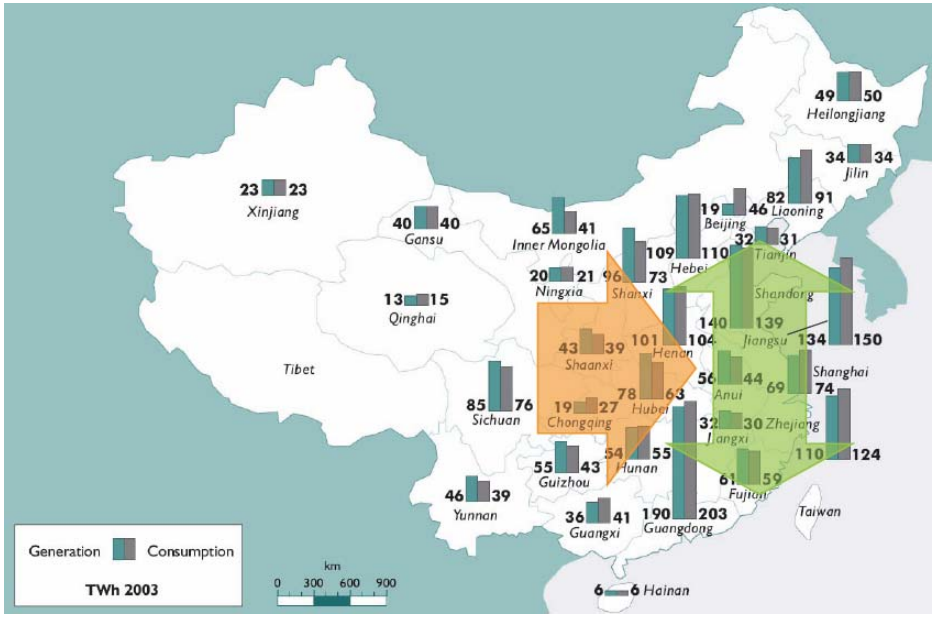


Capping atmospheric CO2 to avoid dangerous climate change

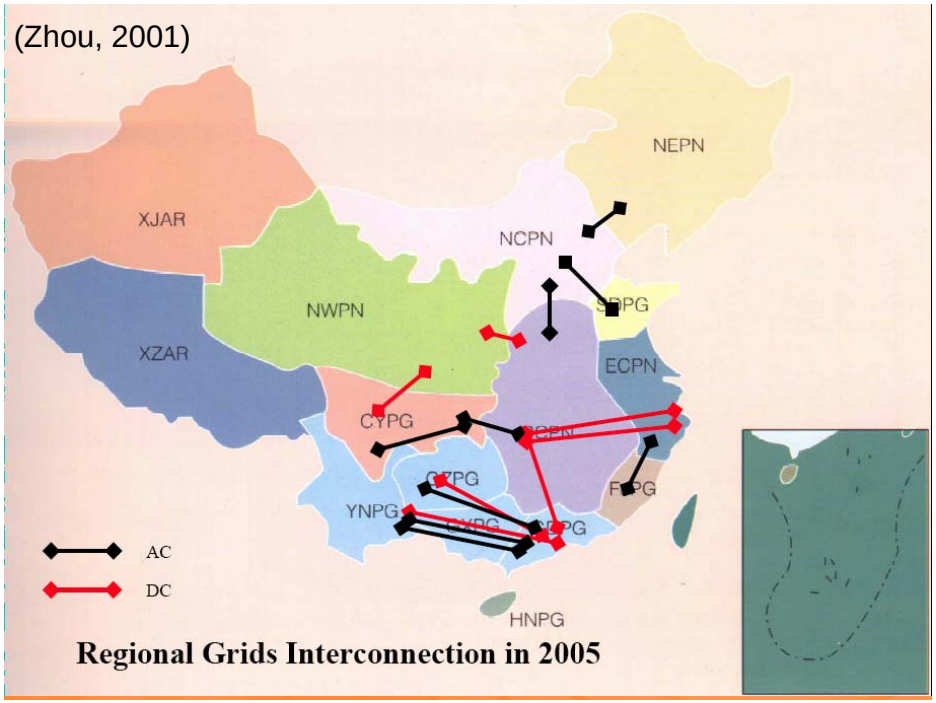
(Hansen, 2006, www.columbia.edu/~jeh1/wsf_09nov2006f.pdf)



Generation & consumption by region (IEA, 2006)

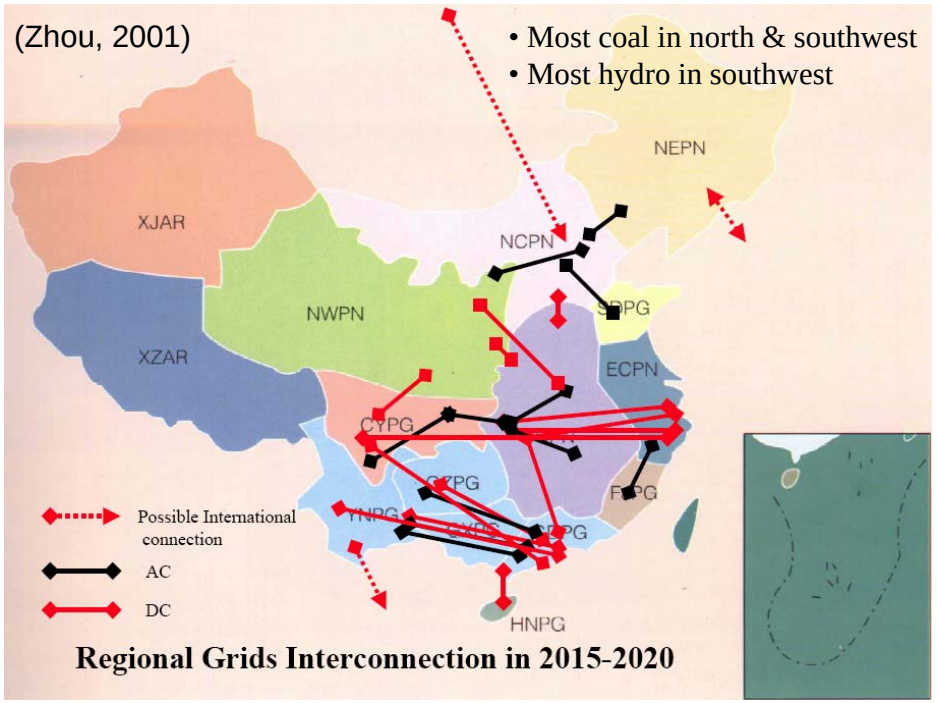


(Zhou, 2001)



(Zhou, 2001)

- Most coal in north & southwest
- Most hydro in southwest



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Problems hindering development of Chinese electricity industry (www.chinaview.cn 2006-05-26)

- Electricity generation still too dependent on coal:
  - Coal 76%, hydro 23%, nuclear 1.4%
- Generation technology immature & inefficient
- Transmission network still weak
- Regulatory and legal system still weak
- Primary energy and electricity markets still weak

China State Council calls for further reform:

- *Unified & open electricity market with sound supervision (http://english.people.com.cn)*

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Electricity restructuring in China (IEA, 2006)

- Generation separated from transmission & dist'n:
  - Five national generation groups
  - Two transmission enterprises
- State Electricity Regulatory Commission (SERC)
- Experiments with pilot regional power markets
- Gradual moves towards more cost-reflective pricing

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Recommended next steps (IEA, 2006)

- Reaffirm strategy for electricity industry restructuring
- Strengthen institutional & governance framework
- Review actions to tackle coal pollution
- Integrate energy efficiency & environmental goals into the regulatory framework
- Implement more cost-reflective pricing to encourage efficiency & demand management
- Increase transparency

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www.ceem.unsw.edu.au