MIT Energy and Environmental Policy Workshop, May 1, 2008

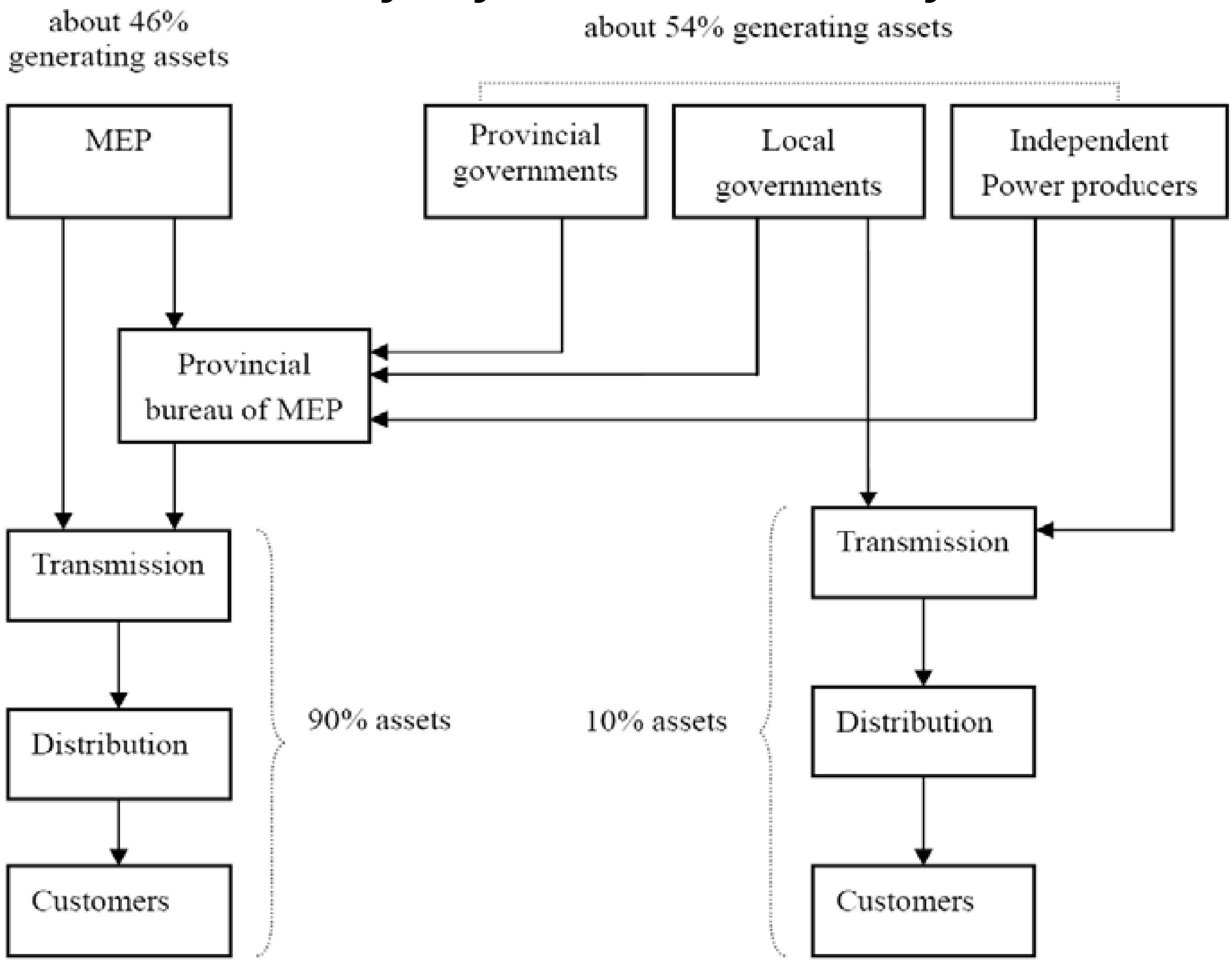
Market Power and Electricity Market Reform in Northeast China

Zhang Xiaochun and John Parsons

Timeline

- 1985 -- end of the central govt monopoly in generation
  - provincial and local governments
  - state owned enterprises
  - private investors, including foreign investors

Electricity System after Early Reforms



Timeline (cont.)

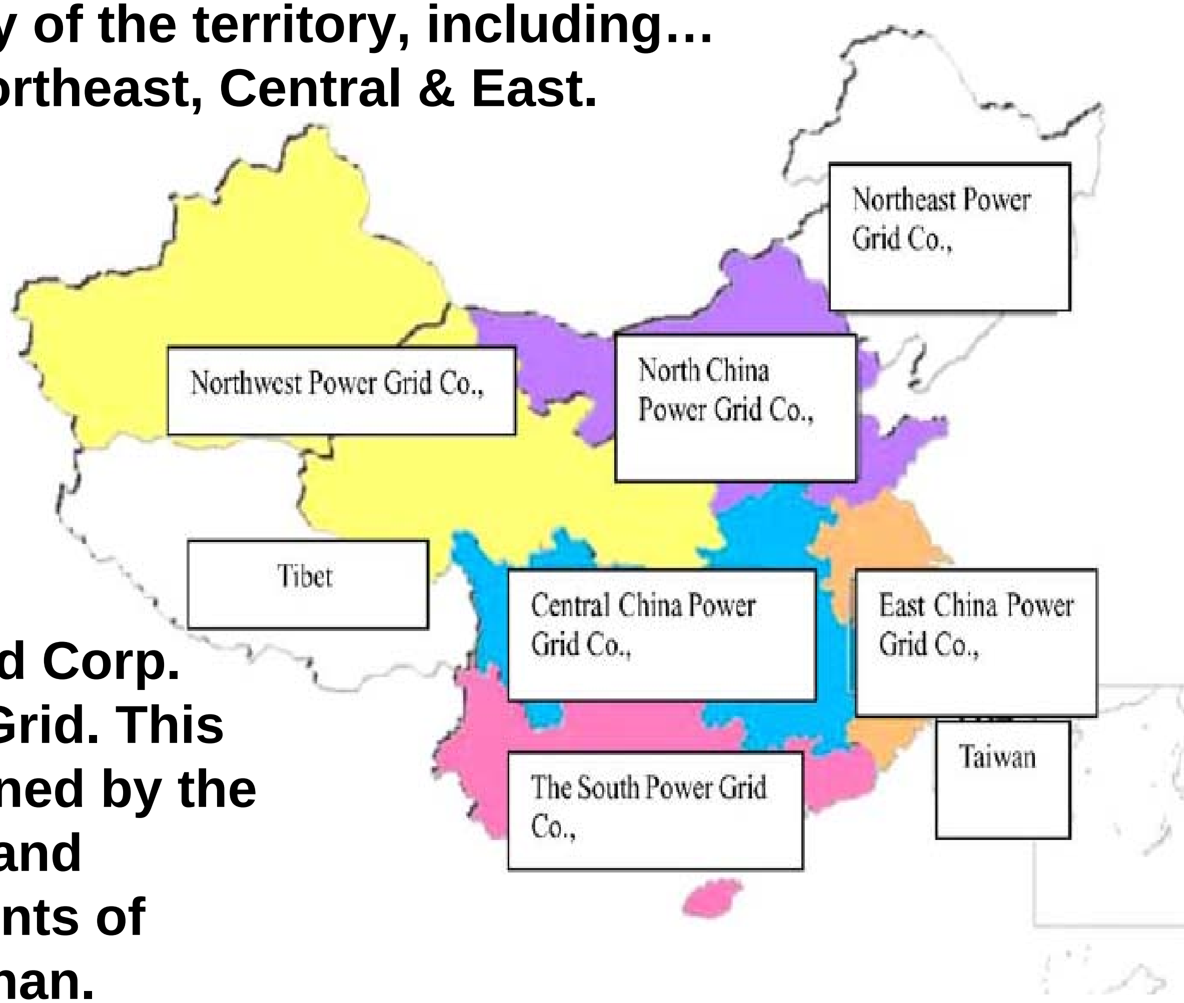
- **1997 – corporatization**
  - transmission and generation assets moved from the Ministry of Electric Power to a State Power Corporation of China
  - parallel reforms at provincial and local levels

Timeline (cont.)

- 2002 -- break-up of SPC
  - 2 main grid companies, with regional and provincial subsidiaries
  - 5 main generation companies
  - assorted engineering and other companies
  - creation of a regulator, SERC or State Electricity Regulatory Commission, but continued involvement of NDRC in economic & industrial strategy

Regional Grid Cos

The State Grid Corp. of China (SGCC) operates the majority of the territory, including… Northwest, North, Northeast, Central & East.



The South China Grid Corp. operates the South Grid. This is a joint venture owned by the central government and provincial governments of Guangdong and Hainan.

Generation Cos

- 5 Gencos…majority owned by the central government
  - Datang
  - GuoDian
  - HuaDian
  - Huaneng
  - China Power Investment Corp.

- Assured that no company had more than 20% of the generating assets in any region.

- State Grid also has generation.

- Other 54% of generation continues…provincial, local, IPPs

- Ownership structure is inadequately reported.

Timeline (cont.)

- 2004 -- Regional grids, uniform management & dispatch, increased geographic exchanges of power

- 2004 -- Development of market for wholesale power
  - experiments had occurred in 2000-2001 in 5 provinces & 1 city; primarily simulation and generally of little consequence; many problems.
  - Northeast region started in January 2004; simulation first, trial operation for limited capacity; unsatisfactory results and no settlement; suspended pending decisions about how to move forward.
  - East region started in 2005 with simulation, a pair of auctions in 2006 with settlement.
  - South region started in 2006.
  - Others announced.
  - Single buyer system: generators sell to the grid, and the grid sells to consumers; parallel to long-term contracts.
  - Integration with reform of electricity tariff system is unclear.

- Next ???

Our Analysis -- the Northeast Region

Liaoning, Jilin, Heilongjiang **and the eastern portion of the Inner Mongolia Autonomous Region, encompassing the** **Hulunbeier League,Xingan League,Tongliao City and Chifeng City**

Northeast Region -- Overview

	Territory		Population		GDP			Electricity Generation		Electricity Consumptio		
							per capita					per capit
	(thousand km sq)		(million)		(billion Yuan)		(Yuan)	(Terawatt hours)		(Terawatt hours)		(kwh)
	[a]	[b]	[c]	[d]	[e]	[f]	[g]	[h]	[I]	[j]	[k]	[l]
NE	1,249		120		2,109		17,600	238		236		1,961
L	146	12%	43	36%	926	44%	21,700	101	42%	123	52%	2,876
J	187	15%	27	23%	425	20%	15,600	46	19%	41	18%	1,515
H	454	36%	38	32%	622	29%	16,300	65	27%	60	25%	1,562
IM	462	37%	12	10%	136	6%	11,400	27	11%	12	5%	986

Figure 2
Generation Capacity by Province

Installed capacity: 48 GW

Liaoning:	**18 GW, 39% of the total**
Jilin:	**11 GW, 23%**
Heilongjiang:	**13 GW, 28%**
E. Inner Mongol:	**5 GW, 10%**

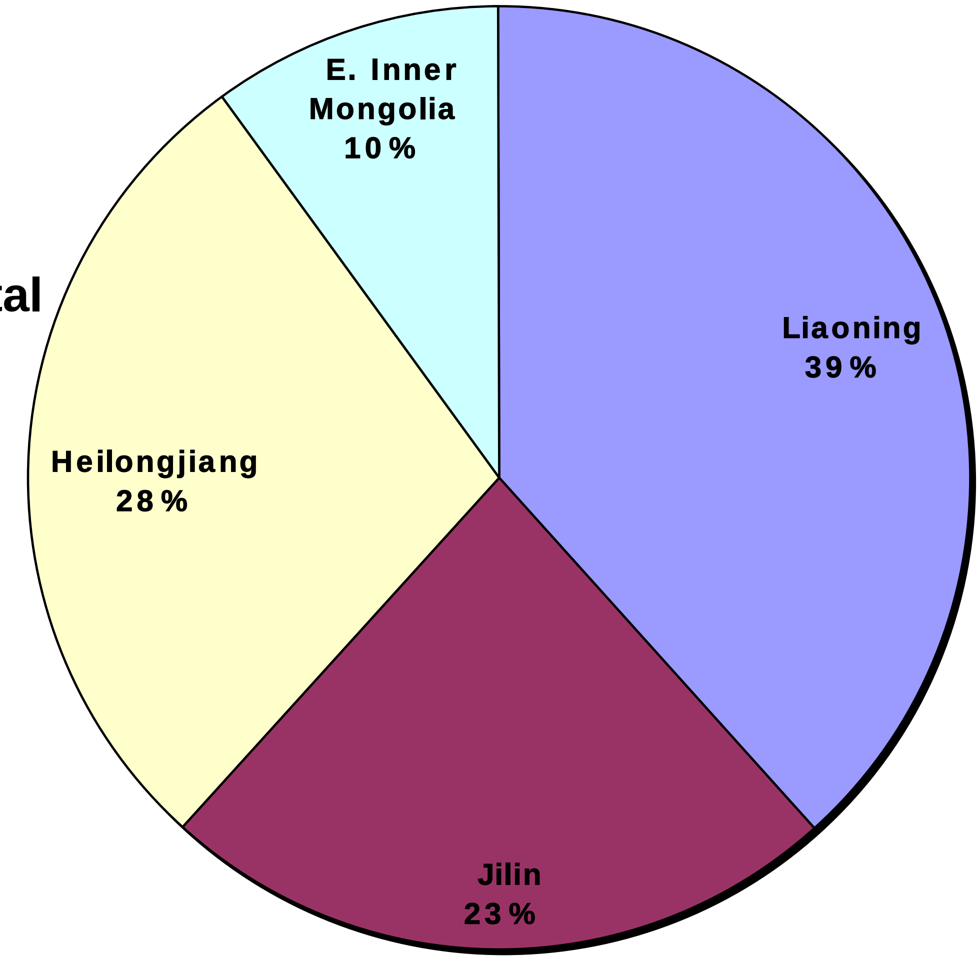


Figure 3
Generation Capacity by Installation Size

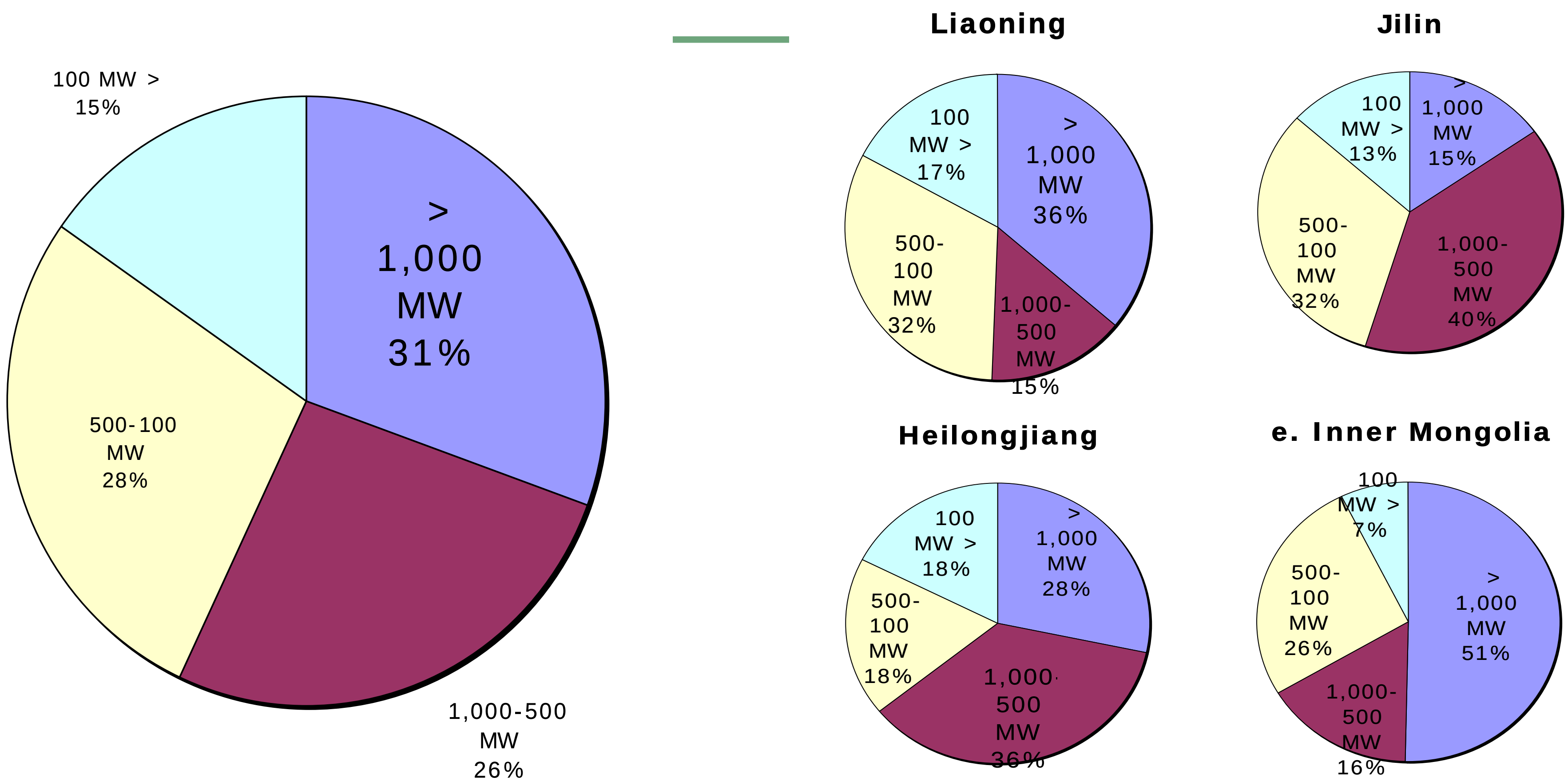


Figure 4
Generation Capacity by Fuel Type

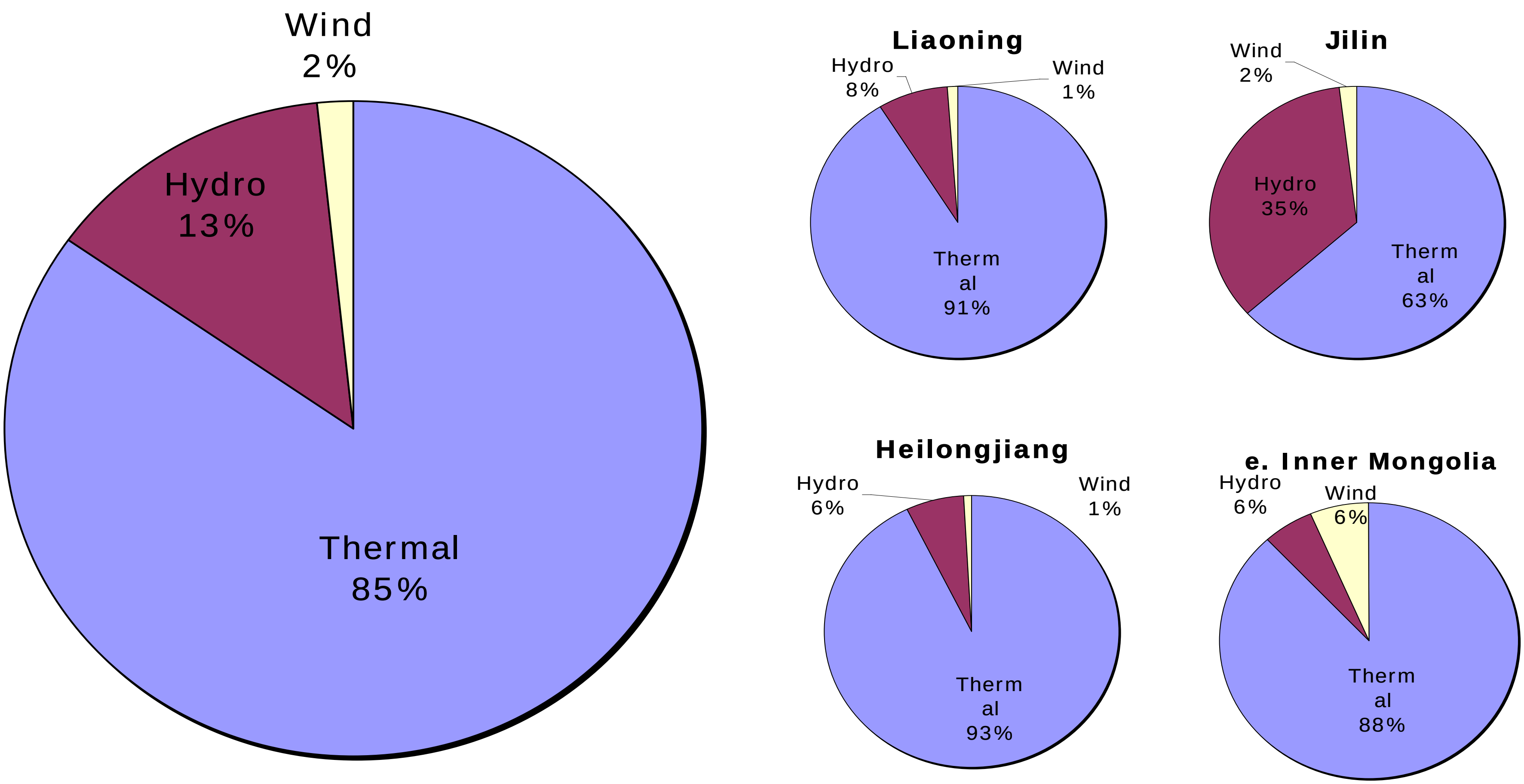


Figure 5
Generation Capacity by Outlet

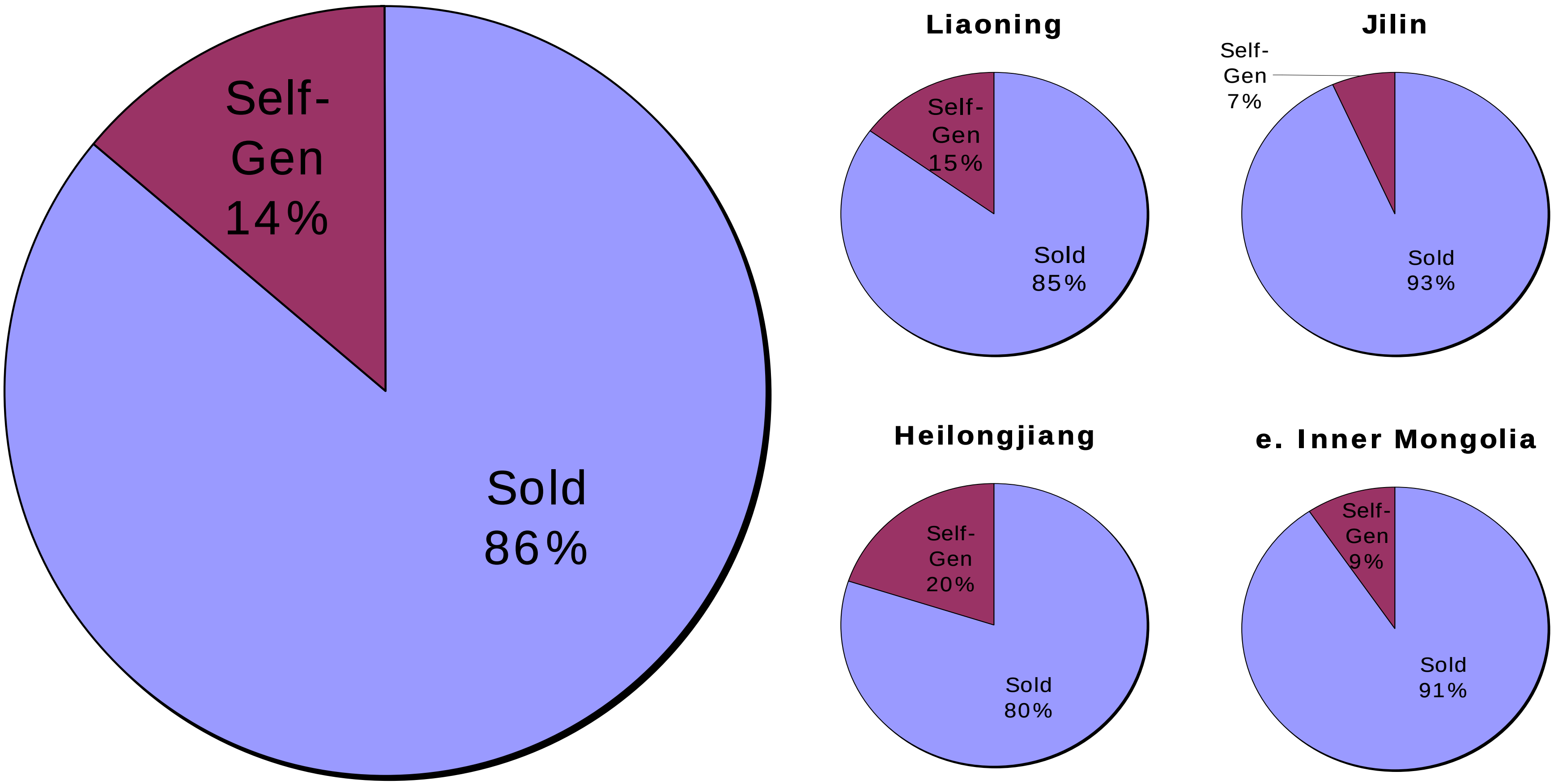
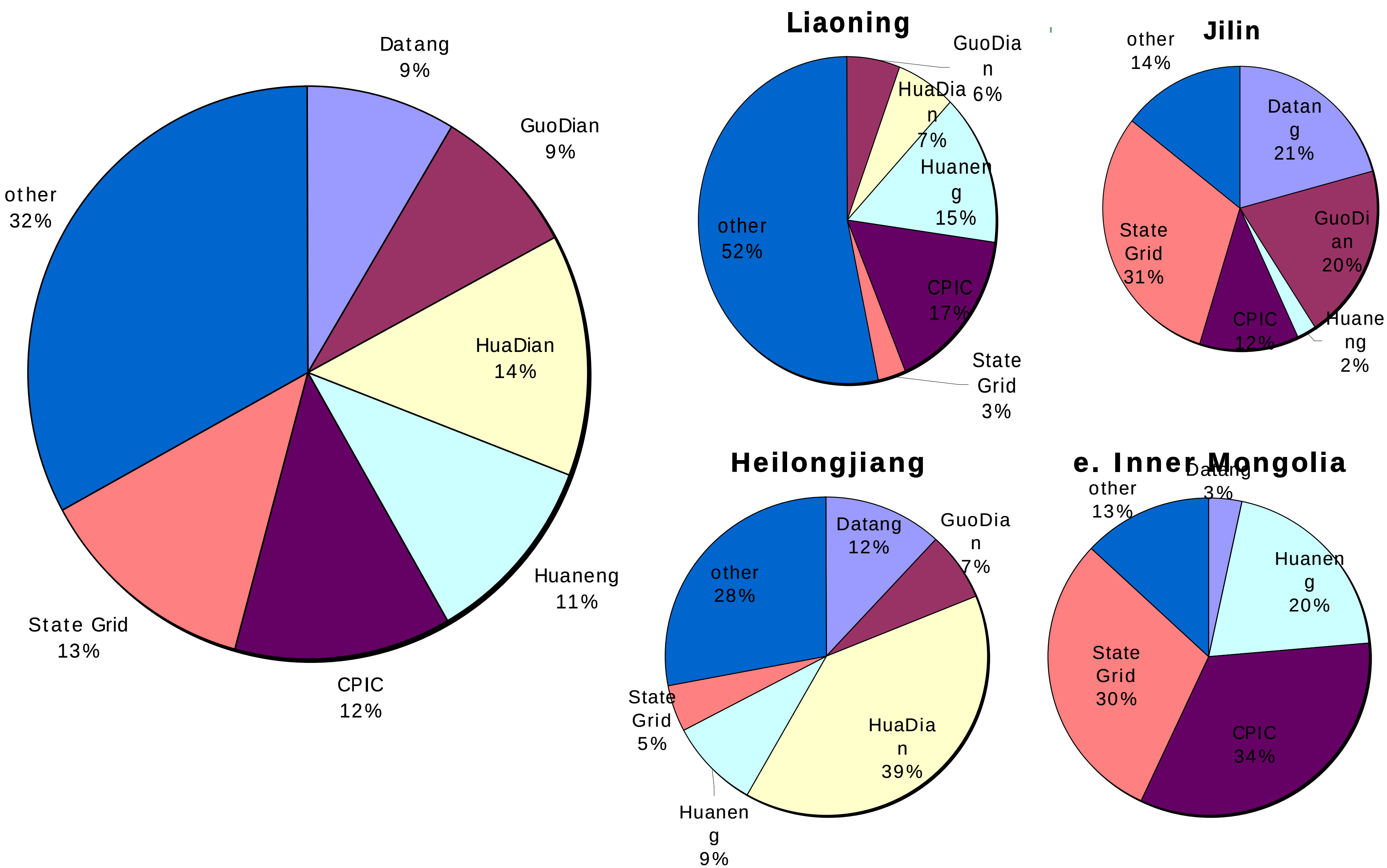


Figure 6
Generation Capacity by Ownership

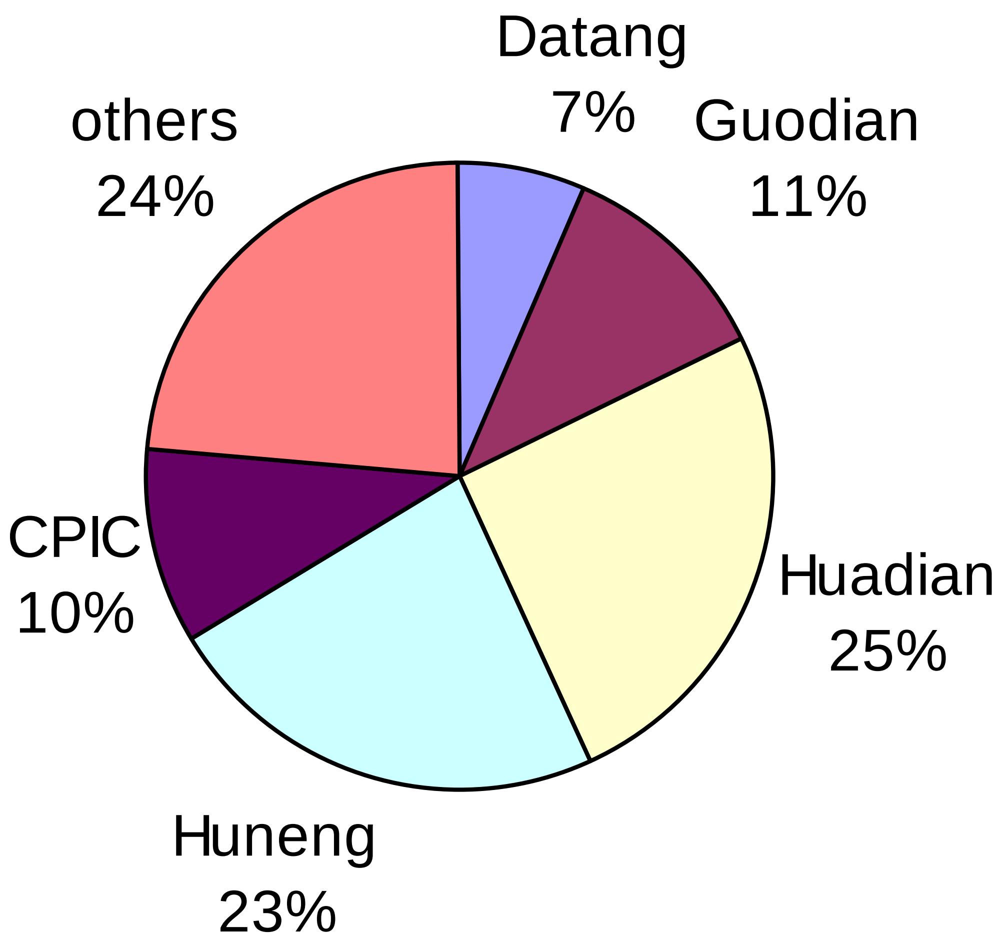


Market Power in Trial Operation 2005

	Company	Capacity in MW	Market Share
	[a]	[b]	[c]
[1]	Datang	1,406	7%
[2]	Guodian	2,420	11%
[3]	Huadian	5,420	25%
[4]	Huneng	4,940	23%
[5]	CPIC	2,200	10%
[6]	Jinzhou	1,200	6%
[7]	Suizhong	1,600	7%
[8]	Hunjiang	400	2%
[9]	Yuanbaoshan	1,500	7%
[10]	Nenggang	400	2%
	Total	21,486	100%

- **Huadian and Huaneng 48%**
- **CR4 = 70%**
- **HHI = 1,582**

Market Power in Trial Operation 2005



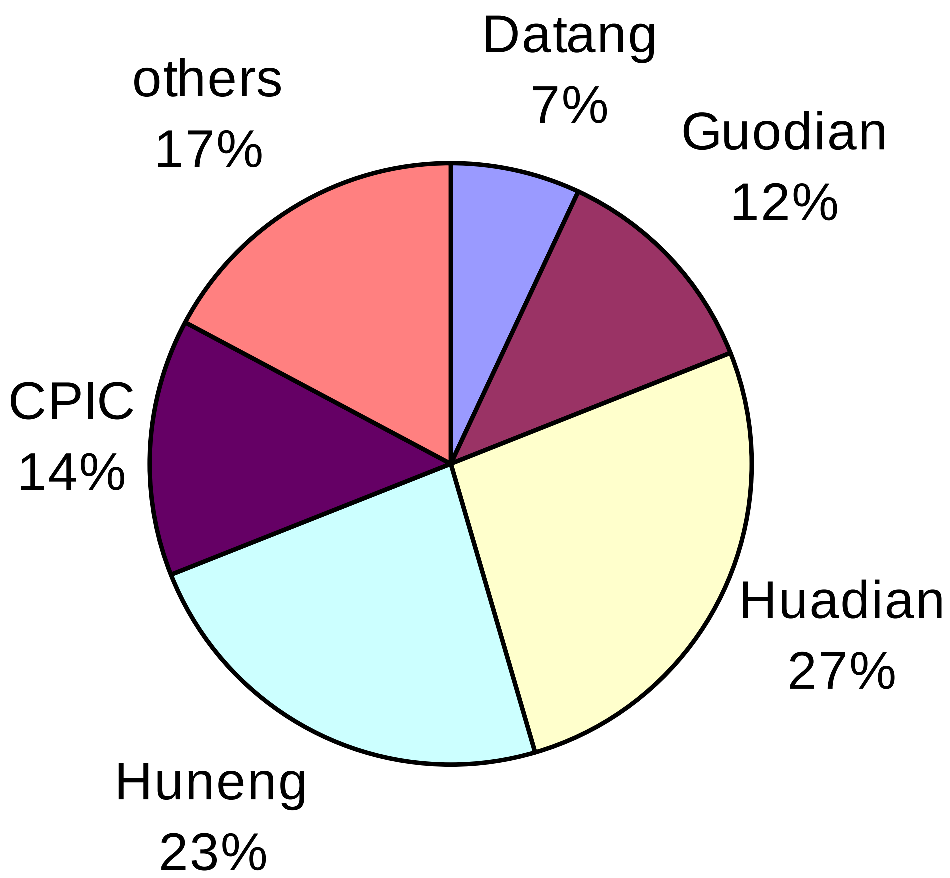
- **Huadian and Huaneng 48%**
- **CR4 = 70%**
- **HHI = 1,582**

Market Power in Trial Operation 2006

	Company	Capacity in MW	Market Share
	[a]	[b]	[c]
[1]	Datang	1,405	7%
[2]	Guodian	2,430	12%
[3]	Huadian	5,420	27%
[4]	Huneng	4,700	23%
[5]	CPIC	2,805	14%
[6]	Suizhong	1,600	8%
[7]	Nenggang	400	2%
[8]	Yuanbaoshan	1,500	7%
	Total	20,260	100%

- **Huadian and Huaneng 50%**
- **CR4 = 76%**
- **HHI = 1,759**

Market Power in Trial Operation 2006



- **In Liaoning, Huaneng has 35% of the competitive capacity.**
- **In Jilin, Guodian has 50% of the competitive capacity .**
- **In Heilongjiang, Huadian has 62% of the competitive capacity .**
- **When there are transmission constraints and power shortages, there might be significant concentrations of market power in these provinces.**

Prospects for an Expanded Regional Market

	All Facilities		Excluding Self-Generation	
	CR4 [a]	HHI [b]	CR4 [c]	HHI [d]
[1] Northeast Region	50%	770	58%	1,035
[2] Liaoning	44%	580	51%	803
[3] Jilin	83%	1,925	89%	2,202
[4] Heilongjiang	67%	1,837	84%	2,850
[5] E. Inner Mongolia	87%	2,427	96%	2,952
[6] Trial Regional Market	76%	1,759		

Thanks