

China's Energy Demand Scenarios to 2020

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- **Background**
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China's Development Objective to 2020

- A well-off society
 - ◆ Quadruple GDP of Year 2000
 - ◆ Industrialization achieved in the main
 - ◆ New industrialization pattern
 - ◆ Strengthened sustainability

Raising Questions to Social/economy/energy Development

- How to realize the goals?
- What kinds of economic development pattern should be followed?
- Could the energy supply meet the energy demand from GDP growth rate of 7.2% annually?
- Is it possible to affect energy demand?

Energy Scenarios Project Review

- Three years project, started from 1999, Scenarios analysis method
- Sponsored by Energy Foundation and Shell Foundation
- Technical Supported by domestic institutions and agencies
- Implemented by BECon, LBNL, and Shell International's group

Project Objective

- Explore the sustainable energy future for China, based on demand analysis;
- Quantification of economic and energy development of China's "Tenth Five-Year" Plan;
- Analyze the potential of energy efficiency improvement;
- Impact analysis of environmental control and fuel shift;
- Provide Important reference case for related agencies

Progress and Achievement

- Provided technical support to “10th Five-Year” Energy Conservation Plan;
- Completed the energy conservation potential analyses for energy- intensive sectors;
- Developed the LEAP Model framework and database;
- Published “China’s sustainable energy scenarios in 2020”

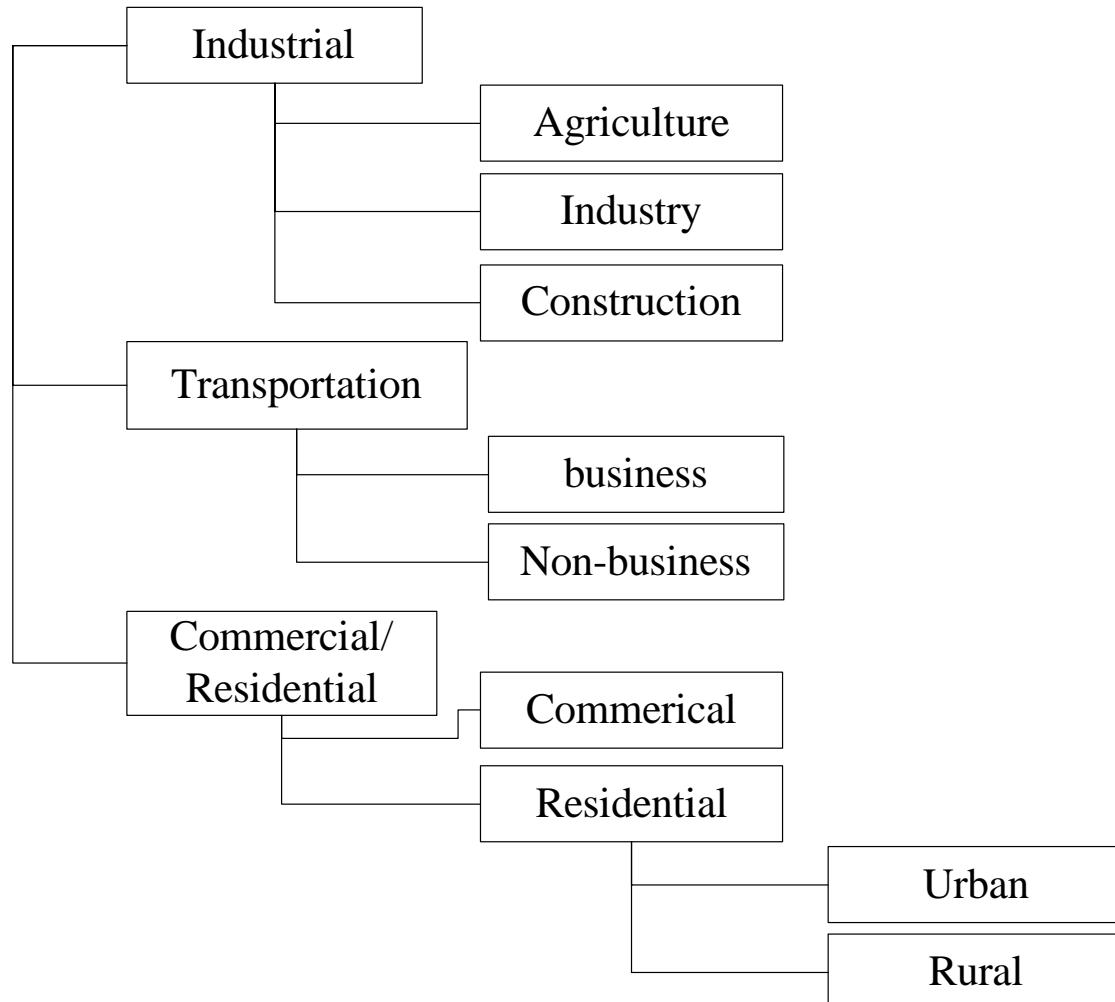
Follow-on Project Introduction

- In earlier 2003, revising and updating the key assumptions to prospect China's energy demand beyond to 2020 when achieving the anticipated social/economic goal, focused on analyzing the impact of policy options on energy demand under the set economic growth target
- Since last October, developing energy demand scenario, in terms of latest social/economic development trend.

Methodologies

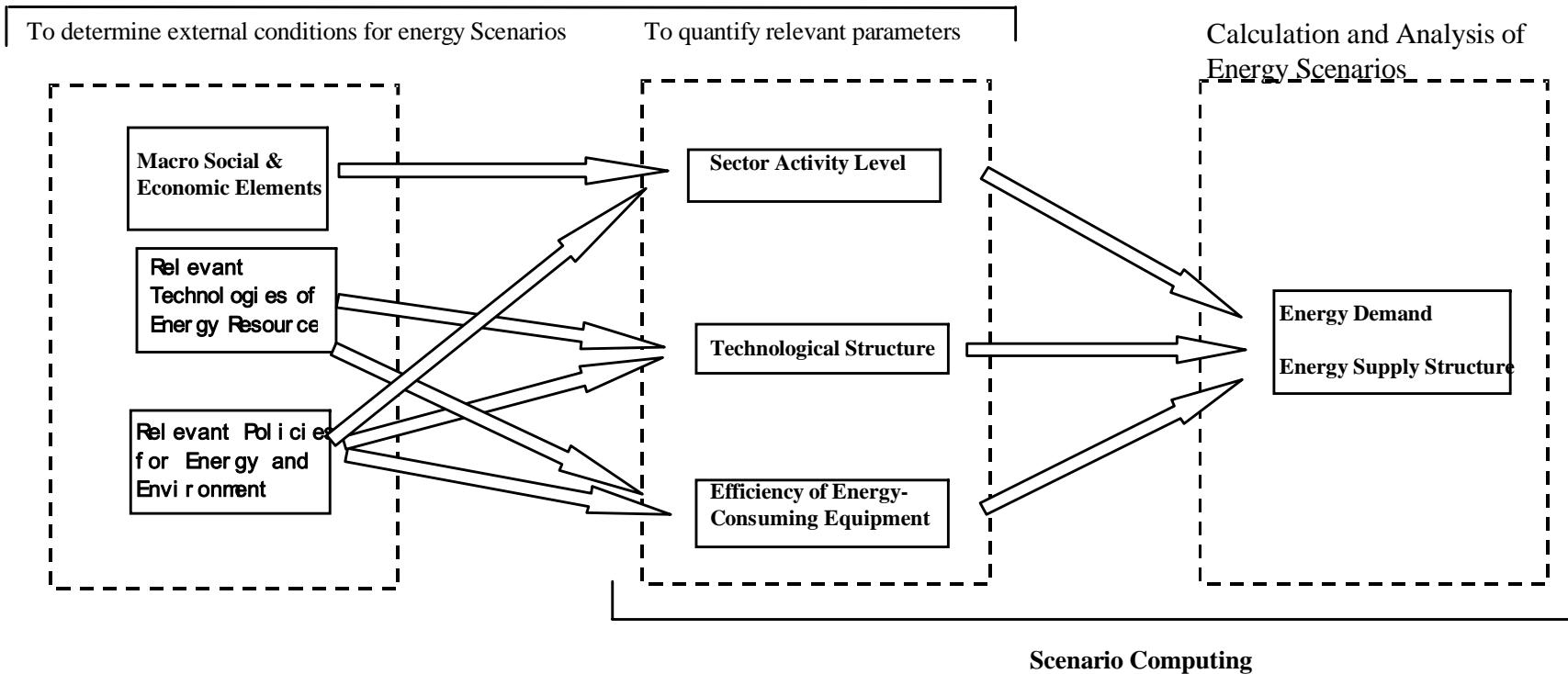
- Adopting the comparison analysis, suvey and Delphi (experts consultation) methods
- Sorting out the main drivers affecting China's energy demand and developing energy demand scenarios
- Using bottom-up model to calculating future final energy demand under different scenarios
- Analyzing the influence of different supply options on primary energy demand and related carbon emissions
- Covering all sectors

Framework for Sector Division

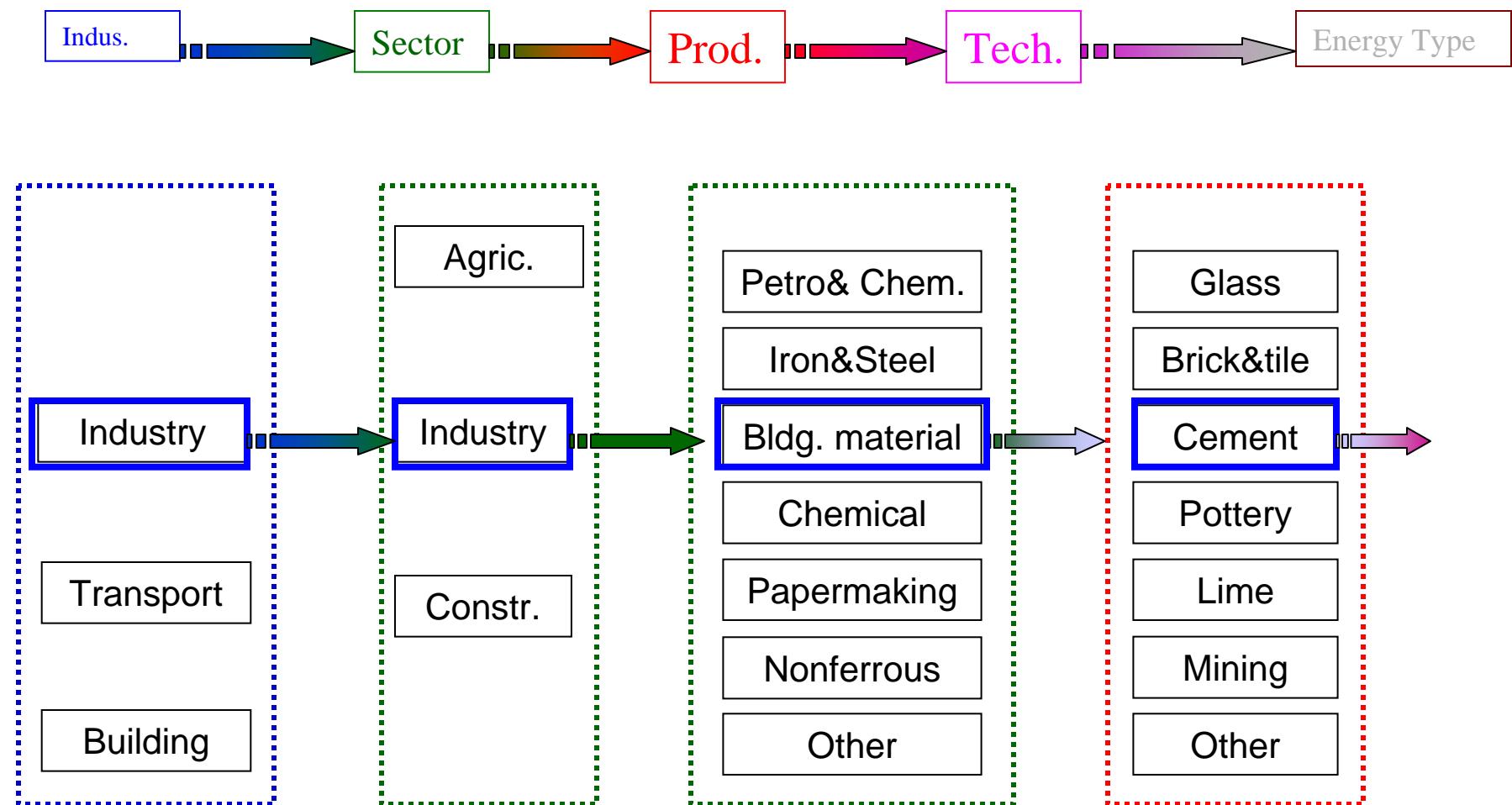


Process of Energy Scenarios Analysis

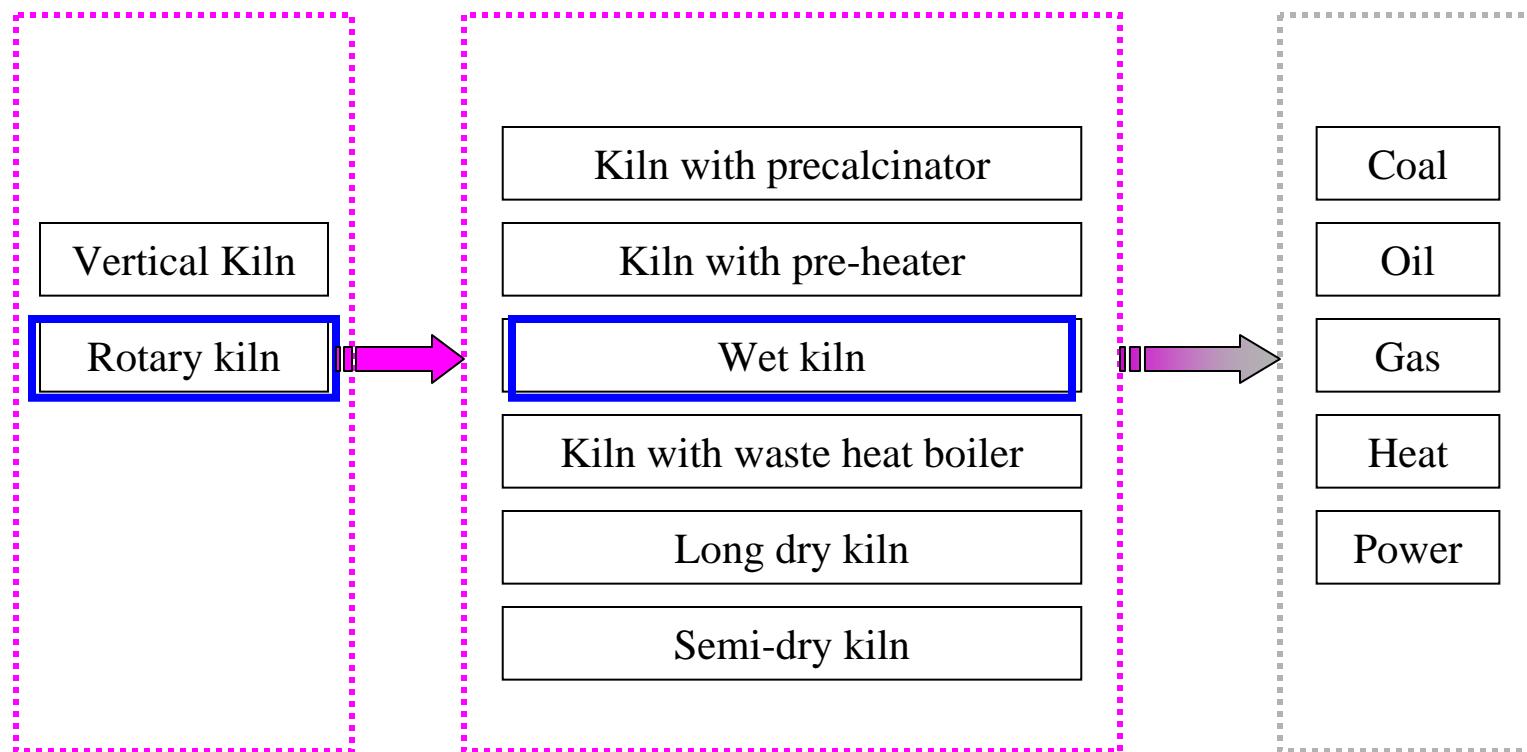
Setting Up Scenarios



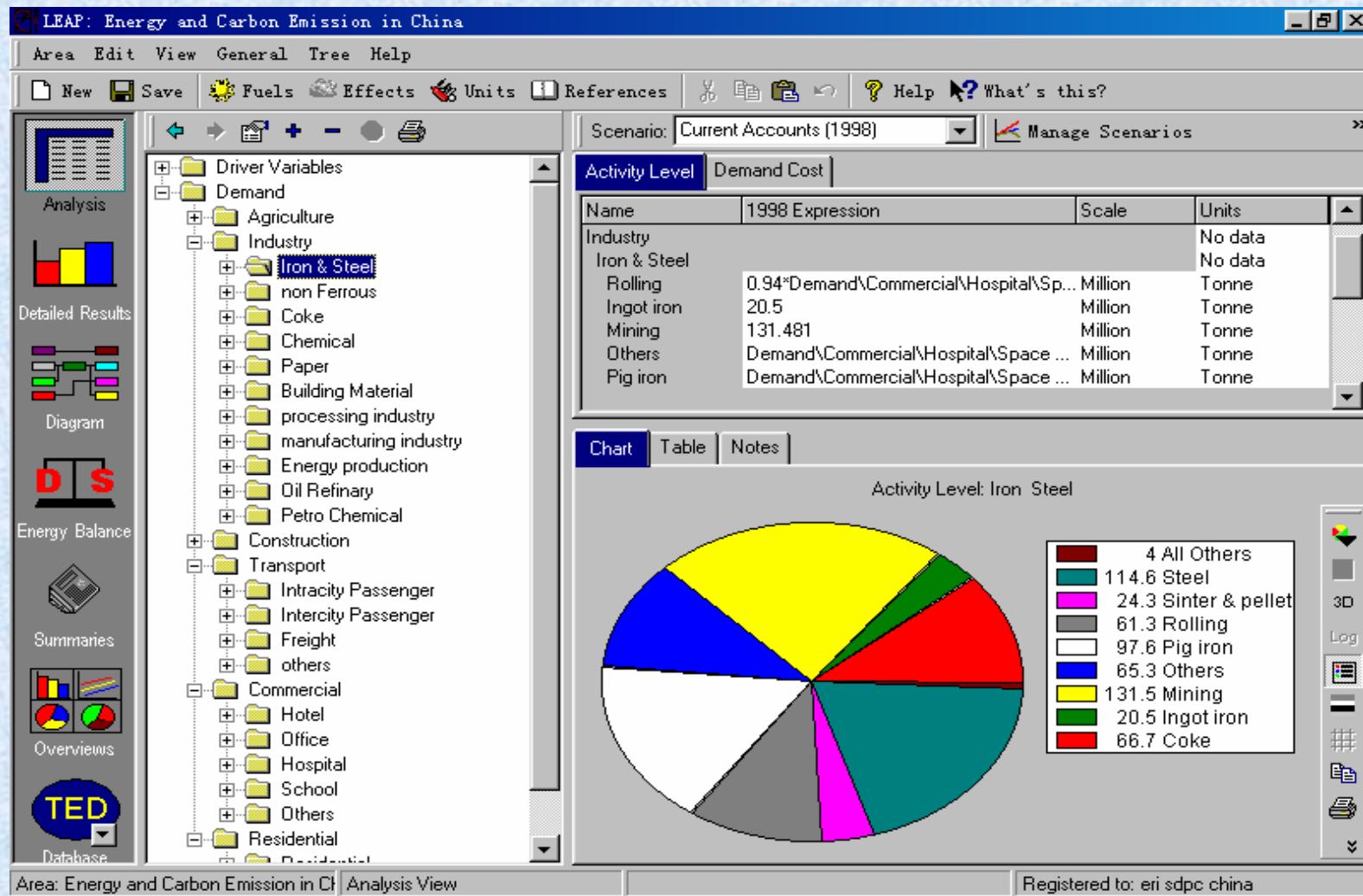
To determine the activities and energy efficiency by technique of individual sector through top-down & bottom-up approach



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Schematic diagram of LEAP model



BAU Energy Scenarios

- **Current social/economic development trend**
 - ◆ Speeding-up of industrialization process, characterized with “heavy and chemistry industry taking the dominance”
 - ◆ Expediting of urbanization course
 - ◆ Updating of consumer structure, upsurge of “automobile & real estate” purchase emerging

Activities Design for Social/economic Development Under Well-off Society

Population and urbanization rate prospective

	Unit	2000	2005	2010	2020
Population	Billion- persons	1.267	1.321	1.378	1.47
Urbanization rate	percentage	36.22	40.8	45.8	58.3

Economy development target to 2020

	2000	2005	2010	2020
GDP (亿元)	89468.1	128742	183540	357875
	2000~2005	2005~2010	2010~2020	
年均增长率	7.55%	7.35%	6.9%	

注：以上数据为2000年不变价

Industrial Structure beyond to 2020

Unit: %

	2002	2005	2010	2020
Primary industry	15.4	13.5	12	10
Secondary Industry	51.1	52	52.3	51
Tertiary Industry	33.5	34.5	35.7	39

Scenarios Design of Industrial Sector

- Mix of industry sector beyond to 2020 Unit:%

	2002	2005	2010	2020
Energy-intensive sectors	38.5	38.5	38.6	37.5
Light industry	29.5	29.4	28.7	29.2
Others	32	32.1	32.7	33.3

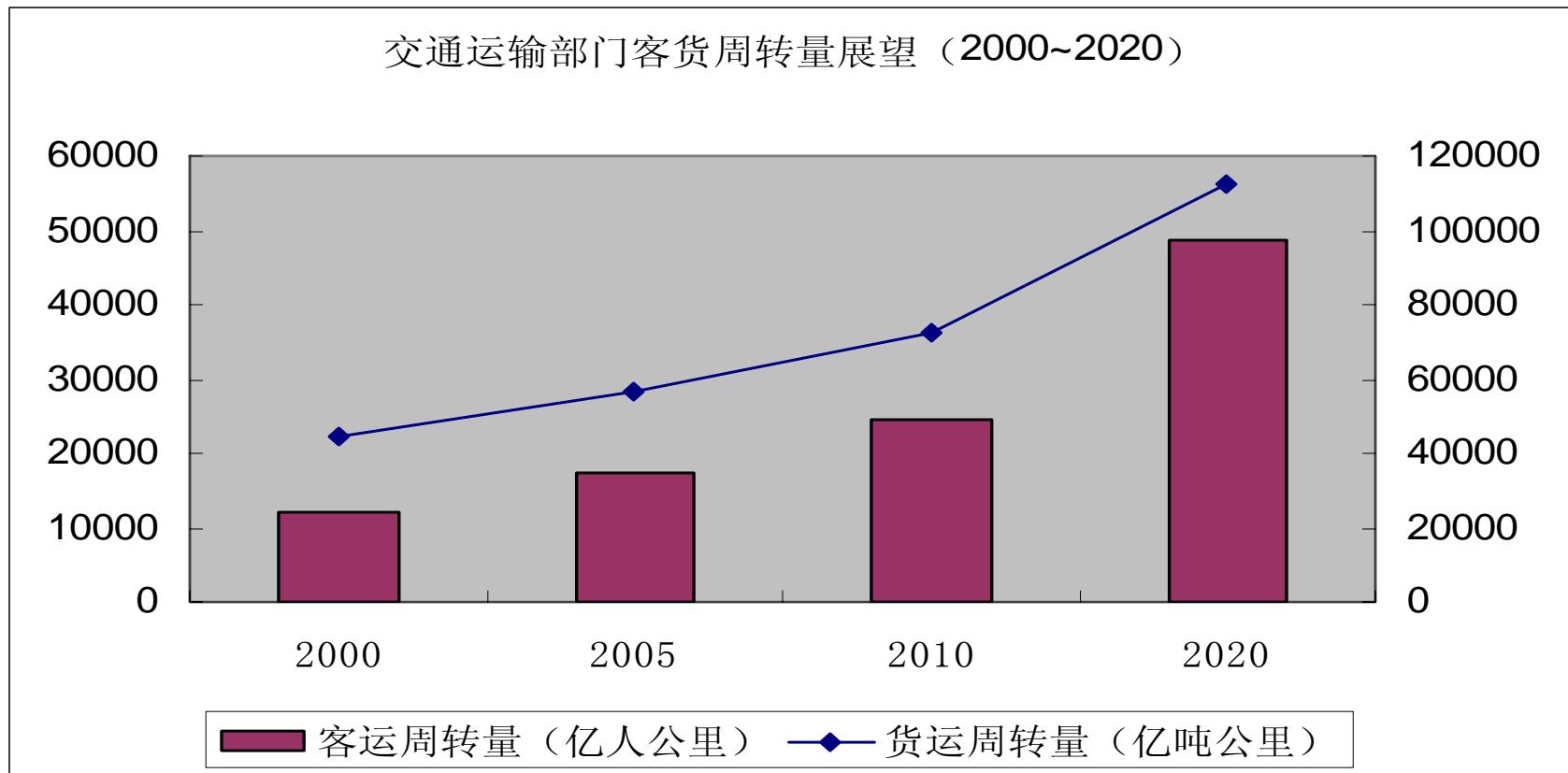
Scenarios Design of Industrial Sector

- Energy-intensity products output to 2020

	2000	2005	2010	2020
Steel (10 ⁸ ton)	1.29	2.5	3.0	2.8
Cement (10 ⁸ ton)	5.97	8.8	10	12.8
Ammonia (10 ⁴ ton)	3346	4000	4500	5500
Ethylene (10 ⁴ ton)	450	790	1200	2000

Scenarios Design of Transportation Sector

- Anticipated Pass-km and freight ton-km



Scenarios Design of Transportation Sector

- Vehicle and Car Stock Perspective to 2020

	2000	2005	2010	2020
汽车 (万辆)	1608	3800	6800	11000
私人小汽车 (万辆)	370	1200	3200	7200
人口 (亿人)	12.66	13.21	13.78	14.7
人均小汽车拥有率 (%)	0.3	0.9	2.3	4.9

Scenarios Design of Commercial/residential Sector

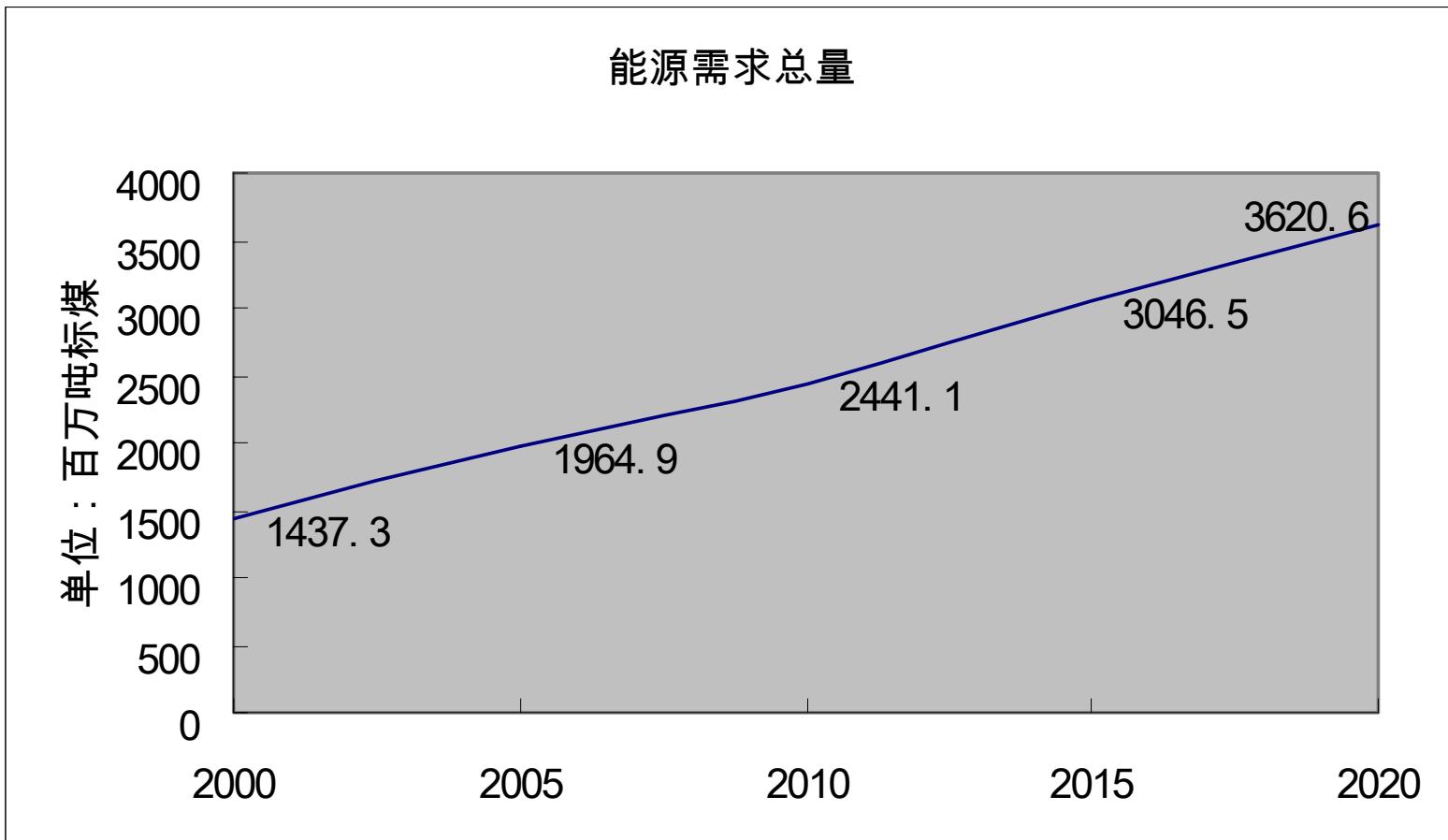
- Per capita living space perspective to 2020

	2000	2010	2020
Per capita living space in urban (m ²)	20.3	23	30
Per capita living space in rural area (m ²)	24.8	28	33

Determination of End Use Energy Efficiency

- Factors affecting energy efficiency
 - ◆ Technique progress
 - ◆ Optimized energy structure
 - ◆ Energy-conservation policy
 - ◆ Environmental policy
 - ◆

Results



Results

Energy Demand by type to 2020

	Unit	2000	2005	2010	2020
Coal	10^8 ton	14.5	19.2	22.8	31.8
Oil	10^8 ton	2.3	3.1	4.1	6.5
Nature Gas	10^8 cm	239	483	863	1701
Hydro, nuclear & others	10^8 KWh	3930	7575	9227	15858
Total energy demand	10^8 tce	14.4	19.6	24.4	36.2

Results

	Unit	2000	2005	2010	2020
Electricity Generation	10^{12} KWh	1.395	2.230	3.065	5.322
Capacities	10^8 KW	3.22	4.43	6.36	11.06

Results

		发 电 量 (TWh)			构 成 (%)		
		2000	2010	2020	2000	2010	2020
趋 势 照 常 情 景	总 发 电 量	1263	2630	4604	100.0	100.0	100.0
	煤 电	917	1876	3517	72.6	71.3	76.4
	油 电	23	25	20	1.8	1.0	0.4
	气 电	2	86	82	0.1	3.3	1.8
	水 电	292	549	746	23.1	20.9	16.2
	其 中 :						
	小 水 电	64	116	116	5.0	4.4	2.5
	核 电	26	83	210	2.1	3.2	4.6
	新 能 源	3	10	29	0.2	0.4	0.6
	其 中 : 风 电	0	7.9	26.3	0.0	0.3	0.6

Results

		装机容量 (GW)			构成 (%)		
		2000	2010	2020	2000	2010	2020
趋势照常情景	总装机	322	636	1106	100.0	100.0	100.0
	煤电	220	405	780	68.3	63.6	70.5
	油电	15	13	10	4.7	2.0	0.9
	气电	2	53	73	0.7	8.3	6.6
	水电	80	150	200	24.9	23.6	18.1
	其中：						
	小水电	22	40	40	6.8	6.3	3.6
	核电	4	13	32	1.2	2.0	2.9
	新能源	1	3	11	0.3	0.5	1.0
	其中：风电	0	3	10	0.0	0.5	0.9

Results

Final Energy Use by type to 2020

	2000	2005	2010	2020	年均增长率
煤炭	569	728.1	792.8	853	2.0%
石油	294.4	401.3	531.6	866.7	5.5%
天然气	27.90	49.40	80.40	184.60	9.9%
热力	72.1	100.1	125.3	205.8	5.4%
电力	158.5	253.4	348.2	604.7	6.9%
总计	1121.9	1532.3	1878.3	2714.8	4.5%

Results

表 5-1-11、三大部门对未来中国新增能源需求的贡献率（%）

	2000~2005	2005~2010	2010~2020
产业部门	66.5	46.4	40.1
交通运输	2.2	25.0	28.3
商用/民用	21.9	28.5	31.5
合计	100	100	100

Summing-up

- Analysis of scenarios results shows that energy demand is the function of varieties of drivers such as GDP growth rate, the change of economy structure including industrial structure and even product mix, technical improvement and restructuring of energy mix and so on.
- The choice of economy development pattern and policy options will have obviously impact on energy demand. In the next 20 years, China's energy demand may vary in a wide scope , not simply a constant figure.