

# Model Results of Sustainable Energy Development Scenarios

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## Background of the Study

- To figure out the energy development trend likely happening within expected social and economic conditions or may happen if better conditions available
- Supporting by Energy Foundation and Shell Foundation
- Cooperating with LBNL and Shell Institute
- Cooperating with Chinese sectoral experts

## Three Scenarios

- All three scenarios should be referred as low carbon scenario, as all of them include the continuing efforts and new efforts on energy conservation and fuel substitution in coming years
- Government plays important roles in pushing those efforts, for the sake of promoting sustainable energy development in China

## Scenario 1

- Market becomes determinative, government's role for promoting energy conservation weakening
- Some existed barriers still remain and new barriers may emerge
- Governmental plan can hardly be fully reached
- Difficulties existing in enlarging natural gas market, domestic supply, and natural gas import projects
- Difficulties existing in urban mass transportation infrastructure construction

## Scenario 2

- Based on the goals of “10<sup>th</sup> Five-Year Plan and Later 10 Year’s Outlook”
- Administrative management continually plays important roles
- The policies for realizing above governmental plans be effectively implemented

## Scenario 3

- Reflecting sectoral experts’ desired direction for concerned sector development
- Technically feasible
- Energy conservation be further enhanced by strong enforcement of new energy and environmental policies and standards
- Government plays important roles in enlarging natural gas market and infrastructure construction
- Favorable conditions available for environment sound technology and know-how transfer

## Population and Economy Growth Projection

		1998	2005	2010	2020
Population	billion	1.248	1.32	1.38	1.47
Urbanization Rate	%	30.39	39.9	44.7	57.4
GDP Growth Rate	%	7.5	7		6.7
Share of Primary Industry	%	18	13	11	9
Share of Secondary Industry	%	49.2	51	50	45
Share of Tertiary Industry	%	32.8	36	39	46
GDP Per Capita	1998 Chinese Yuan	6277	9400	13010	23280

## Output of Energy Intensive Products

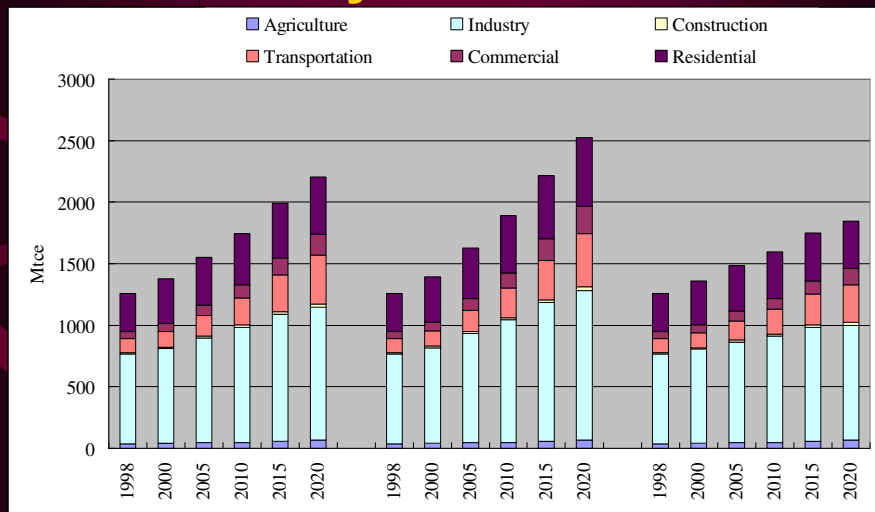
(million tons)

	1998	2010	2020	Annual Growth Rate
Steel	114.6	190	210	2.8%
Cement	536	790.66	948.25	2.6%
Ammonia	31	36.7	40	1.2%
Ethene	3.77	10	18	7.4%
Paper	27.33	50	75	4.7%

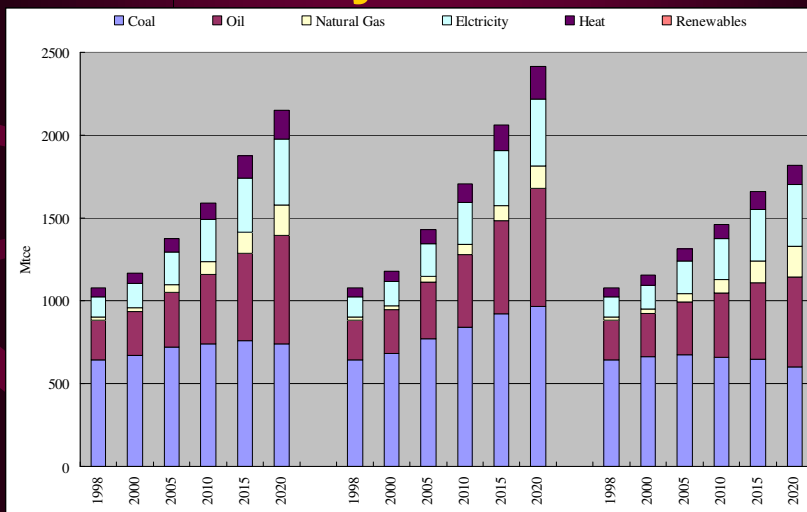
# Model Structure



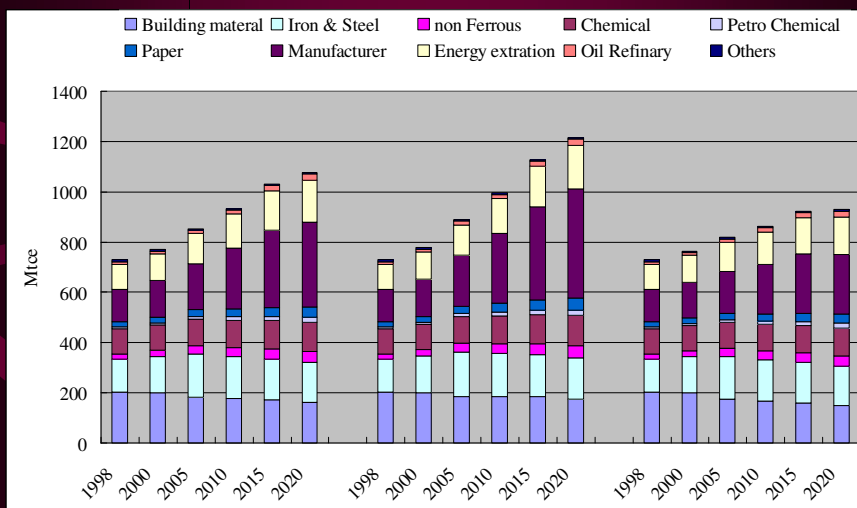
# Final Energy Demand by Sector



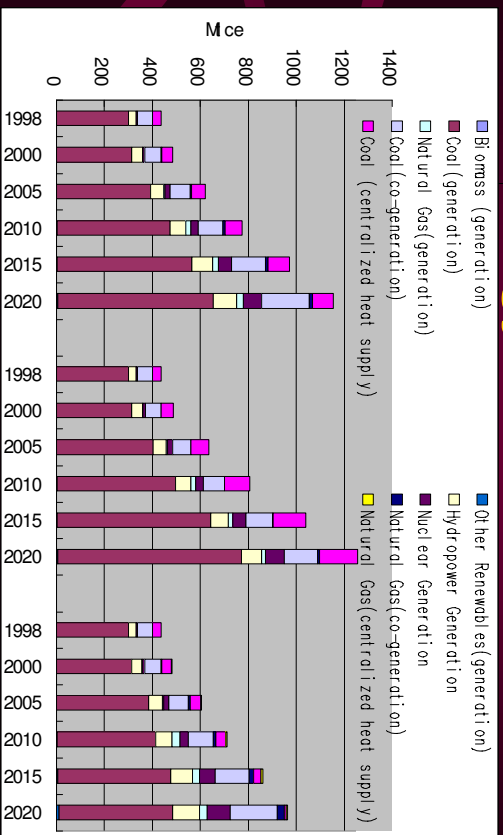
# Final Energy Demand by Fuel



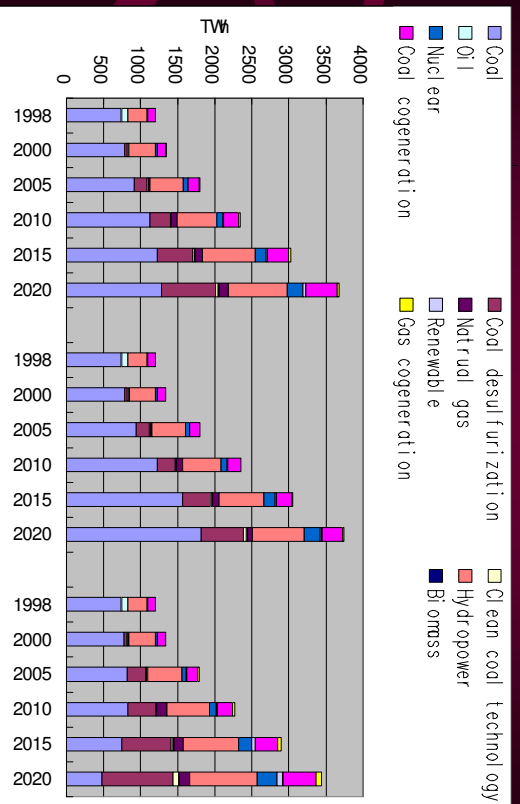
# Final Energy Demand by Industrial Sectors



# Energy Used for Energy Transformation



# Electricity Generation Output



## Electricity Consumption Per Capita (kilowatt hour)

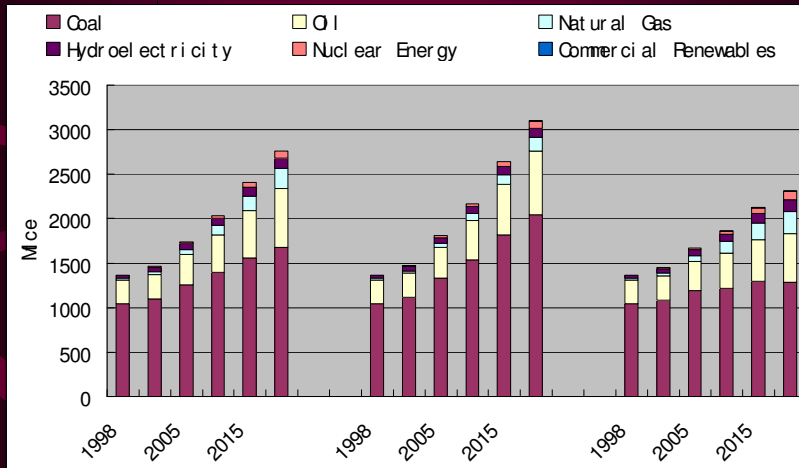
	1998	2000	2005	2010	2015	2020
S1	960.833	1,053.74	1,361.86	1,705.20	2,143.04	2,546.44
S2	960.833	1,057.44	1,364.32	1,701.91	2,124.48	2,502.58
S3	960.833	1,056.24	1,352.67	1,646.84	2,030.52	2,338.22

## Electricity & Heat Demand by End Use Sector

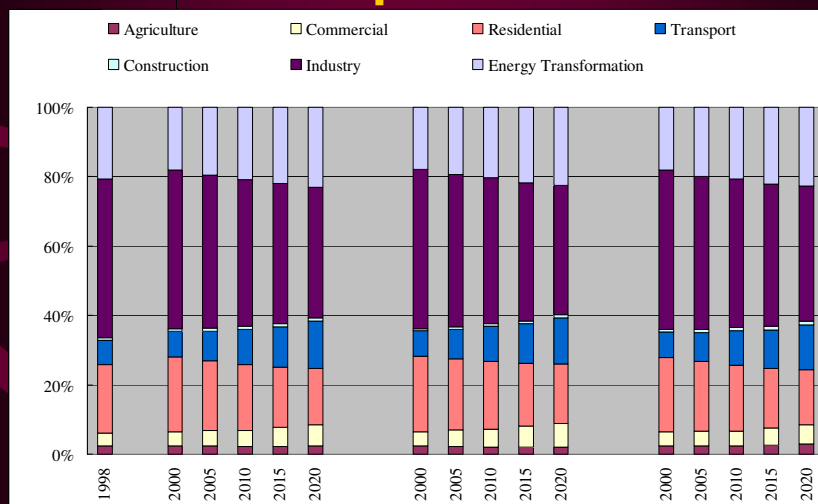
	1998	2020			1998	2020		
		S1	S2	S3		S1	S2	S3
Agriculture	6.08%	3.87%	3.97%	4.24%				
Industry	65.69%	49.51%	48.97%	45.41%	54.84%	34.90%	36.79%	43.05%
Construction	1.84%	1.66%	1.71%	1.82%	0.12%	0.11%	0.12%	0.18%
Transportation	2.49%	2.72%	2.89%	3.06%				
Commercial	10.28%	20.05%	17.69%	15.43%	22.06%	28.90%	26.55%	25.17%
Residential	13.63%	22.17%	24.77%	30.02%	22.98%	36.09%	36.53%	31.60%



# Primary Energy Composition



# Energy Consumption Composition



## Primary Energy Consumption Per Capita (ton of coal equivalent)

	1998	2000	2005	2010	2015	2020
S1	1.10	1.16	1.37	1.57	1.85	2.11
S2	1.10	1.15	1.32	1.48	1.69	1.88
S3	1.10	1.14	1.27	1.35	1.49	1.58

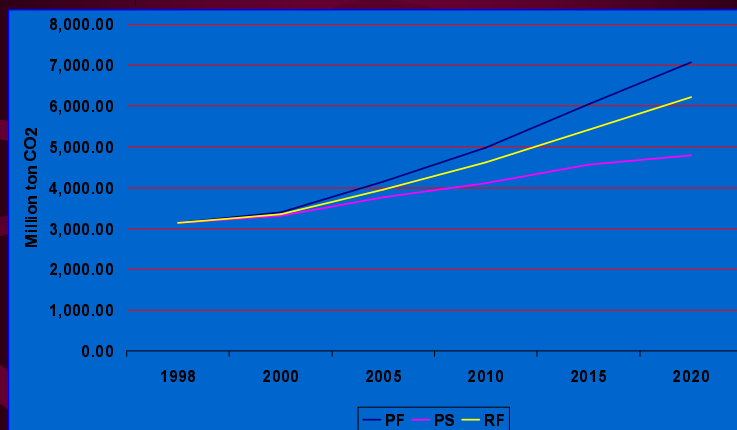
## Energy Intensity (tce per million 1998 Chinese Yuan of GDP)

	1998	2000	2005	2010	2015	2020
S1	174.61	162.68	139.89	118.57	104.89	89.44
S2	174.61	161.33	134.75	111.16	95.64	79.67
S3	174.61	159.76	129.31	101.69	84.44	66.89

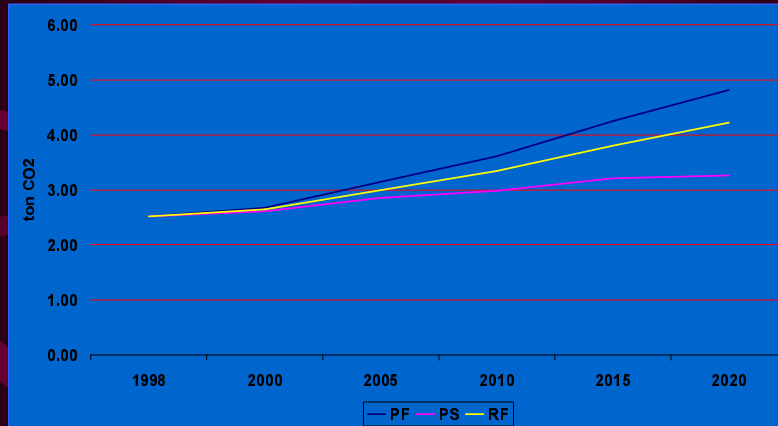
## Energy Elasticity

	1998~2010	2010~2020	1998~2020
S1	0.536	0.549	0.545
S2	0.459	0.471	0.467
S3	0.355	0.339	0.350

## Total CO2 Emission



## CO2 Emission Per Capita



## CO2 Emission Per Capita in 2000 year's world (ton CO2)

World Average	3.89
OECD	11.09
Non-OECD Europe	4.13
China	2.40

- Current CO2 emission per capita in China is only about 60% of the world average
- By 2020, CO2 emission per capita is projected to reach to current world average or non OECD Europe's level, less than a half of current CO2 emission per capita in OECD countries