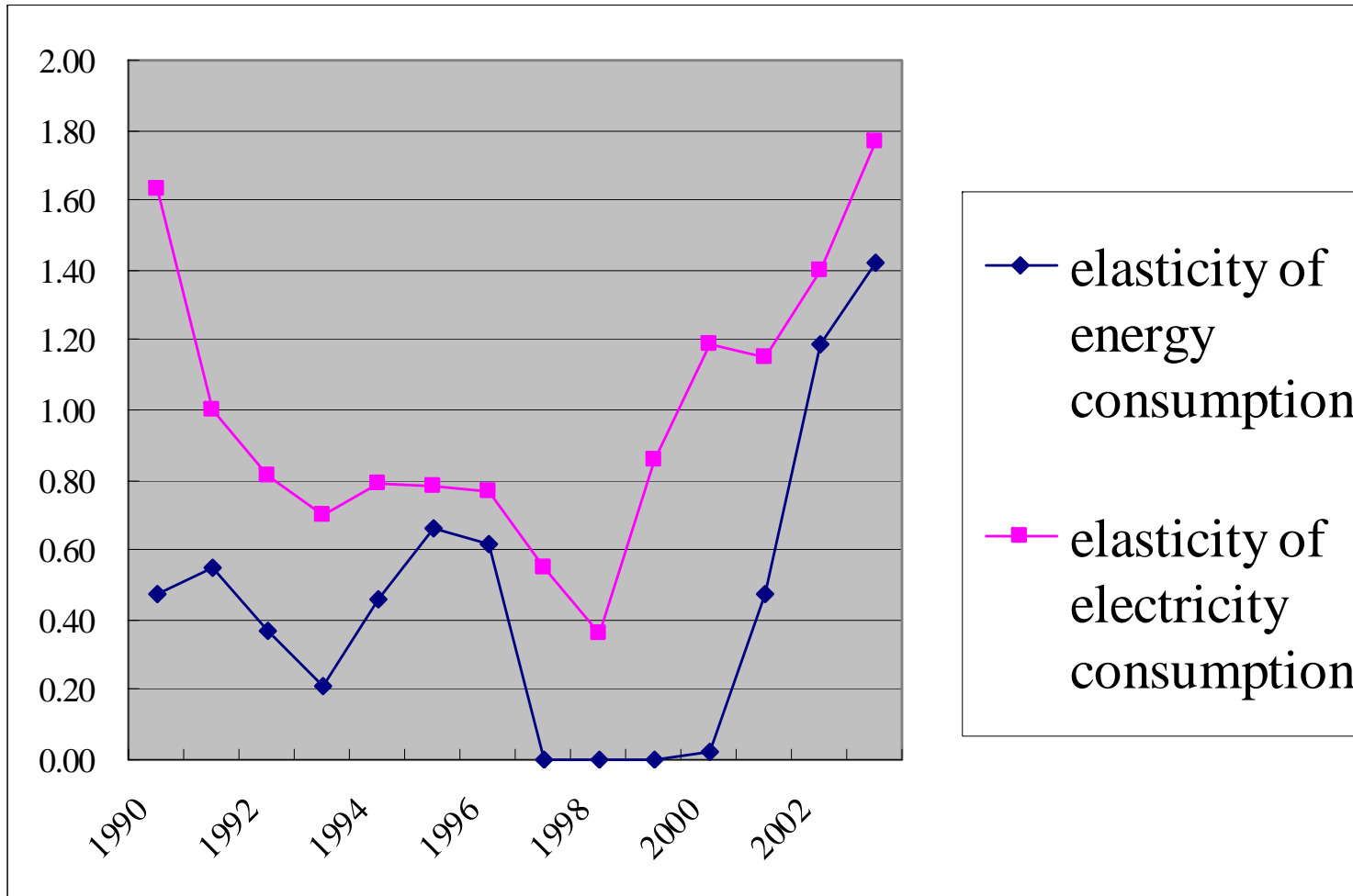


Industry Structure Adjustment and Energy Saving: Primary Results from DVIO Model

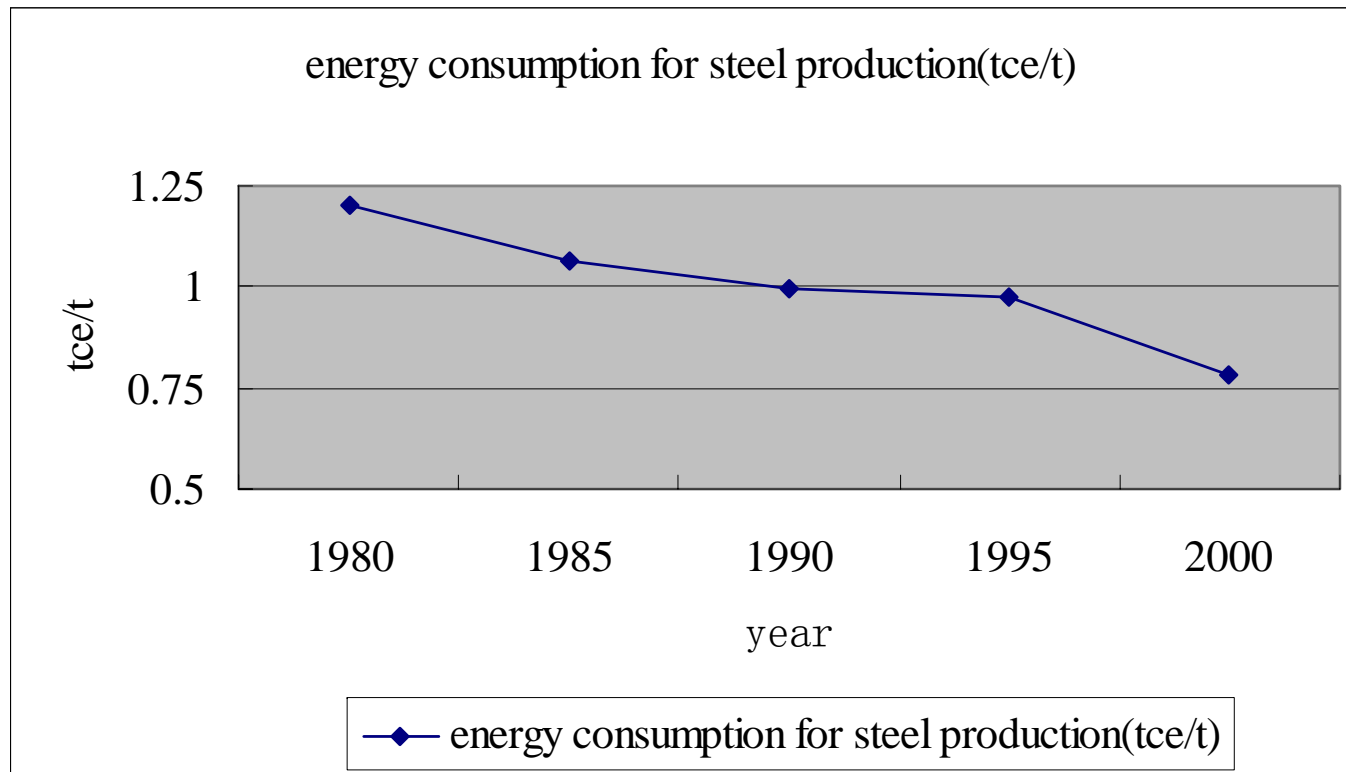
Zheng Zhaoning

2004/10/22

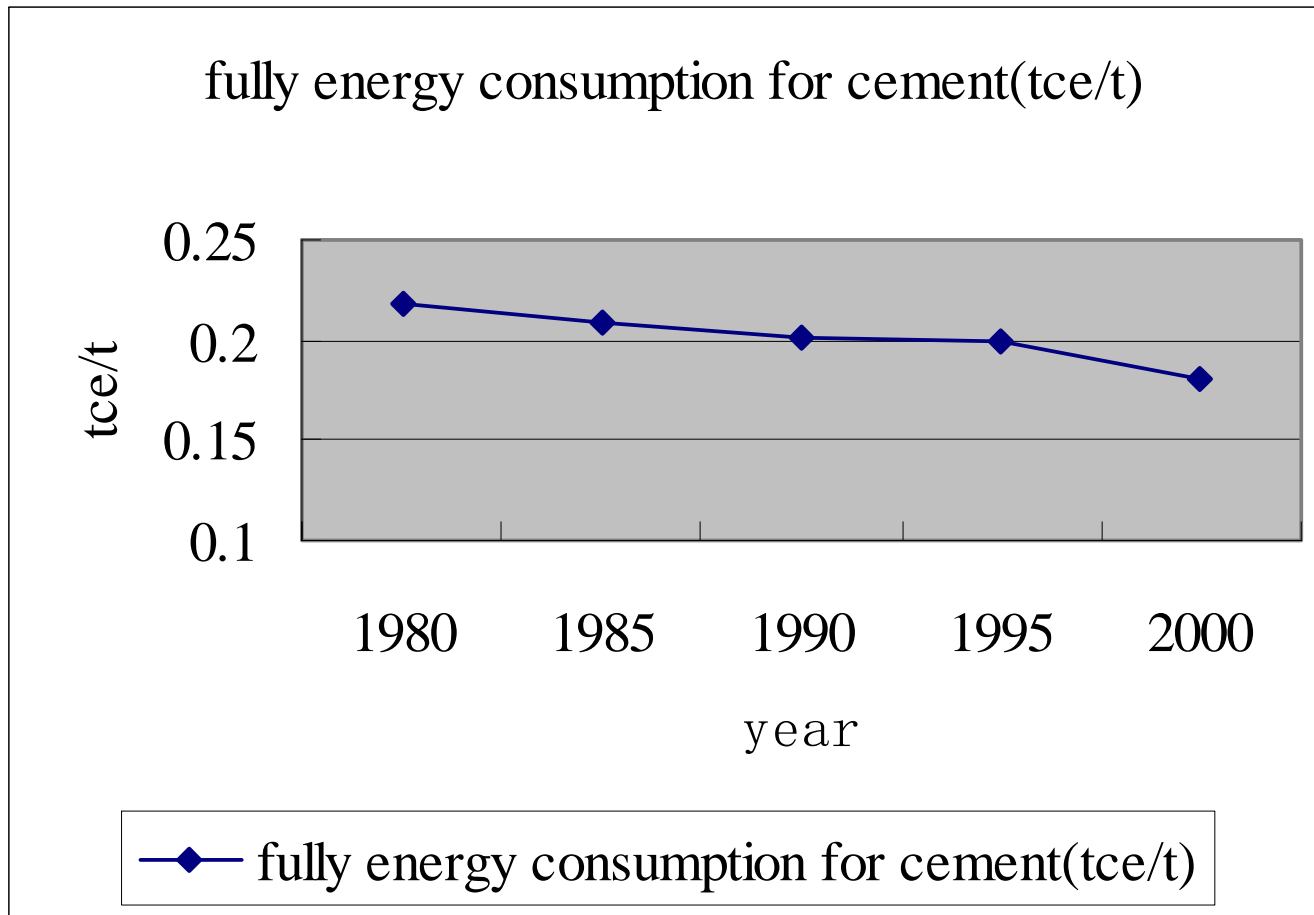
sudden change of energy consumption



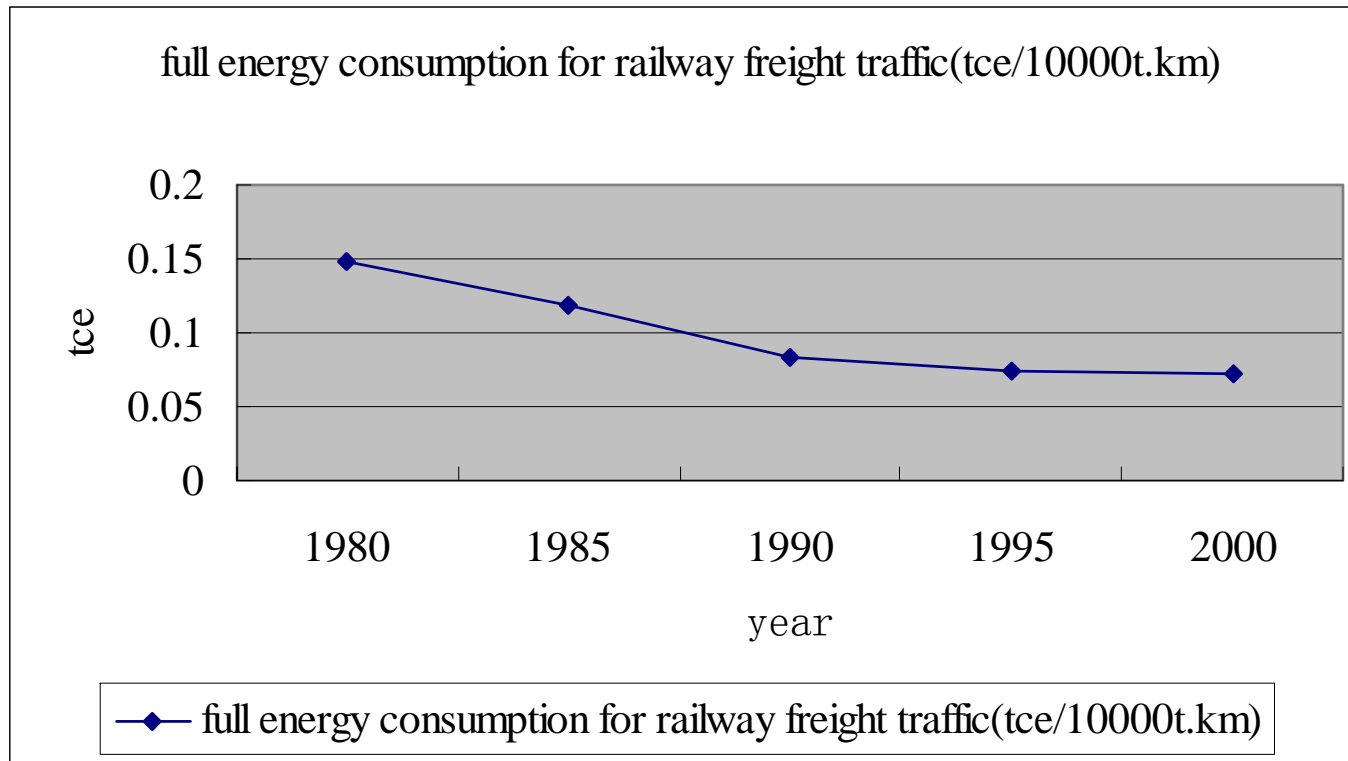
Energy efficiency of main technologies



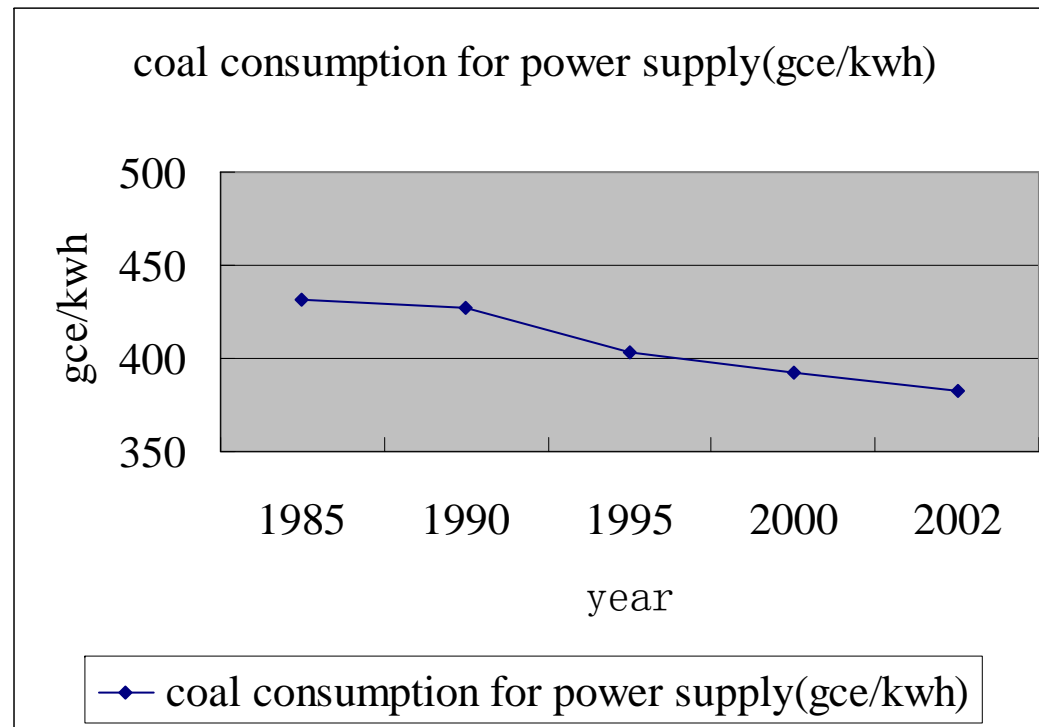
Energy efficiency of main technologies



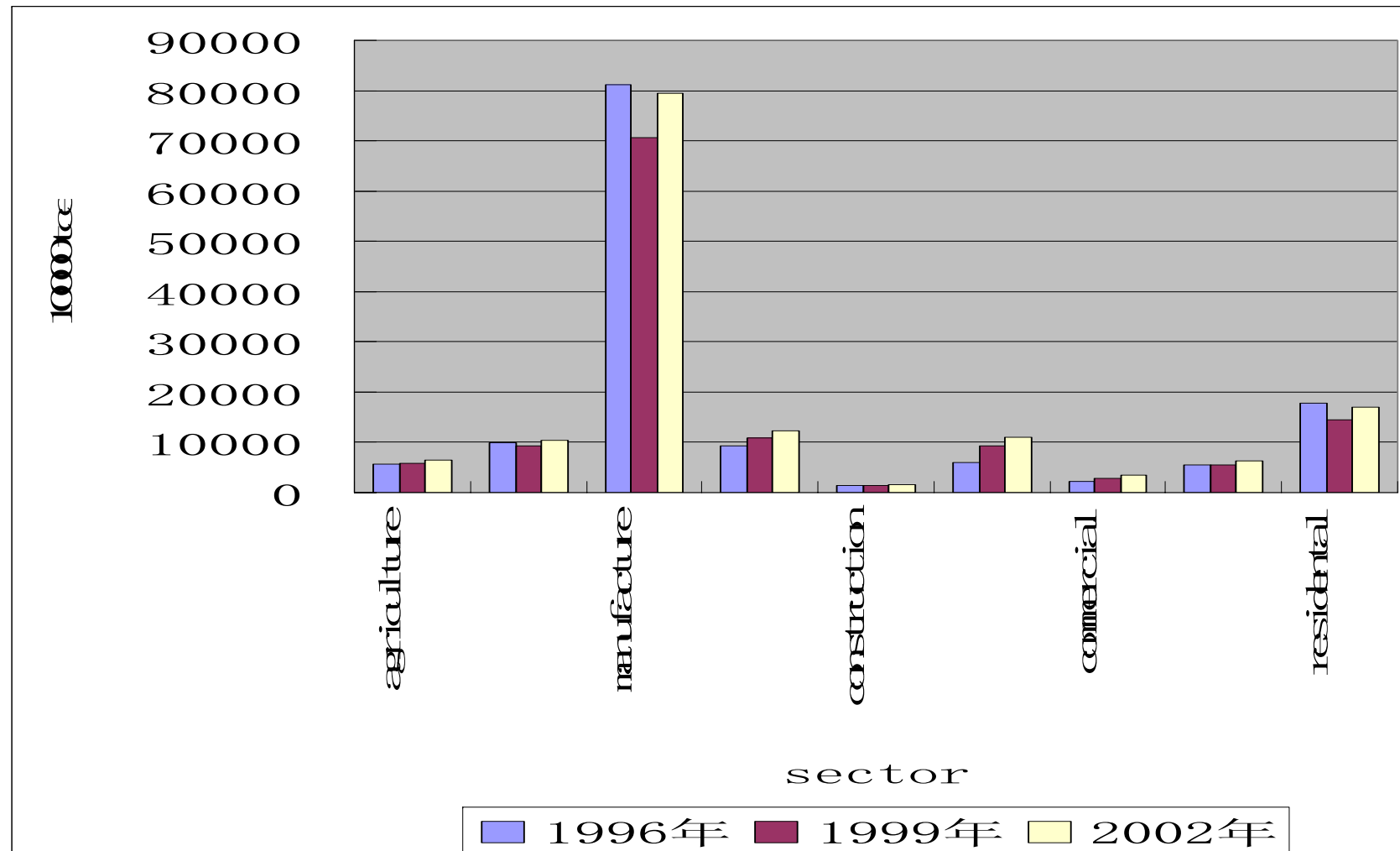
Energy efficiency of main technologies



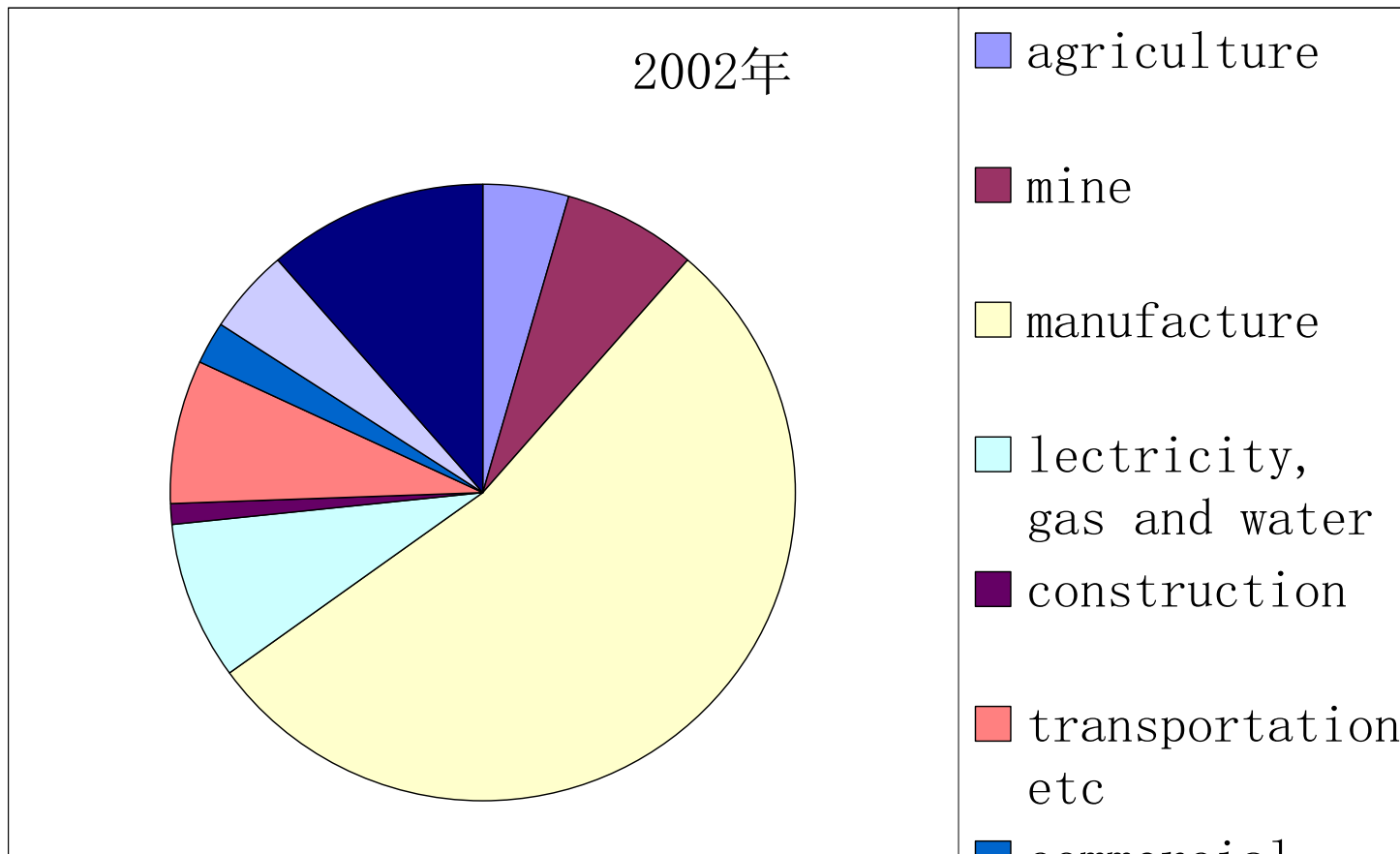
Energy efficiency of main technologies



Energy consumption of different sectors

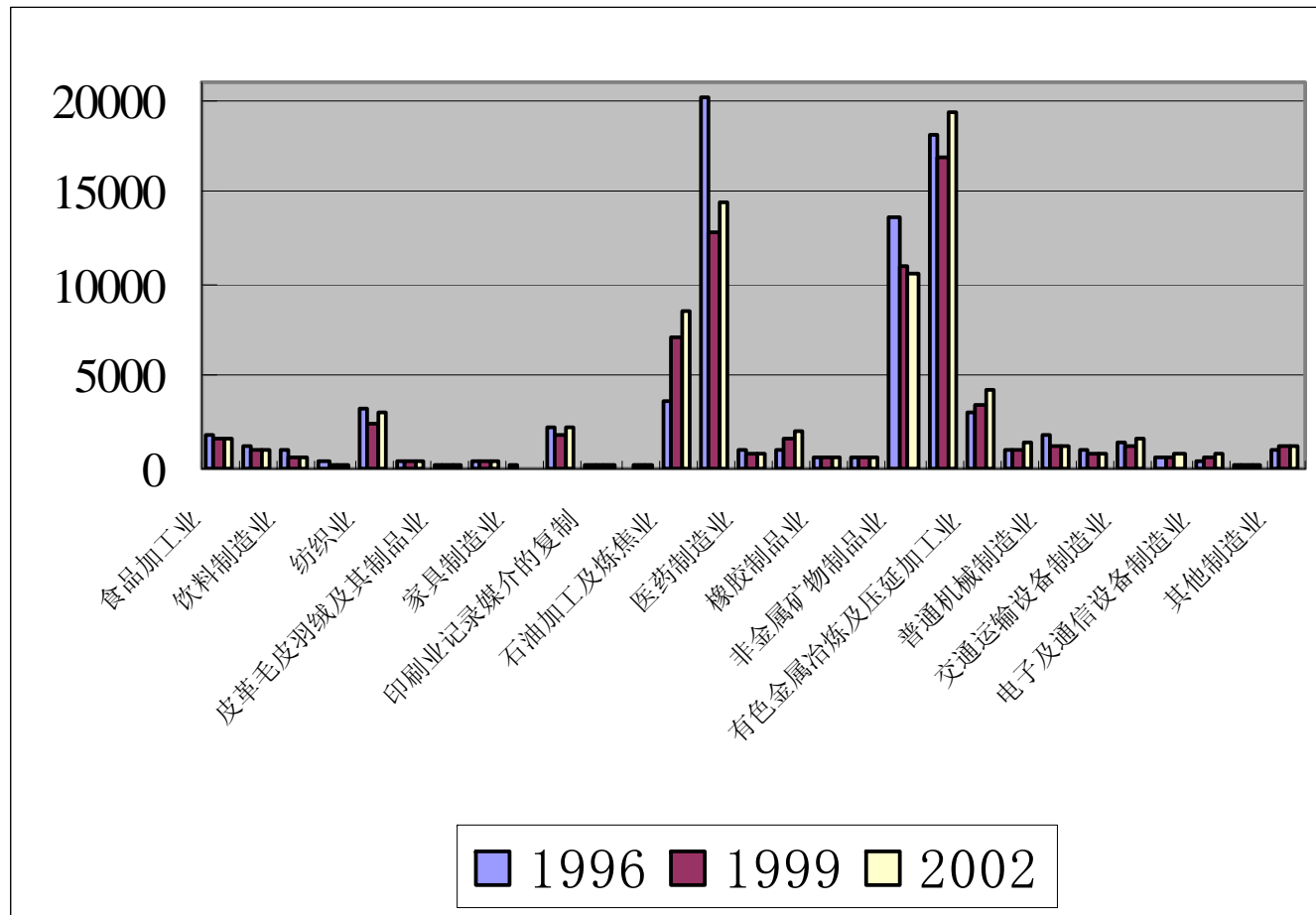


Energy consumption proportion of different sectors



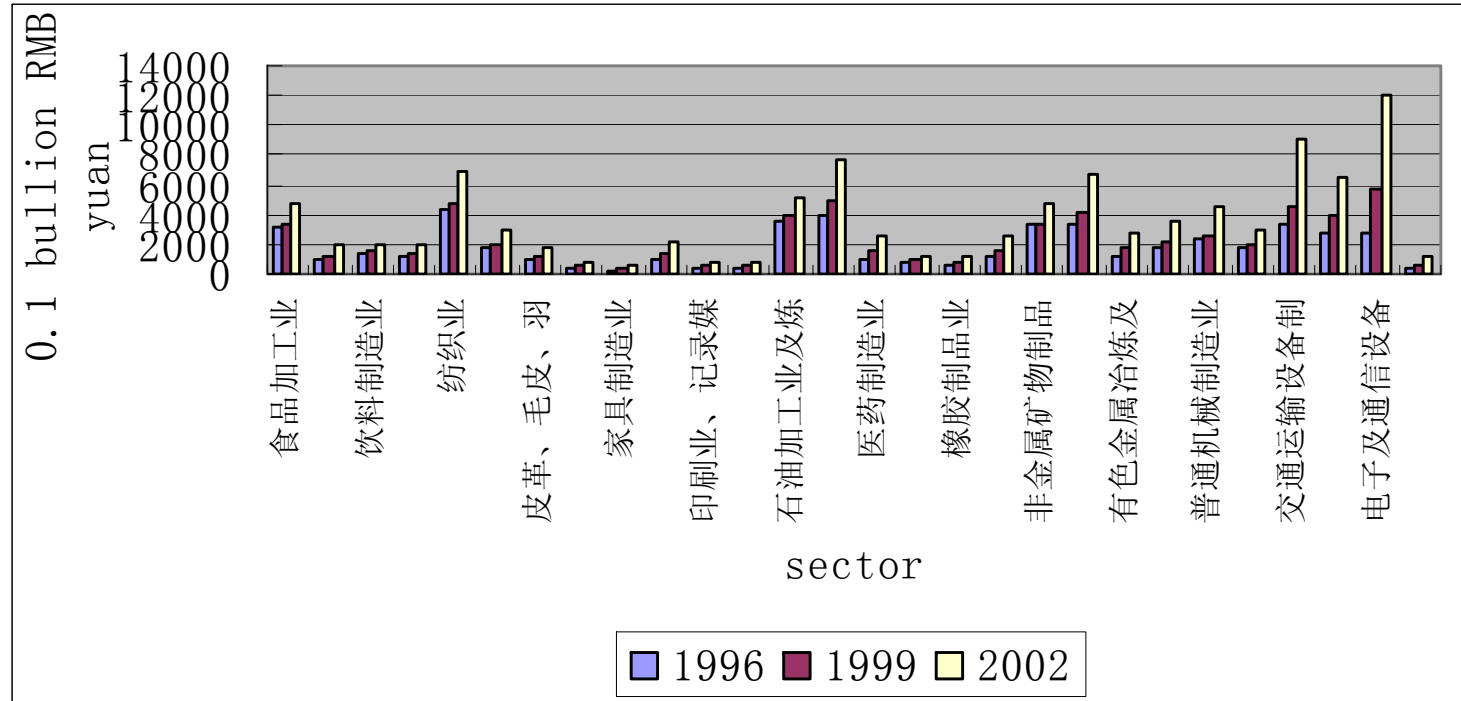
Energy consumption of different sub-sectors in manufacturing

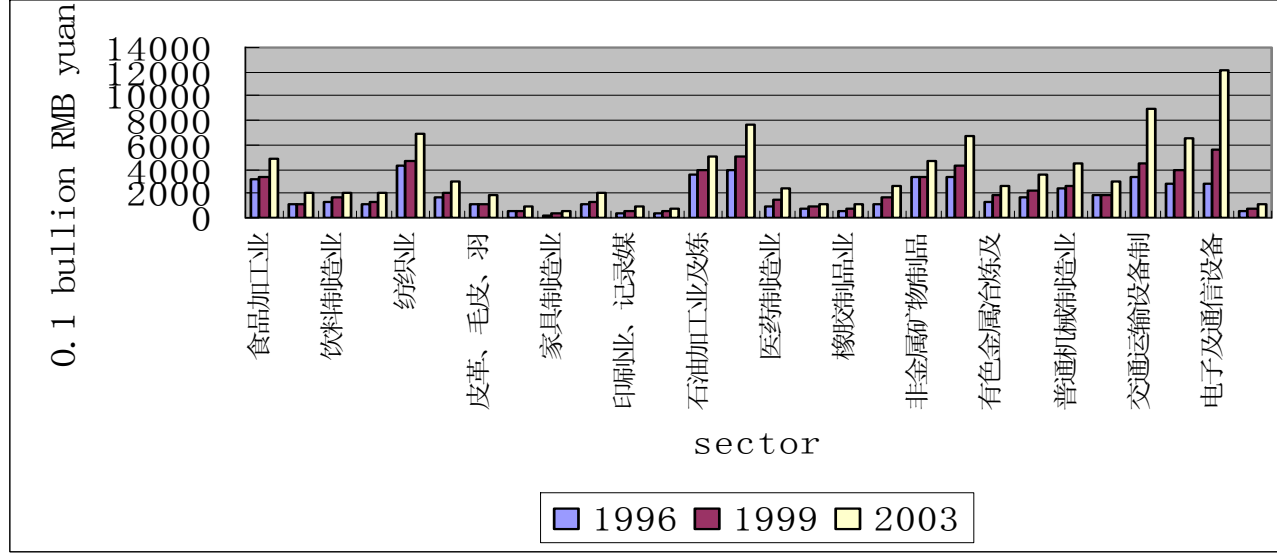
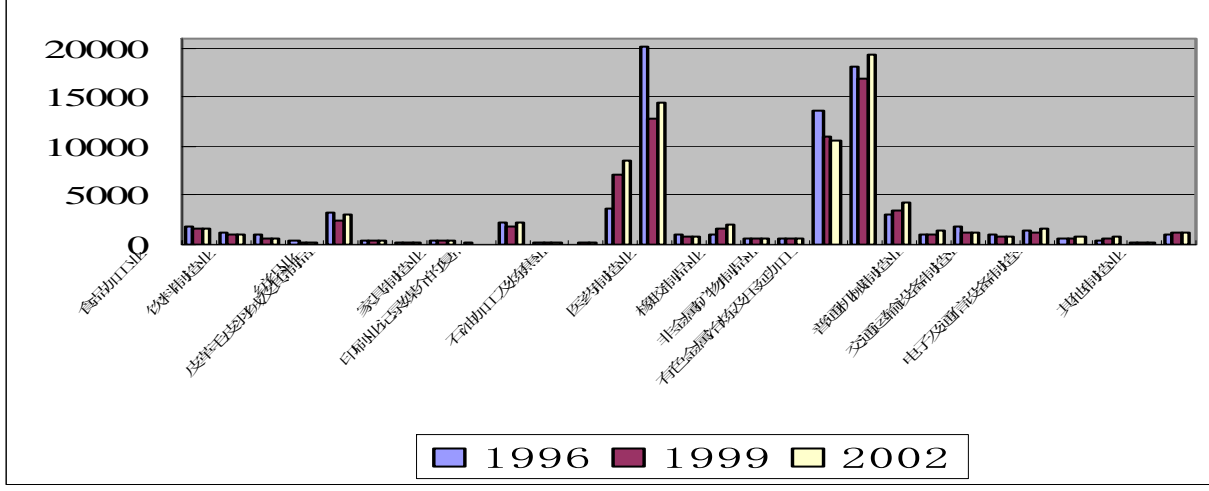
Textile
 Paper and pulp
 petro-finery and
 coking
 Chemistry
 Building
 materials
 Ferrous metal
 Non-ferrous



Gross output of different sub-sectors in manufacturing(price in 2000)

- Electronic equipment
- Vichle
- Chemistry
- Textile
- Electricity
- petro-fineryand coking
- food
- Ferrous metal
- Non-ferrous



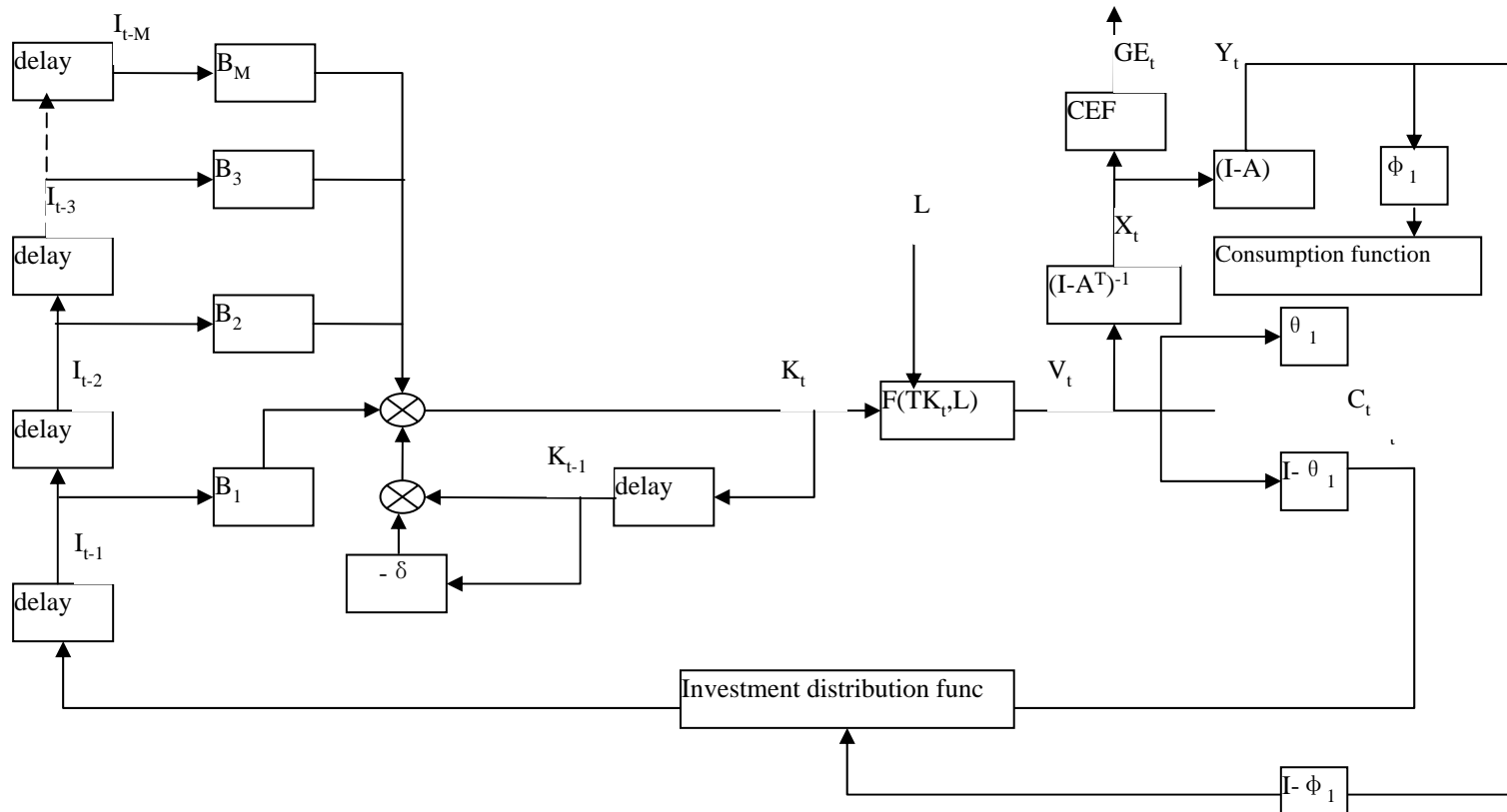


implication

- 1 output structure is much different form energy consumption mix in manufacture sector.
- 2 control the growth of energy consumption by reducing the investment to energy-intensive sector and increasing the investment to non-energy-intensive sector

Model frame

(dynamic variable input-output model)



Model description

Production function

$$V = f(TK, L)$$

$$X_t = (I - A_{V,t})^{-1}V$$

$$Y_t = (I - A)X = (I - A)(I - A_{V,t})^{-1} f(TK, L)$$

Model description

Production Function form

AK- metal mine, electricity, water

CES-transportation, construction,
service

C-D: agriculture, metal mine, non-metal
mine, coal mine, petroleum and gas
mine, light industry, machinery, etc

Model description

Consumption equation

now a simple consumption function estimated by HJH was adopted as follow

$$C = 0.9494C_{-1} + 0.5666Y - 0.516Y_{-1}$$

$$s = \frac{0.9494s_{-1}}{1+G} + 0.4334 \frac{G}{1+G}$$

$$Y = \begin{bmatrix} Y_C \\ Y_I \end{bmatrix} = \begin{bmatrix} Y_{Cnone} \\ P_{ce} Y_{Ce} \\ Y_{Iconsump} \end{bmatrix} + \begin{bmatrix} I_{agr} \\ I_{pu} \\ Y_c \\ Y_m \end{bmatrix},$$

consumption

capital form

Model description

Equilibrium between value added and final use

$$\sum V \begin{bmatrix} \theta \\ 1-\theta \end{bmatrix} = \begin{bmatrix} C \\ I \end{bmatrix} = \begin{bmatrix} \sum Y_{Cnone} + Y_{Iconsump} + P_{ce} Y_{Ce} \\ \sum Y_I = Y_c + Y_m \end{bmatrix}$$

Model sescription

Capital formation equation

$$K_{i,m,t+1} = (1 - \delta_m) K_{i,m,t} + \sum_{ii=1}^{T1} \rho_{ii} I_{t-ii}$$

$$K_{i,c,t+1} = (1 - \delta_c) K_{i,c,t} + \sum_{ii=1}^{T2} \rho_{ii} I_{t-ii}$$

Model description

Labor equation

$$\mathit{salary} = V \otimes S$$

$$V = [V_1, V_2, \dots, V_n]$$

$$\begin{bmatrix} \Delta \\ S \\ T \\ B \end{bmatrix} = \begin{bmatrix} \delta \\ s \\ t \\ b \end{bmatrix}$$

Model description

$$\bar{W} = \frac{\sum V \otimes S}{L}$$

$$L_t = [L_{1t}, L_{2t}, \dots, L_{nt}]$$

$$W_{i,t} = \frac{\textit{Salary}_{it}}{L_{it}}$$

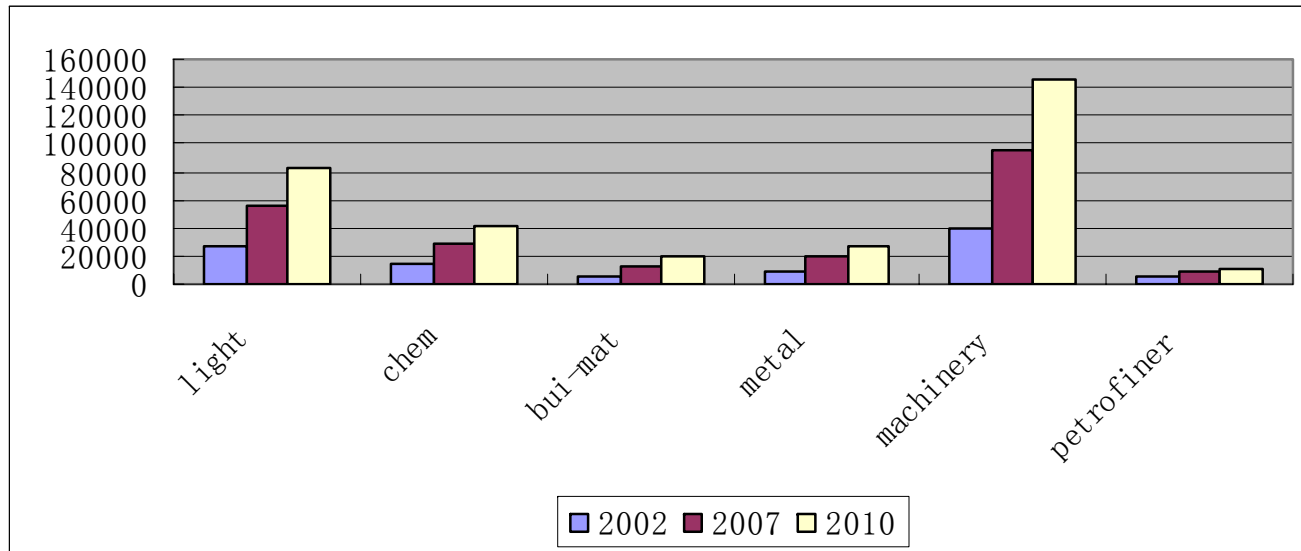
Model description

$$L_{it+1} = L_{it} \left(\nu \frac{\bar{W}_t}{W_{i,t}} \right)$$

Capital increase rate

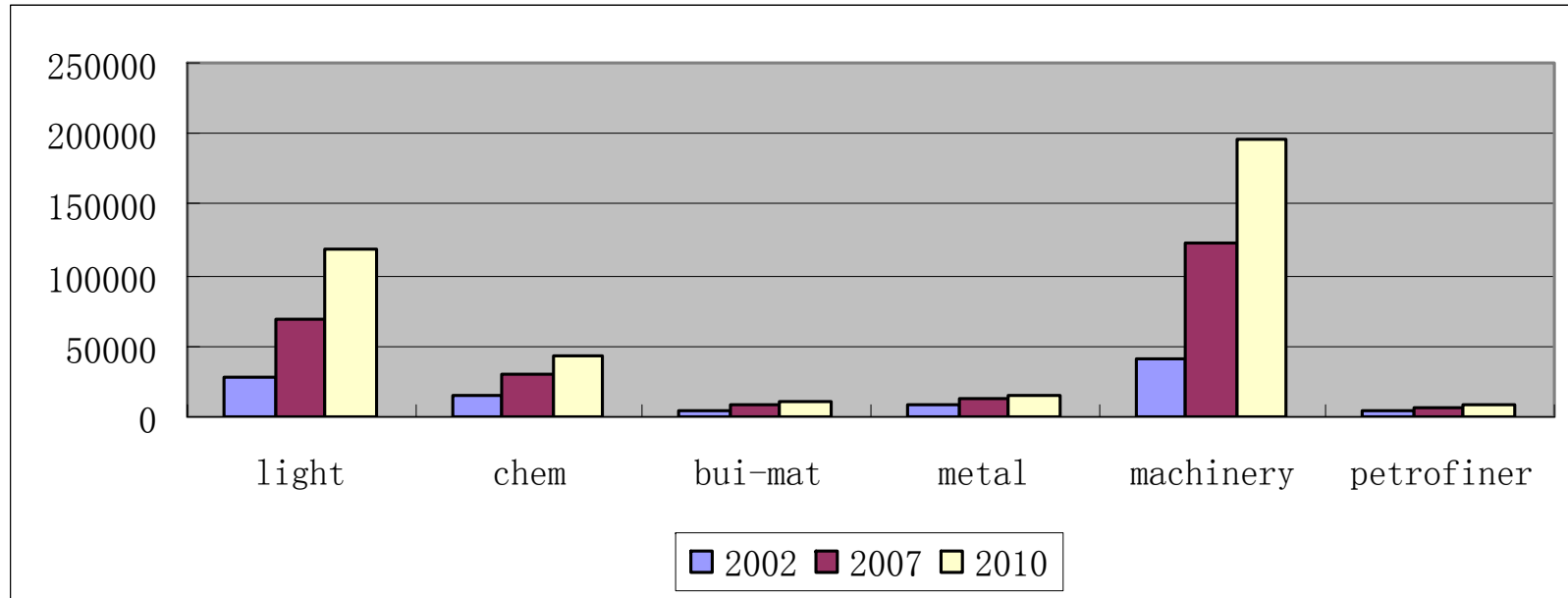
	BAU	scenario1
agriculture	0.05	0.05
metal mine	0.05	0.02
non-metal mine	0.01	0.01
Light industry	0.03	0.1
Chemistry	0.03	0.03
Building material	0.01	0.01
Metal finery	0.03	0.01
Water	0.08	0.08
Transportation and communication	0.06	0.06
Other sector	0.05	0.08
Machinery	0.05	0.08
Construction	0.15	0.05
coal mine	0.05	0.05
mine of petroleum and gas	0.07	0.07
Electricity and heating	0.13	0.07
Oil finery, coal gas and coking	0.03	0.02

results



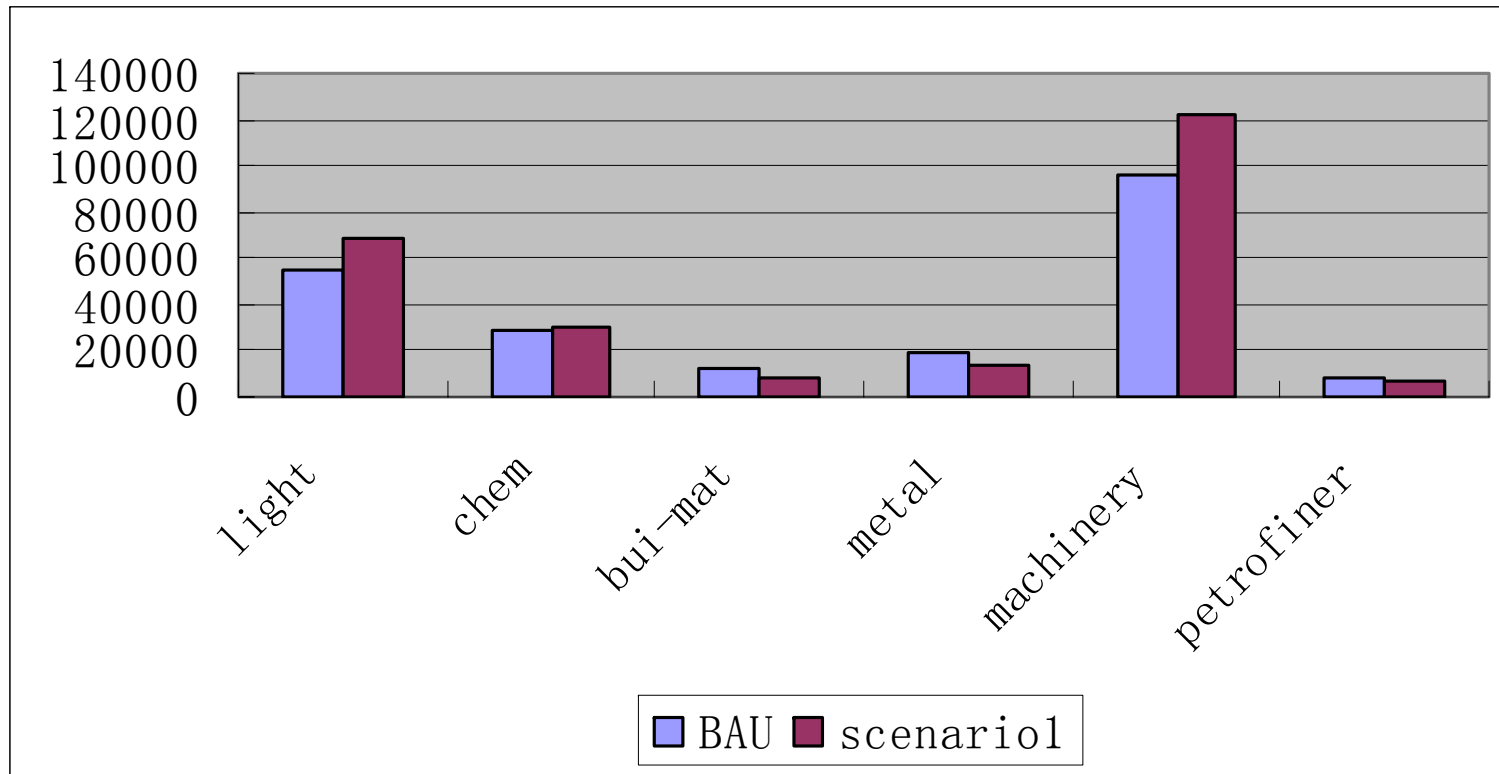
Gross output of different sectors(BAU)

results



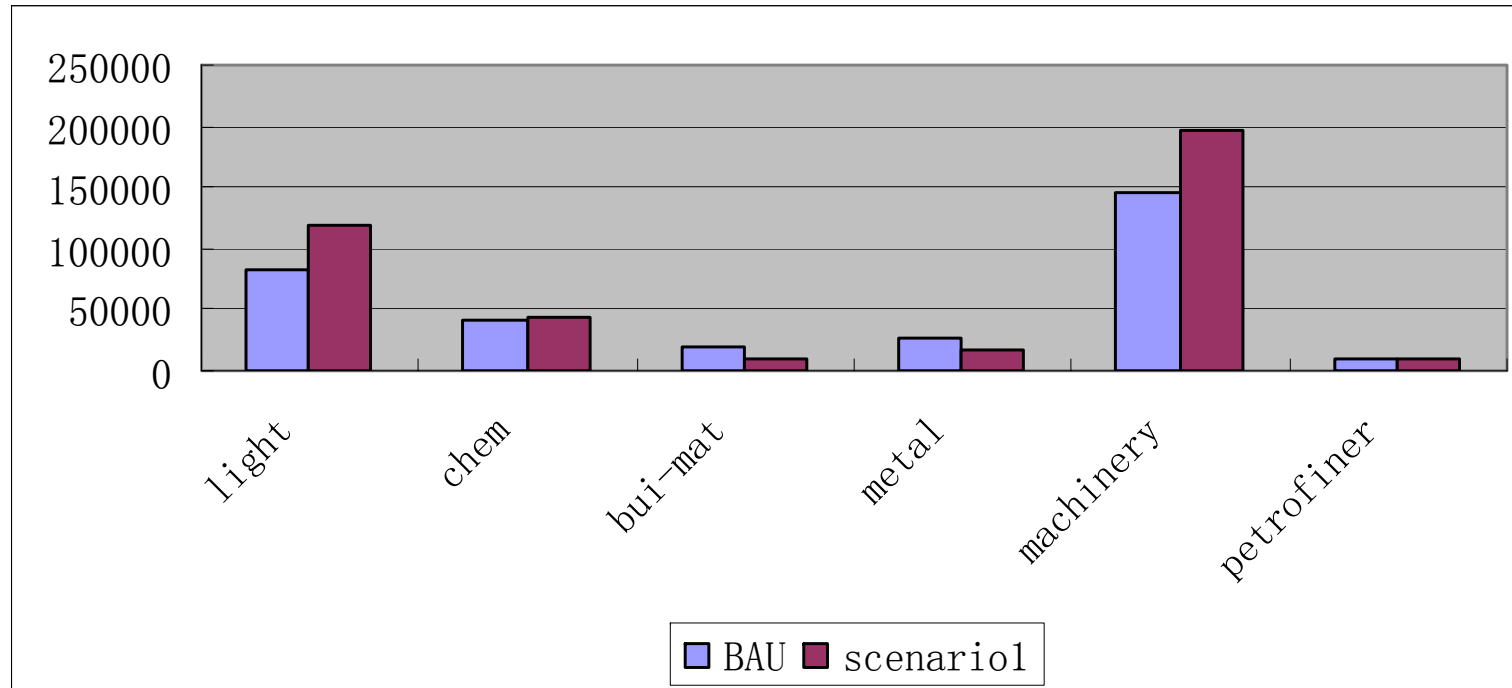
Gross output of different sectors(scenario)

results



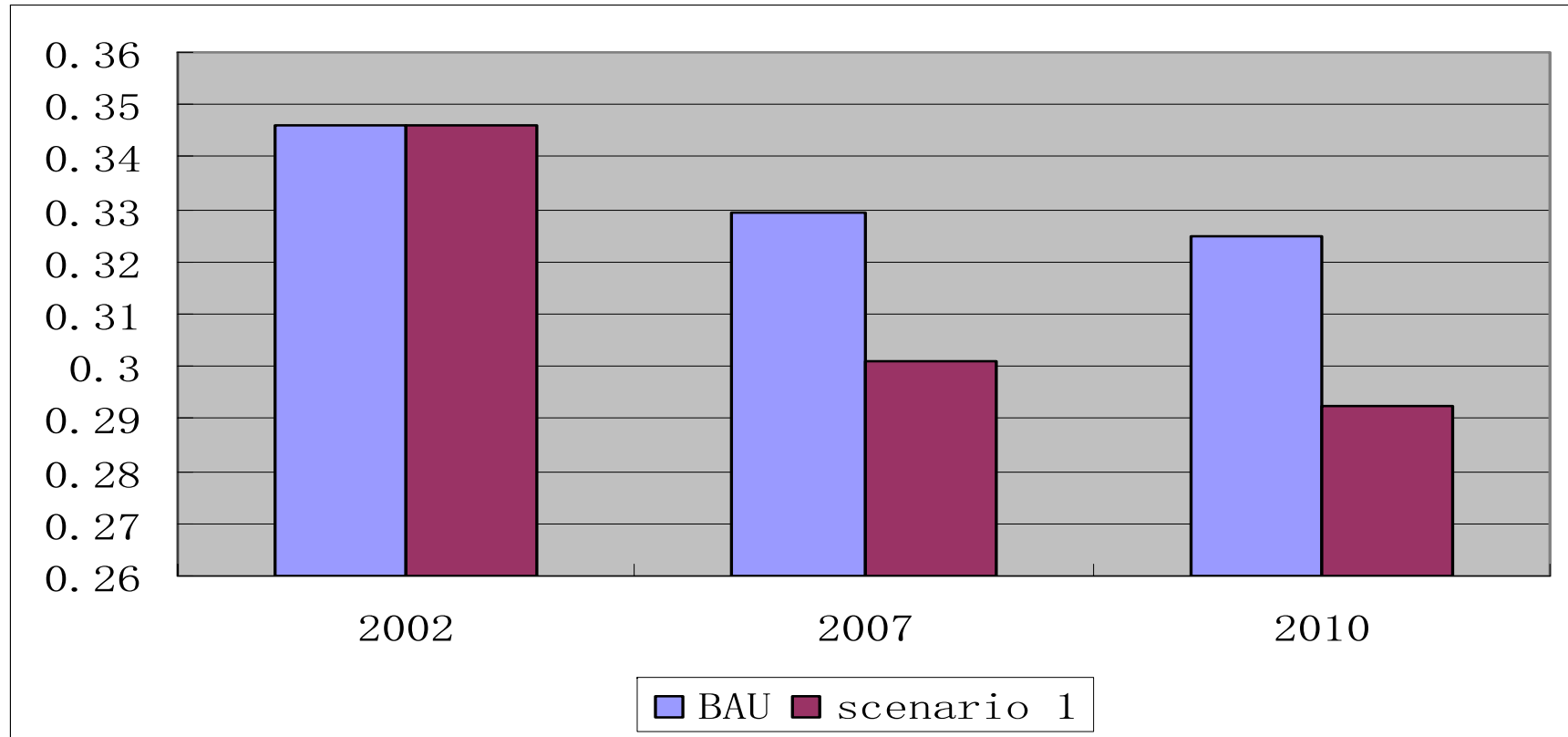
Gross output of BAU and acenario1 (2007)

results



Gross output of BAU and acenario1 (2010)

results



Energy consumption Per unit output

Hasty conclusion

1 under fixed energy consumption of per unit out, structure adjustment can increase output, meantime reduce general energy intensity

2 domestic market orientation or international market orientation? ---China need international market.

3 investment in technical update and transformation is more important than investment in capital construction → adopt the increased output of machinery sector.

Interesting finding

output potential of manufacture sector

**Structure adjustment often leads to energy consumption rebound
due to increase of gross output in manufacture sector**