Michał Przybyliński
Chair of Theory and Analyses of Economic Systems
University of Lodz
Ul. Rewolucji 1905 r. Nr 41
90-214 Lodz
e-mail: micprz@uni.lodz.pl

Foreign Trade and Air Pollution in Poland 1990-2000. Preliminary results

Basic problems

- Calculations made from domestic point of view

- Substitution of imports

- Different classifications

- Specific years – different points on a wave

I-O statistics in Poland

1990 – 43 branches in old classification – beginning of transition and market shock for the economy

1995 – 57 branches in new classification – beginning of high growth

2000 – 54 branches in new classification - recession

Only current prices

Problems of margins

Use table for 2000

Lp.	Industries / Products	Intermediate consumption				Final demand in consumers prices							Final demand in consumers prices	Total output in consumers prices
						consumption			accumulation		export fob			
					Total in consumers prices	households	non-commercial institutions	government	Investment	Changes in inventories	to European Union	to other countries		
	0	1	....	54	55	56	57	58	59	60	61	62	63	64
01 . . . 54	01 . . . 54													
55	**Products**													
56	Costs of employment													
57	Taxes minus subsidies													
58	Gross operating surplus													
59	**Value added**													
60	**Output in basic prices**													

Emission multipliers

$$\mu_j = \frac{Z_j}{x_j}$$ - Emissions per unit of output

$$v_1 y_1 + v_2 y_2 + \ldots + v_n y_n = Z$$

$$v_1 y_1 + v_2 y_2 + \ldots + v_n y_n = \mu_1 x_1 + \mu_2 x_2 + \ldots + \mu_n x_n$$
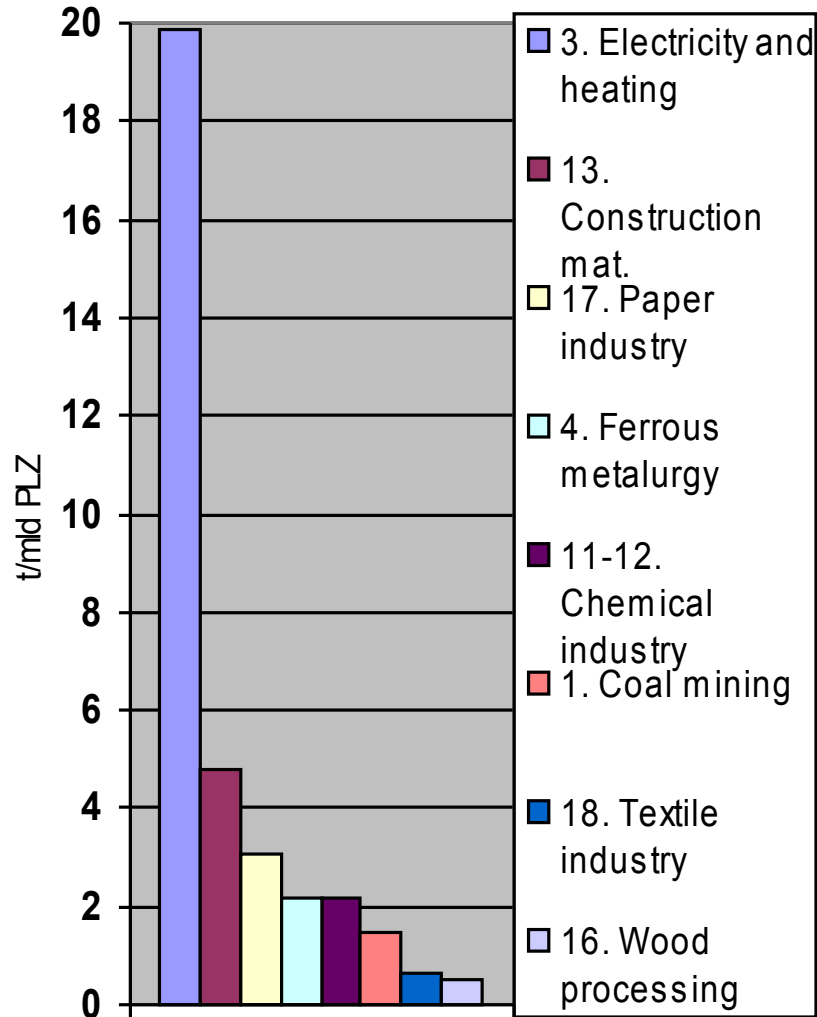
$$\mathbf{v}^T \mathbf{y} = \boldsymbol{\mu}^T \mathbf{x}$$

$$\mathbf{v}^T \mathbf{y} = \boldsymbol{\mu}^T (\mathbf{I} - \mathbf{A})^{-1} \mathbf{y}$$
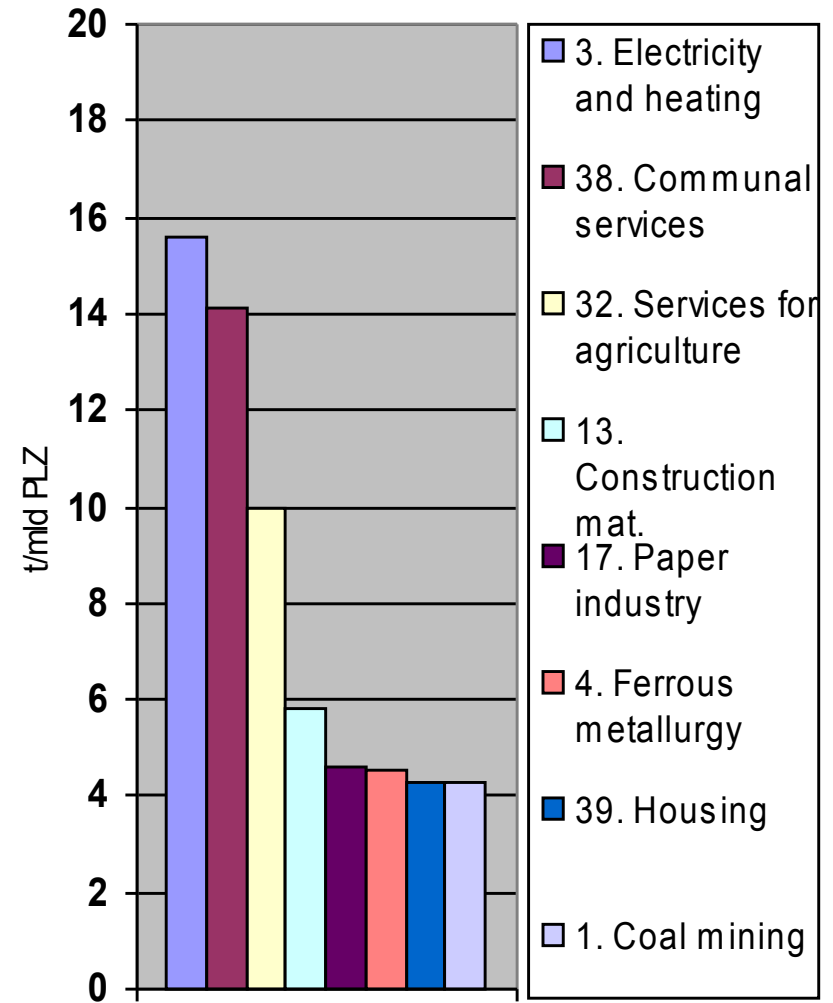
$$\mathbf{v}^T = \boldsymbol{\mu}^T (\mathbf{I} - \mathbf{A})^{-1}$$

1990 - The highest dust emissions per unit ...
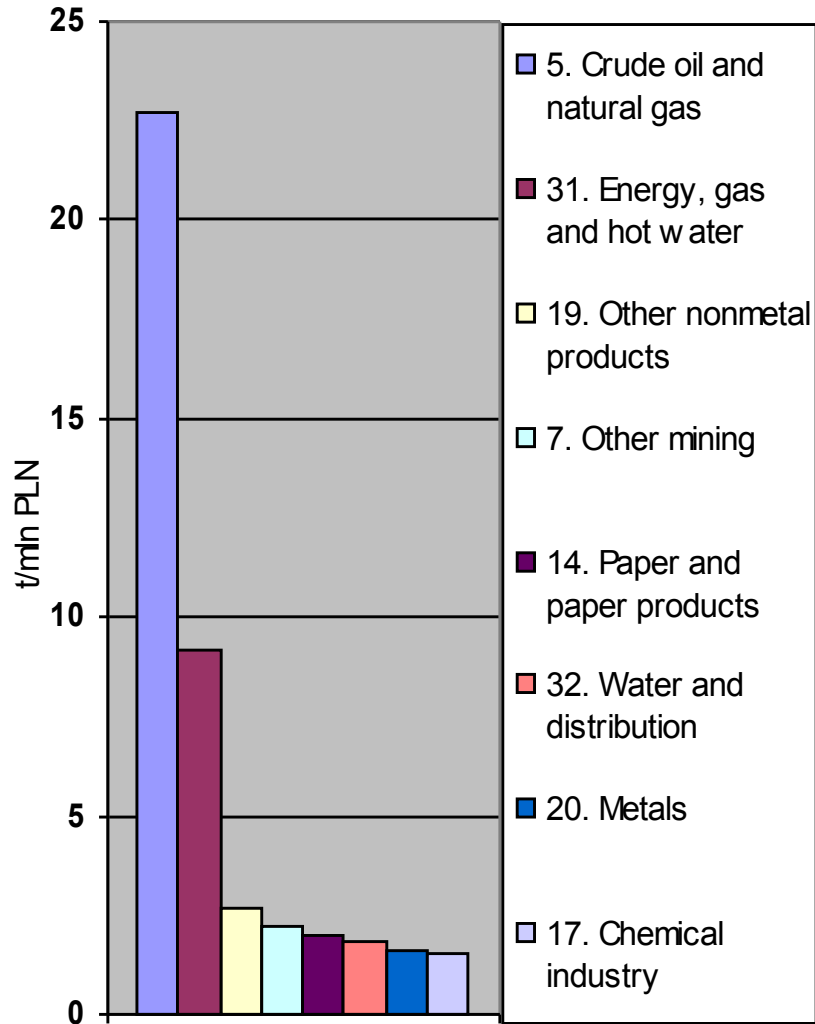
a) Of output

Legend:
- 3. Electricity and heating
- 13. Construction mat.
- 17. Paper industry
- 4. Ferrous metalurgy
- 11-12. Chemical industry
- 1. Coal mining
- 18. Textile industry
- 16. Wood processing

y-axis: t/mld PLZ (0 to 20)

b) Of final demand (multipliers)

Legend:
- 3. Electricity and heating
- 38. Communal services
- 32. Services for agriculture
- 13. Construction mat.
- 17. Paper industry
- 4. Ferrous metallurgy
- 39. Housing
- 1. Coal mining

y-axis: t/mld PLZ (0 to 20)

Source: Own calculations based on : Ochrona Środowiska (1991) i Bilans...(1992)

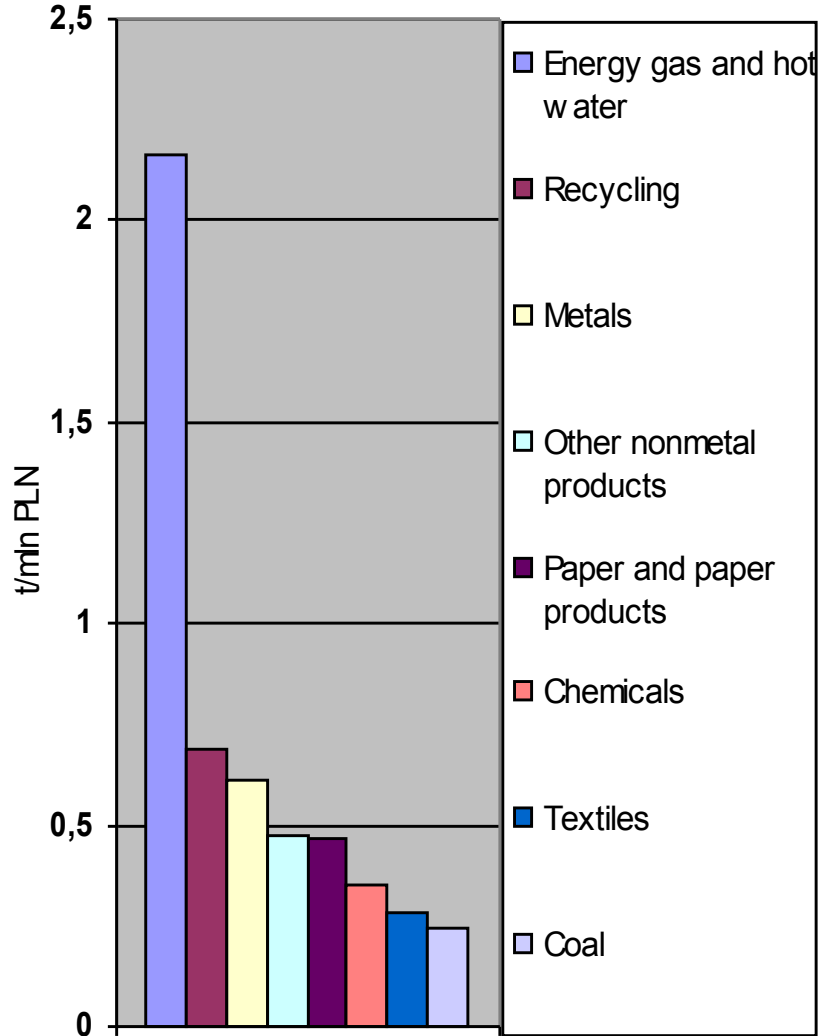# 1995 - The highest dust emissions per unit ...
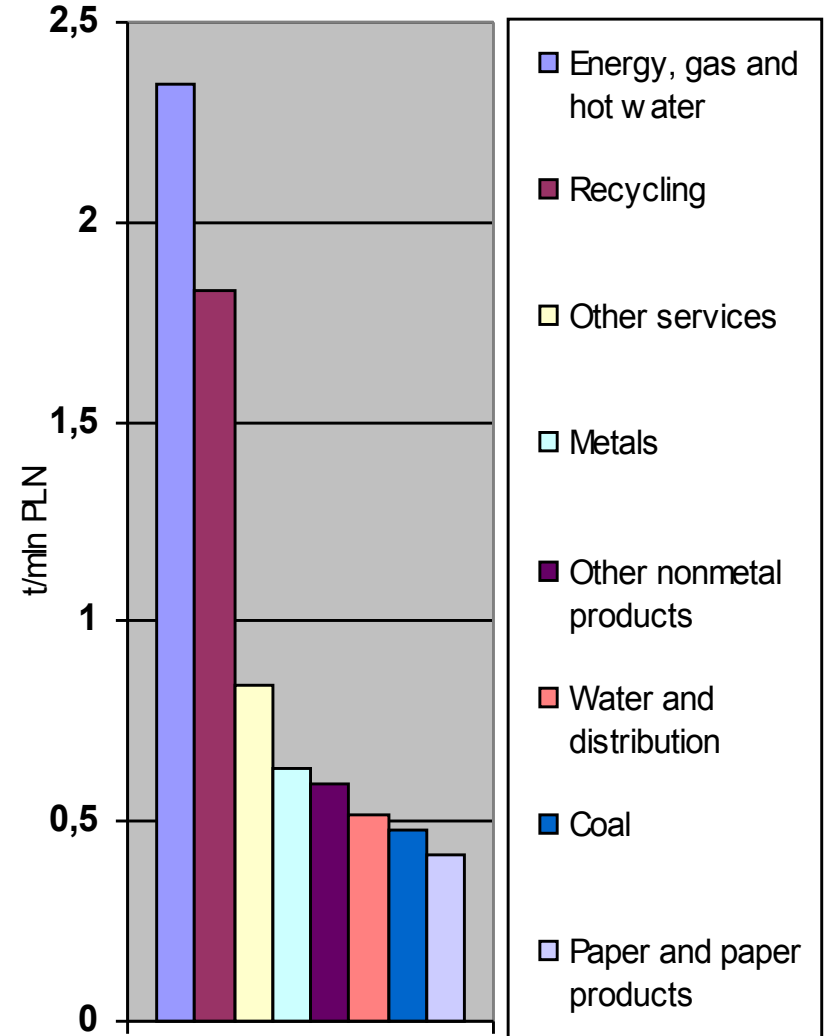
a) Of output

b) Of final demand (multipliers)
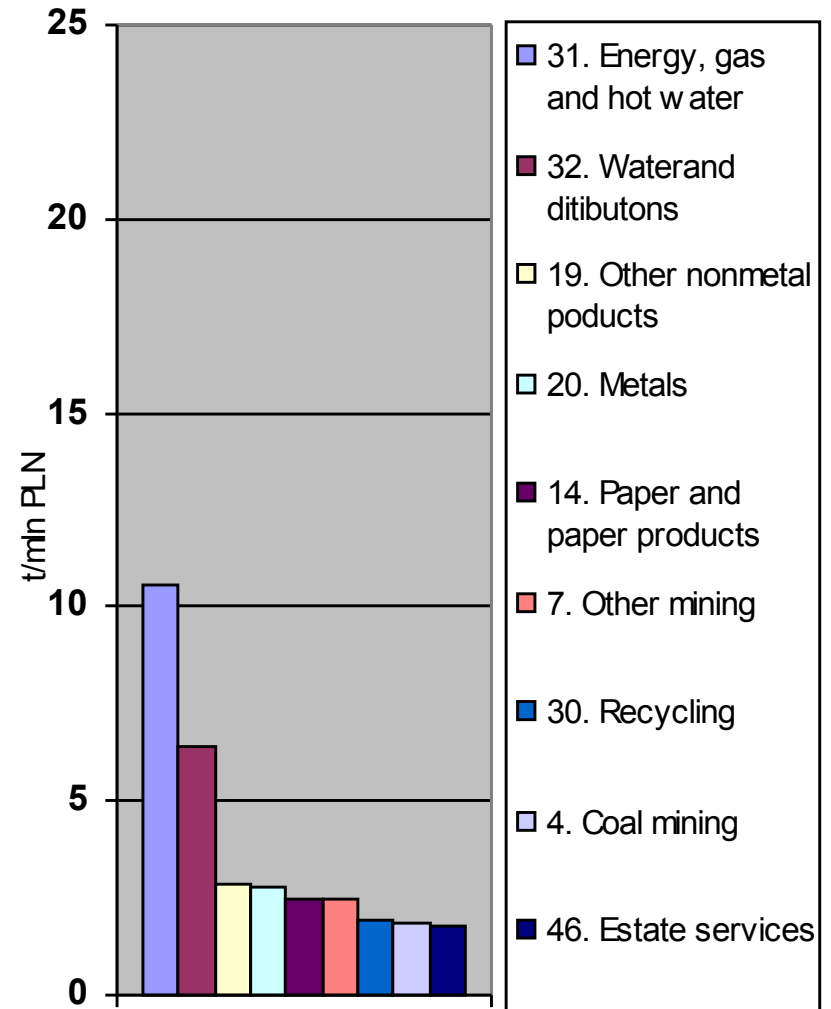
Source: Own calculations based on: Ochrona Środowiska (1996) i Bilans...(1999)

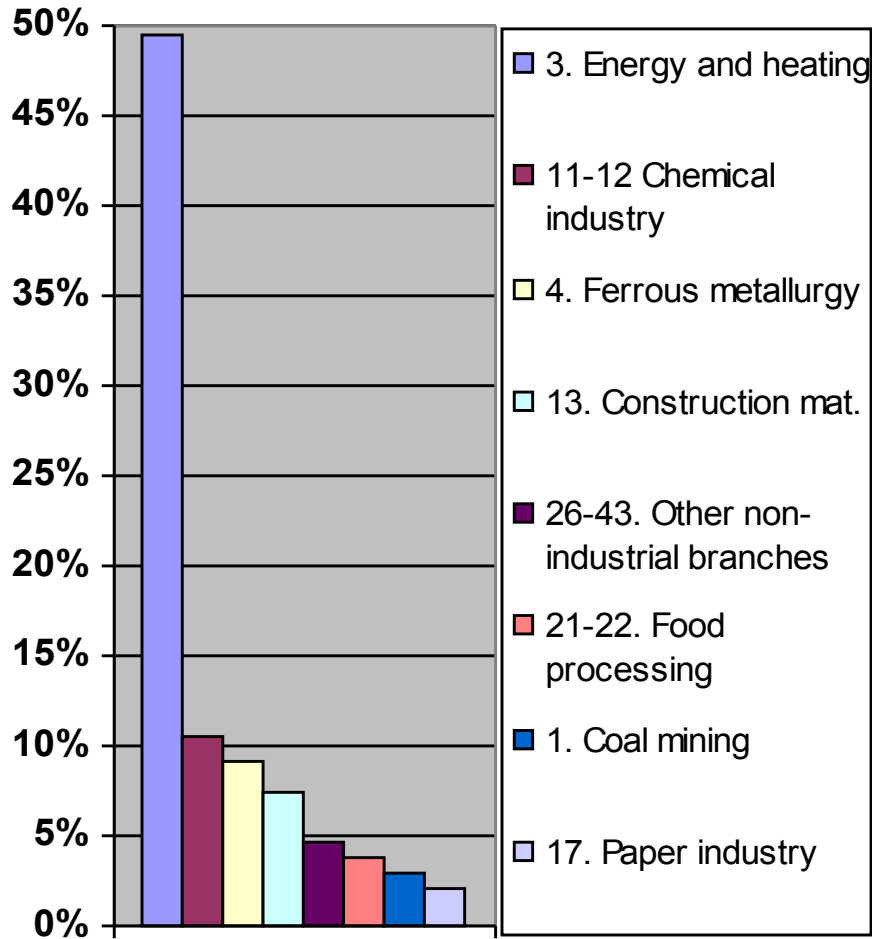# 2000 - The highest dust emissions per unit ...

a) Of output

t/mln PLN

Legend:
- Energy gas and hot water
- Recycling
- Metals
- Other nonmetal products
- Paper and paper products
- Chemicals
- Textiles
- Coal

b) Of final demand (multipliers)

t/mln PLN

Legend:
- Energy, gas and hot water
- Recycling
- Other services
- Metals
- Other nonmetal products
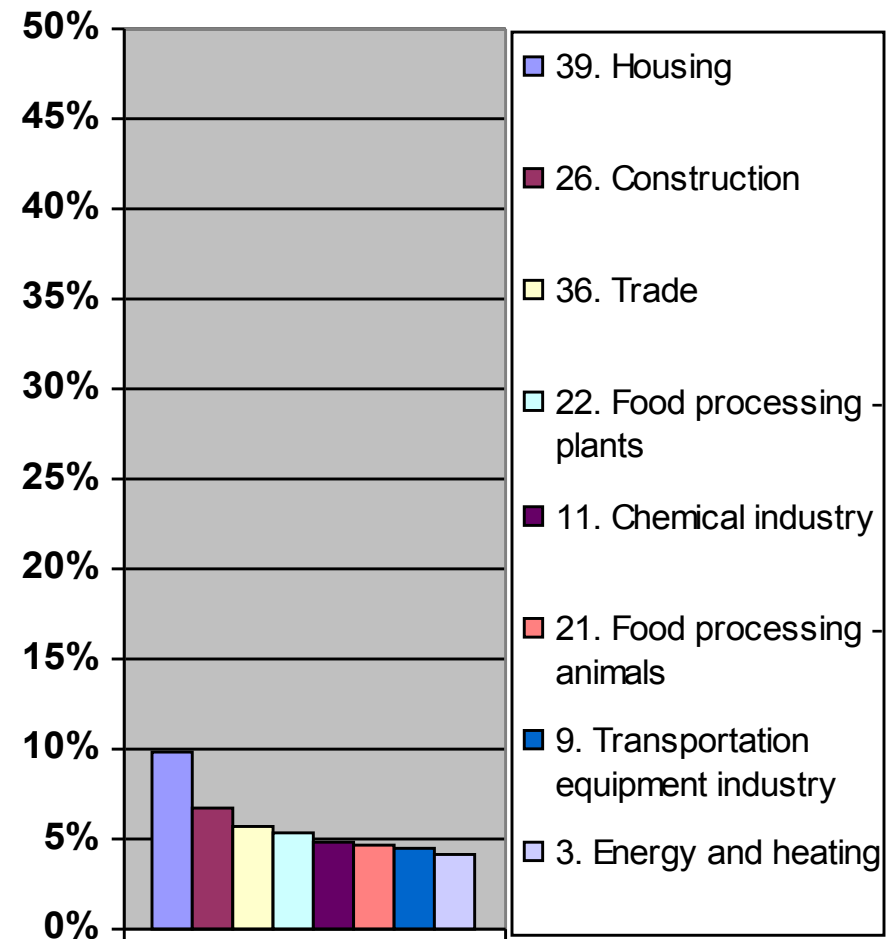- Water and distribution
- Coal
- Paper and paper products

Source: Own calculations based on : Ochrona Środowiska (2001) i Bilans...(2004)

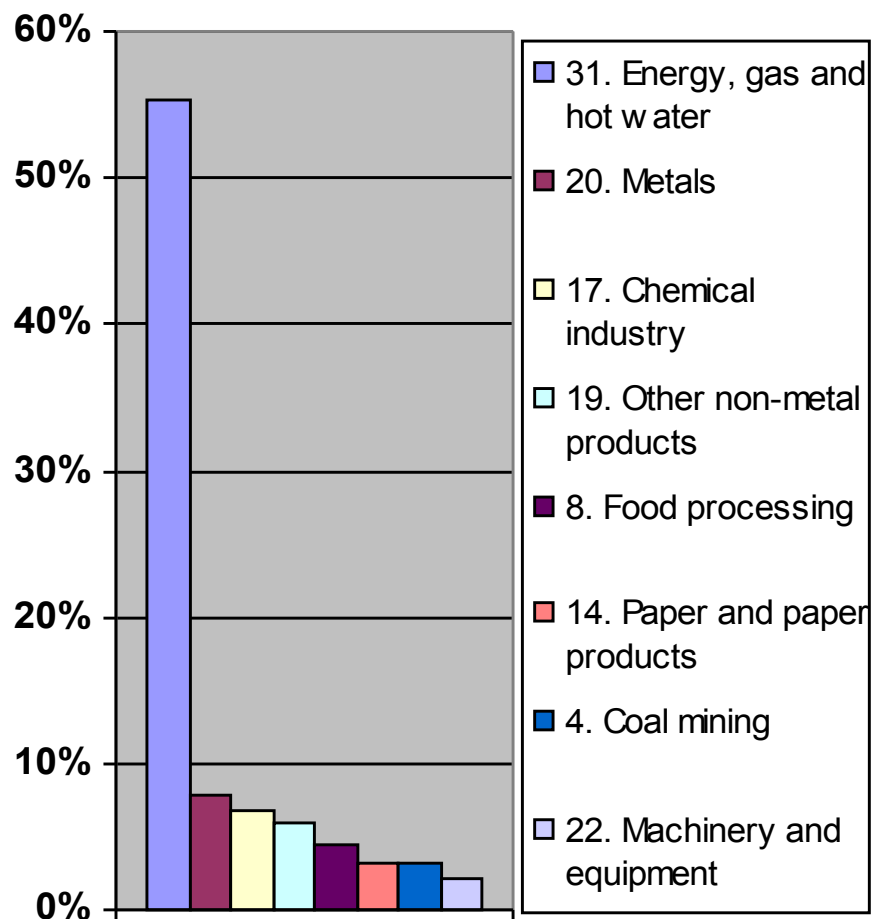# Shares of sectors in total dust emissions in 1990

a) In proportion to output

b) In proportion to final demand

Legend for chart a):
- 3. Energy and heating
- 11-12 Chemical industry
- 4. Ferrous metallurgy
- 13. Construction mat.
- 26-43. Other non-industrial branches
- 21-22. Food processing
- 1. Coal mining
- 17. Paper industry

Legend for chart b):
- 39. Housing
- 26. Construction
- 36. Trade
- 22. Food processing plants
- 11. Chemical industry
- 21. Food processing animals
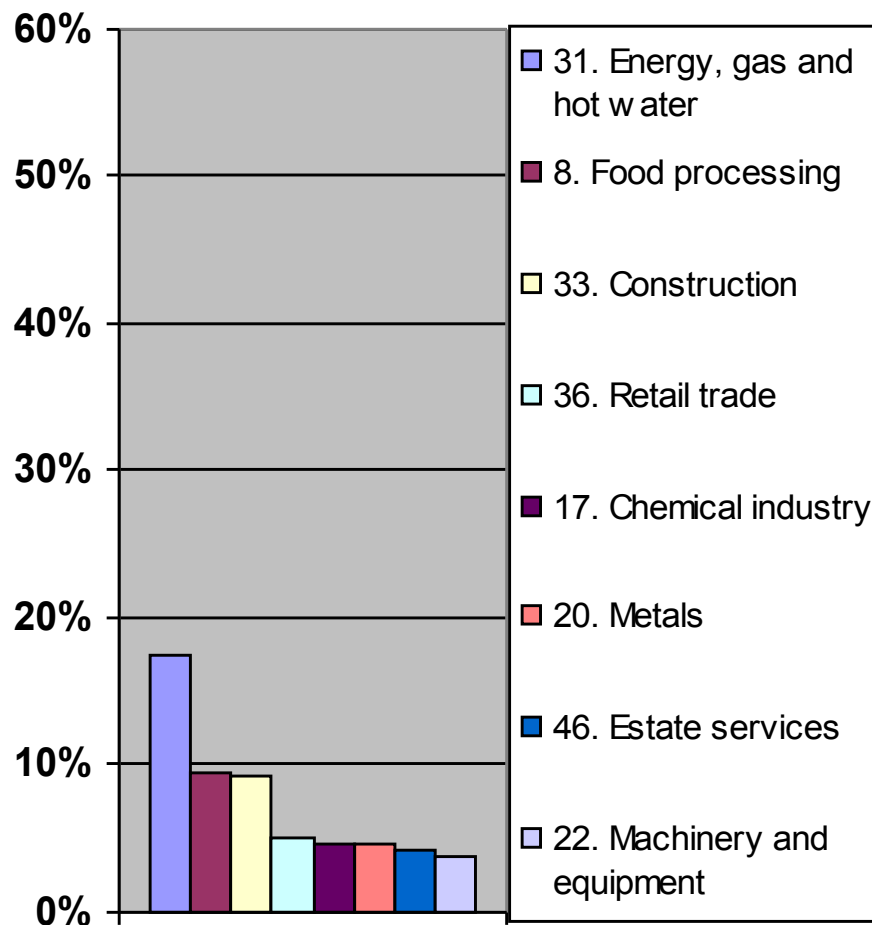- 9. Transportation equipment industry
- 3. Energy and heating

Source: Own calculations based on : Ochrona Środowiska (1991) i Bilans...(1992)

# Shares of sectors in total dust emissions in 1995

a) In proportion to output

Legend:
- 31. Energy, gas and hot water
- 20. Metals
- 17. Chemical industry
- 19. Other non-metal products
- 8. Food processing
- 14. Paper and paper products
- 4. Coal mining
- 22. Machinery and equipment

b) In proportion to final demand

Legend:
- 31. Energy, gas and hot water
- 8. Food processing
- 33. Construction
- 36. Retail trade
- 17. Chemical industry
- 20. Metals
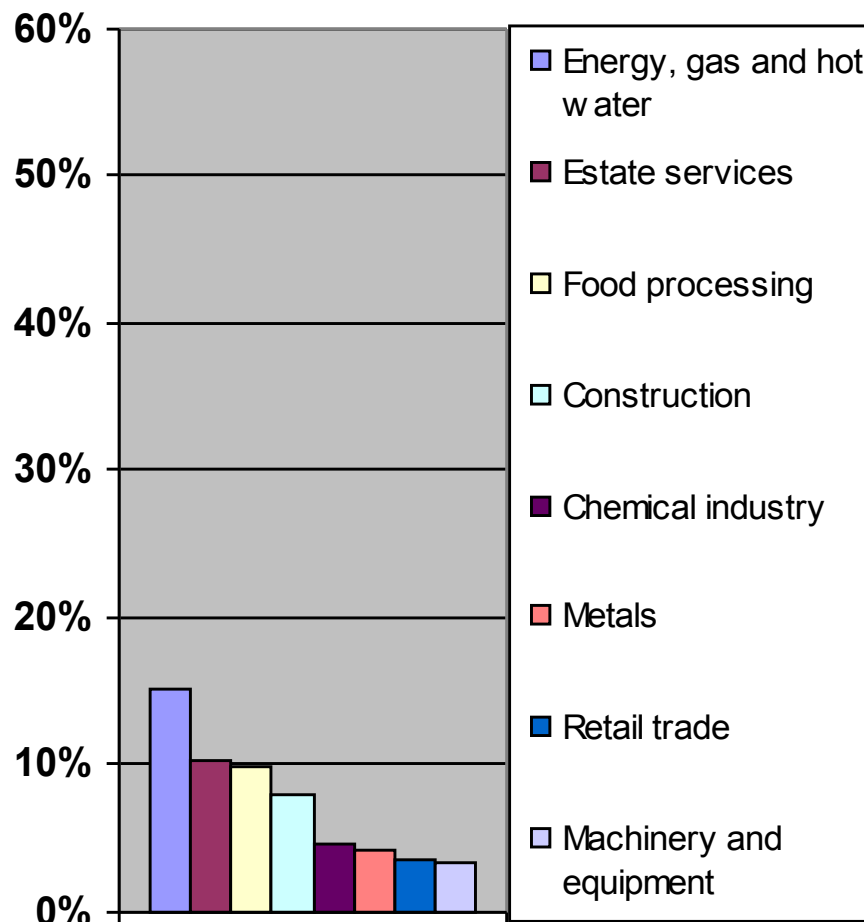- 46. Estate services
- 22. Machinery and equipment

Source: Own calculations based on : Ochrona Środowiska (1996) i Bilans...(1999)

Shares of sectors in total dust emissions in 2000

a) In proportion to output
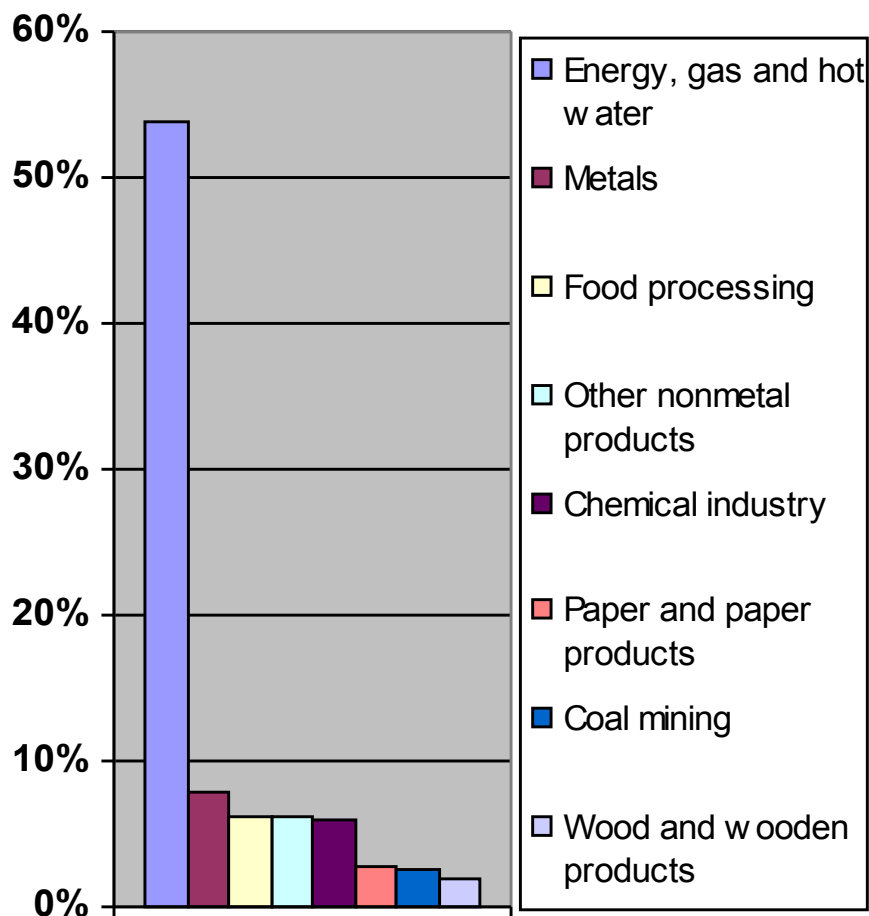
b) In prorpotion to final demand

Source: Own calculations based on : Ochrona Środowiska (2001) i Bilans...(2004)

Emissions due to Polish foreign trade - dusts

	Measure	1990	1995	2000
1	Actual emissions (1000 t)	1162,8	428,40	180,5
2	Emissions attributed to export (1000 t)	339,25	135,50	42,55
3	Emissions attributed to domestic final demand (1000 t)	823,55	292,99	137,93
4	Hypothetical effect of replacing imported goods, produced for domestic final purposes by domestic products	186,60	118,26	
5	Net environmental benefit (autarky) (4-2)	-152,65	-17,25	
6	(2) per unit of export	2,150	1,735	0,21
7	(3) per unit of domestic final demand	1,638	0,979	0,1882
8	(5) per unit of import	2,240	1,667	03
9	Pollution terms of trade (6)/(8)*100	95,99	103,9	

8

Emissions due to Polish foreign trade – SO_2

	Measure	1990	1995	2000
1	Actual emissions (1000 t)	2210,3	1638,29	1040,2
2	Emissions attributed to export (1000 t)	598,52	411,529	179,2
3	Emissions attributed to domestic final demand (1000 t)	1611,78	1226,77	860,62
4	Hypothetical effect of replacing imported goods, produced for domestic final purposes by domestic products	353,44	319,77	
5	Net environmental benefit (autarky) (4-2)	–245,0	–91,7	
6	(2) per unit of export	3,7940	5,264	0,92
7	(3) per unit of domestic final demand	3,2070	4,101	1,12
8	(5) per unit of import	4,2747	4,509	49
9	Pollution terms of trade (6)/(8)*100	88,75	116,79	

Exports to EU in 2000

	EU	Other countries
Structure of exports	70,7%	29,3%
Dusts 1000 t	28,73	13,85
SO_2	120,71	58,87
CO	89,79	43,35
Dusts kg/1000 PLN	0,2081	0,2425
SO_2	0,8746	1,031
CO	0,6505	0,7591