



# The status, trends and developments in mercury emission legislation and control in Europe

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*“... a heavy air in Rome...”*

Seneca,  
Roman Philosopher (61 AD)

## First ever air pollution regulation

*Be it known to all within the sound of my voice, whosoever shall be found guilty of the burning of coal shall suffer the loss of his head.*

King Edward I, 1273

## Forms of legislation

- Emission limits and fines
- Technology based legislation
  - BAT (Europe)
  - MACT (USA)
  - BATNEEC (UK)
- Integrated Pollution (Prevention) and Control
- Emissions trading/cap and trade

## UK legislation during the 1980s and 1990s

- 1988 UNECE NO<sub>x</sub> Freezing Protocol
- 1994 UNECE Sulphur Protocol
- EC LCPD 1990
- IPC, Integrated Pollution and Control
- HMIP emission standards
- LAAPC, local authority air pollution control

## International legislation - European Union

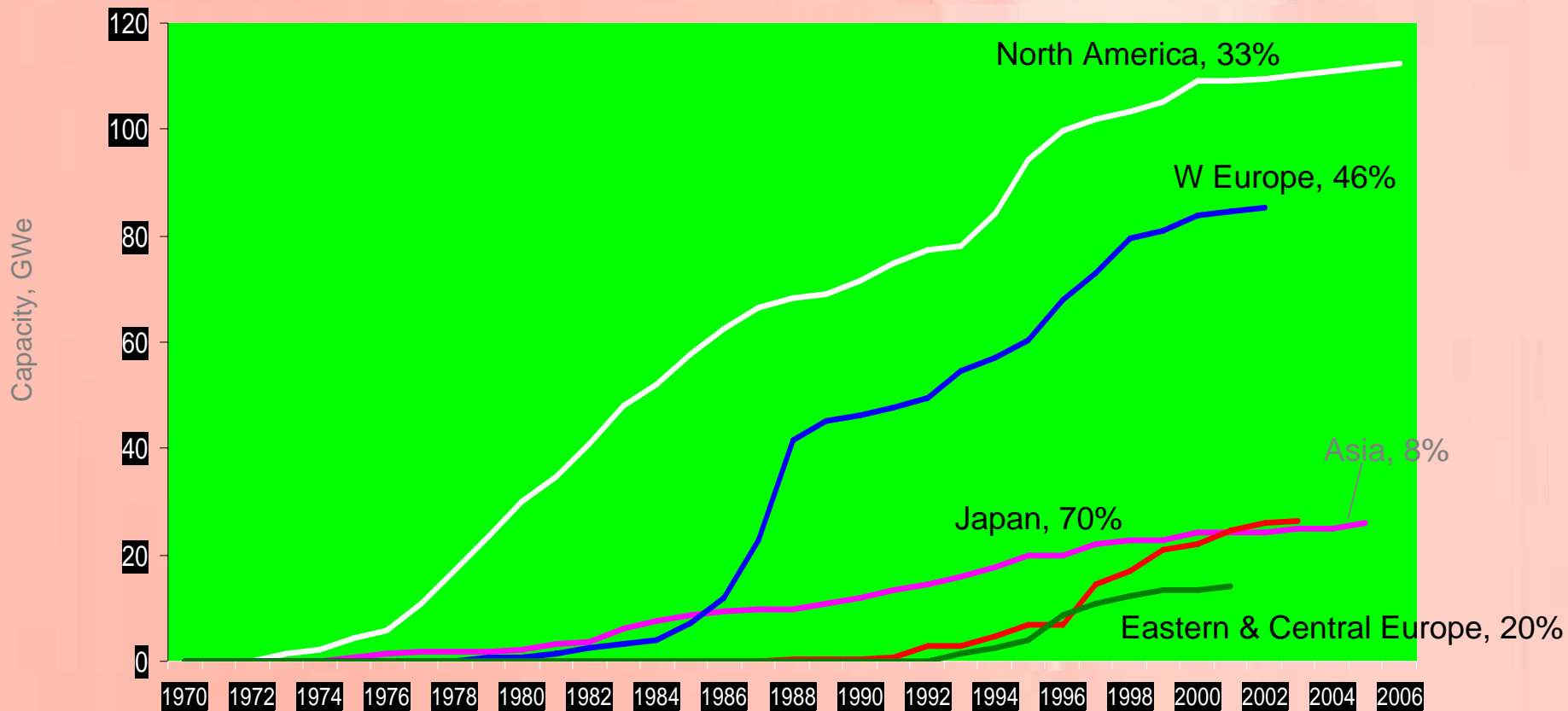
### New legislation:

- LCPD (large combustion plant directive) lists new emission limit values (ELVs) for large combustion plants
- NECD (national emission ceilings directive) caps the total amount of SO<sub>2</sub>, NO<sub>x</sub>, VOC and NH<sub>4</sub> from member countries for 2010;
- IPPC directive for plants >50MWt

## Requirements for plants which cannot meet these limits due to fuel characteristics

MWth	Requirement
<b>Existing plants:</b>	
<100	>60% S removal
>100-<300	>75% S removal
>300	>90% S removal
<500	>94% S removal or >92% where FGD is being installed
<b>New plants:</b>	
<300	300 mg/m <sup>3</sup> SO <sub>2</sub> or >92% S removal
>300	400 mg/m <sup>3</sup> SO <sub>2</sub> or at least 95% S removal

## Growth in FGD capacity

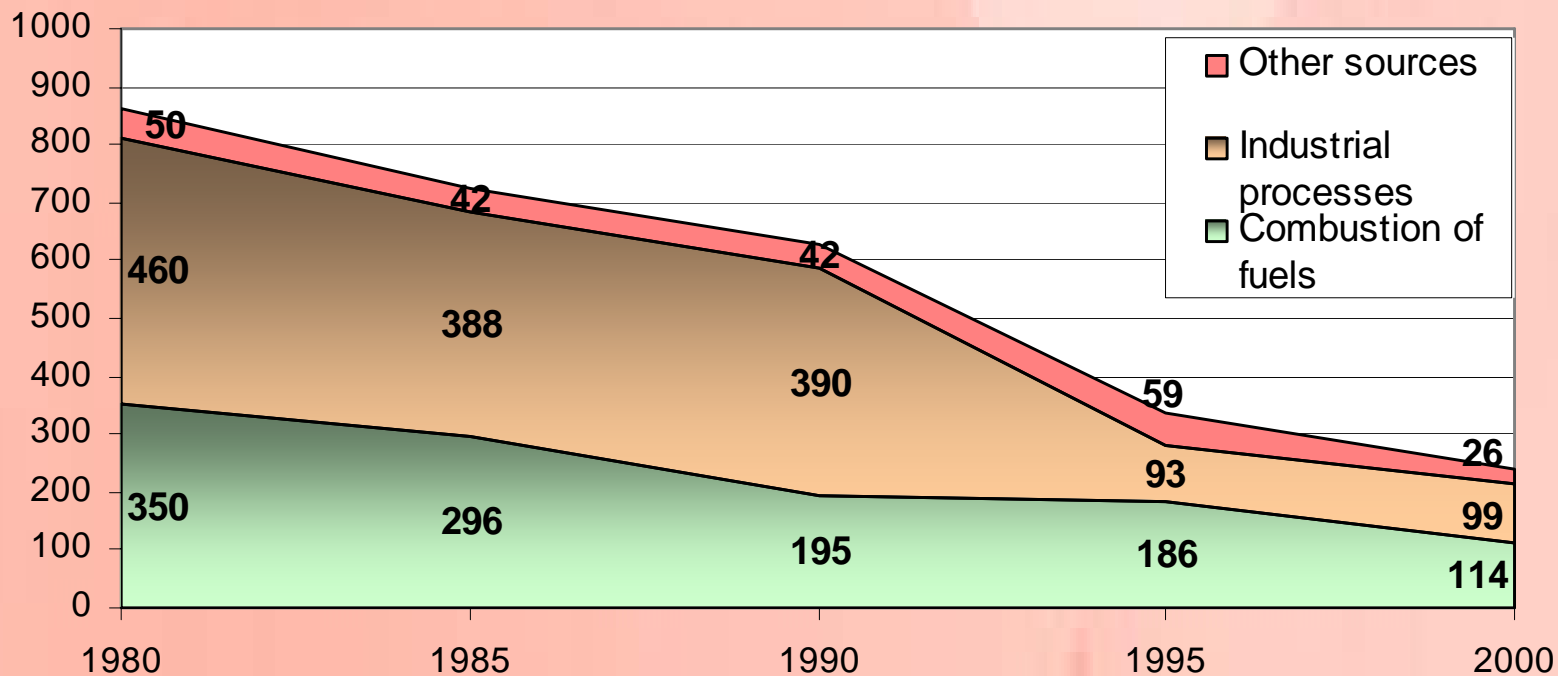




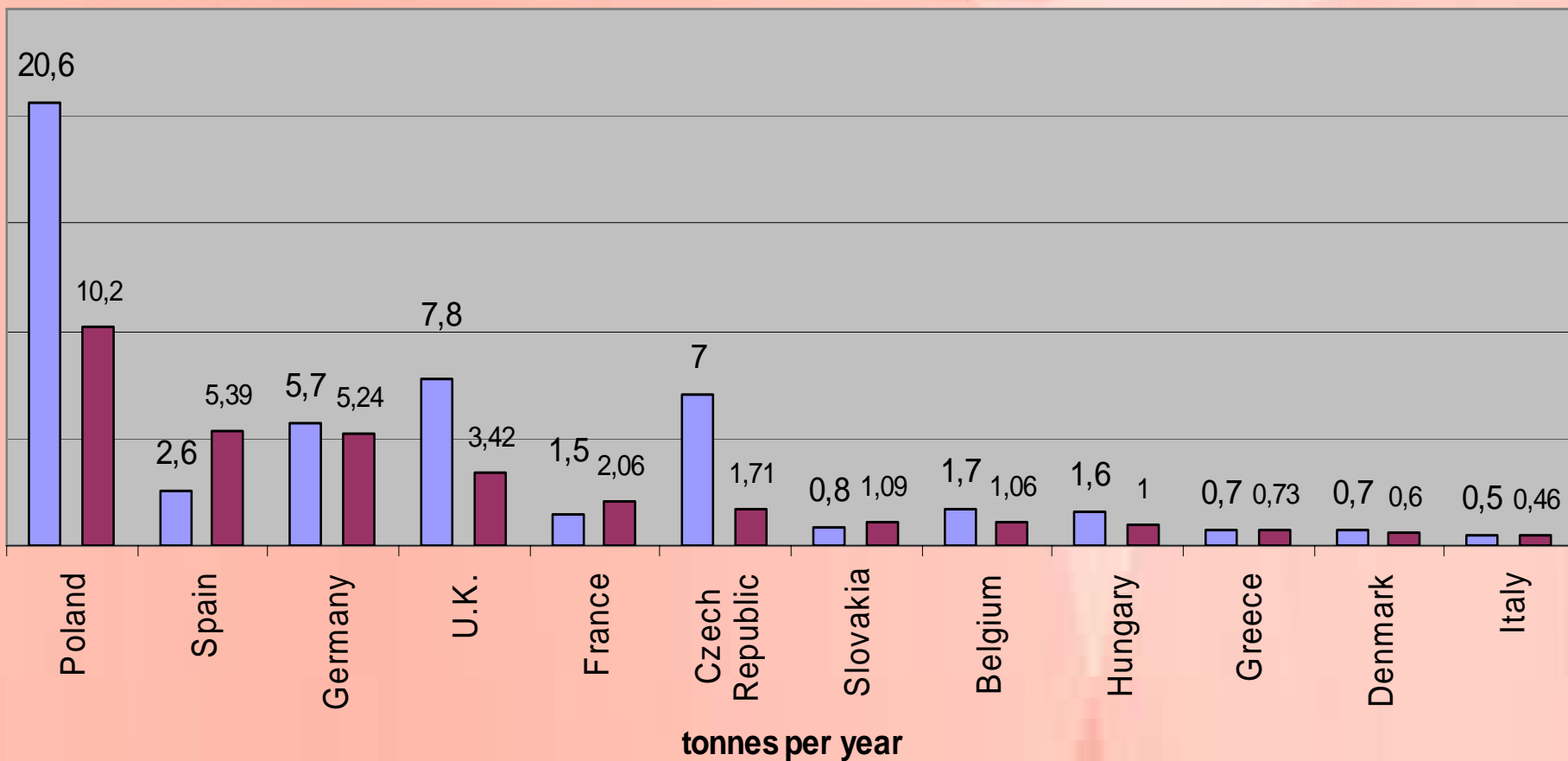
Total emissions  
in Europe  
down by 70%  
1980-2000

Europe - Emissions to air are falling ...

Changes in total anthropogenic mercury emissions in Europe  
(tonnes/year)



### Hg emissions from coal combustion in power plants 1995 and 2000



## European legislation

- No specific limits for coal combustion
- Waste incineration directive (2000/76/EC)
- Co-firing limit – 50 micrograms/m<sup>3</sup> at 6% O<sub>2</sub>

## EU will concentrate on “larger/easier” targets first

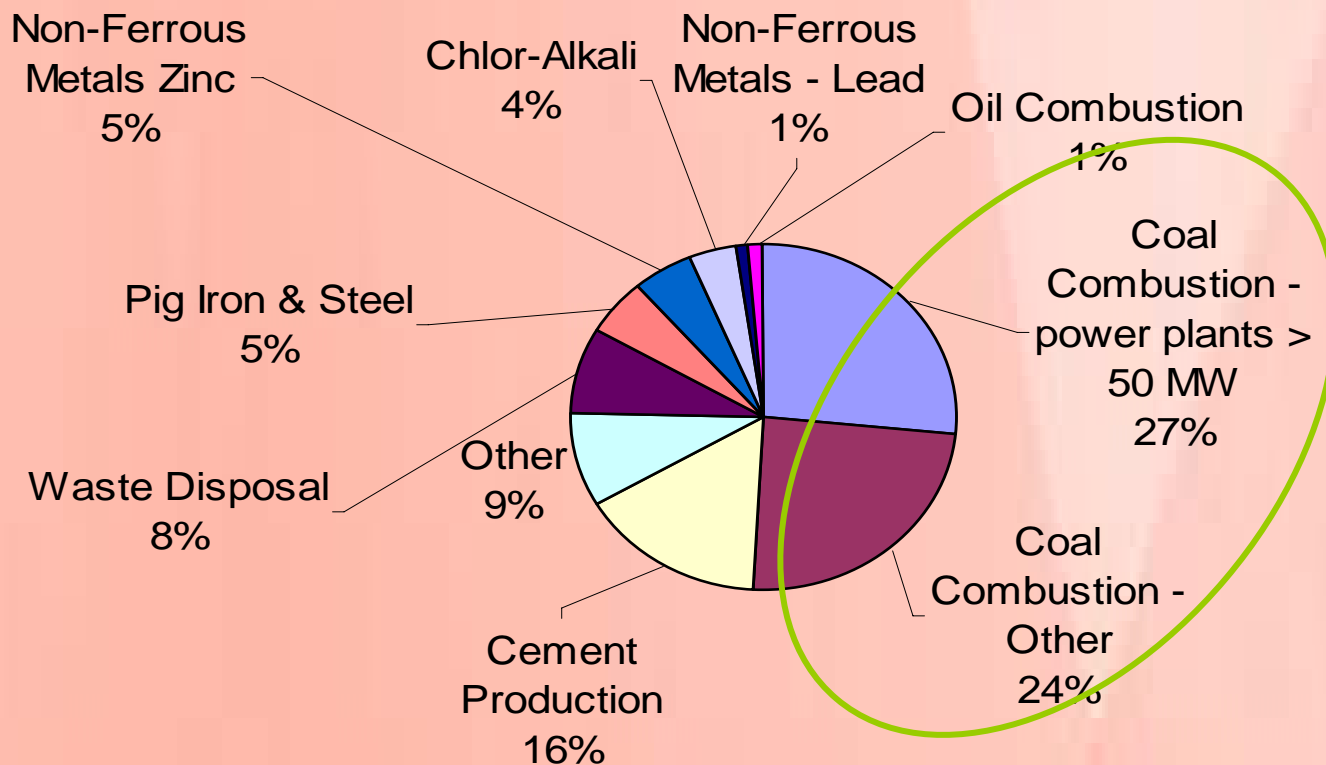
for example:

- imports and exports of Hg containing material;
- batteries and light switches
- chlor-alkali plants

## Mercury emissions in Sweden (kg/y) (Hovsenius, 1998)

Process	1960	1985	1987	1995
coal and peat combustion	400	300	300	210
waste incineration	2,500	1,500	1,000	90
cement kilns	700	500	500	3
chlor-alkali plants	10,000	400	400	120
sulphide ore smelting	2,000	800	300	74
steel production	1,000	700	700	110
crematoria	100	200	50	10
mining	4,000	200	50	10
deposits	?	?	800	800
dentists, hospitals, labs	?	?	800	~
other industrial activities	?	?	1,600	~
<b>TOTAL</b>	<b>&gt;25,000</b>	<b>&gt;8,000</b>	<b>6,700</b>	<b>1,700</b>

...yet coal combustion remains the largest source.



## Action on large coal-fired facilities beyond 2007/8

- information gathering on mercury monitoring, BAT options and co-benefit results under IPPC - 2008
- review of the IPPC directive
- additional measures on mercury if current legislation fails to reduce mercury emissions - 2010

## Action on SCIs

A 50% reduction in emissions of Hg from SCIs could be achieved by 2020 by:

- increased efficiency of combustion systems and end use systems (homes;
- enhanced coal washing
- fuel switching to oil and gas
- retrofitting of baghouses or ESP+FGD for plants 20-50 MWth

*AEAT and NILU Polska report for EC DG Environment*



Emerging issues:  
Co-combustion is becoming increasingly  
common

Most coals	<0.05 mg/kg
Meat and bone meal	<0.05 mg/kg
Sewage sludge	0.15 mg/kg

Co-combustion with 5% sewage sludge can cause  
a slight increase in emissions:

	coal	coal+ss
flue gas	4.8 g/h	6.9 g/h
ESP ash	1.4 g/h	2.5 g/h
gypsum	20.8 g/h	21.2 g/h

## Conclusions

- existing legislation in the EU has resulted in a steady reduction in Hg emissions from coal combustion
- legislation for coal is not regarded as necessary ... yet
- other Hg sources will be “targeted” first

## Conclusions

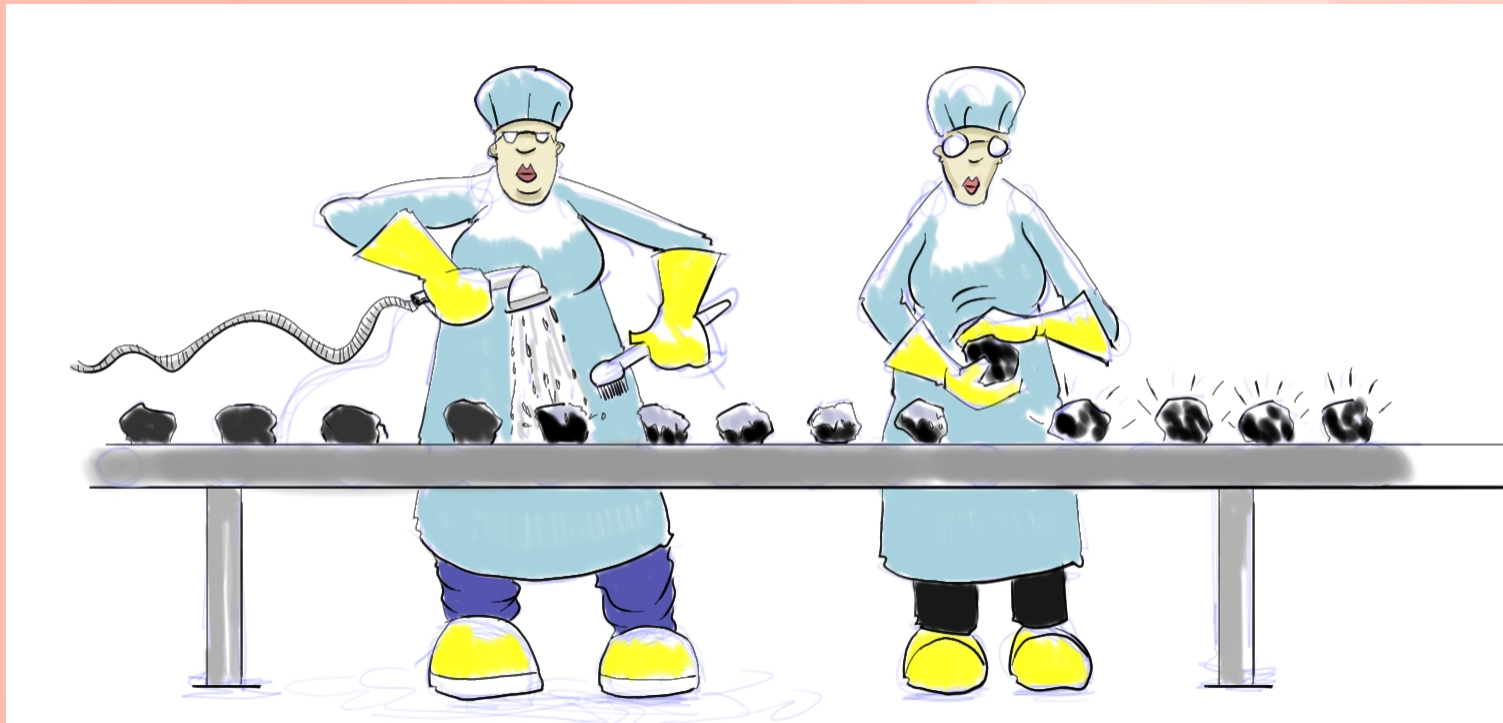
- new legislation is under discussion which may apply to small and large coal-fired facilities in the future
- significant research is still ongoing to determine the effects of co-combustion of biomass fuels with coal
- significant research and development is underway on mercury control strategies



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IEA CCC

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