

Table 2
Emissions of sulphur oxides obtained from the application of technological options to fossil-fuelled boilers

	Uncontrolled emissions		Additive injection		Wet scrubbing <u>a/</u>		Spray dry absorption <u>b/</u>	
Reduction efficiency (%)			up to 60		95		up to 90	
Energy efficiency (kW _{el} /10 ³ m ³ /h)			0.1 - 1		6 - 10		3 - 6	
Total installed capacity (ECE Eur) (MW _{th})					194,000		16,000	
Type of by-product			Mix of Ca salts and fly ashes		Gypsum (sludge/ waste water)		Mix of CaSO ₃ * 1/2 H ₂ O and fly ashes	
Specific investment (cost ECU(1990)/kW _{el})			20 - 50		60 - 250		50 - 220	
	mg/m ³ <u>c/</u>	g/kWh _{el}	mg/m ³ <u>c/</u>	g/kWh _{el}	mg/m ³ <u>c/</u>	g/kWh _{el}	mg/m ³ <u>c/</u>	g/kWh _{el}
Hard coal <u>d/</u>	1,000-10,000	3.5-35	400-4,000	1.4-14	<400 (<200, 1% S)	<1.4 <0.7	<400 (<200, 1% S)	<1.4 <0.7
Brown coal <u>d/</u>	1,000-20,000	4.2-84	400-8,000	1.7-33.6	<400 (<200, 1% S)	<1.7 <0.8	<400 (<200, 1% S)	<1.7 <0.8
Heavy oil <u>d/</u>	1,000-10,000	2.8-28	400-4,000	1.1-11	<400 (<200, 1% S)	<1.1 <0.6	<400 (<200, 1% S)	<1.1 <0.6
	Ammonia scrubbing <u>b/</u>		Wellman Lord <u>a/</u>		Activated carbon <u>a/</u>		Combined catalytic <u>a/</u>	
Reduction efficiency (%)	up to 90		95		95		95	
Energy efficiency (kW _{el} /10 ³ m ³ /h)	3-10		10-15		4-8		2	
Total installed capacity (ECE Eur) (MW _{th})	200		2,000		700		1,300	
Type of by-product	Ammonia fertilizer		Elemental S Sulphuric acid (99 vol.%)		Elemental S Sulphuric acid (99 vol.%)		Sulphuric acid (70 wt.%)	
Specific investment (cost ECU(1990)/kW _{el})	230-270 <u>e/</u>		200-300 <u>e/</u>		280-320 <u>e/ f/</u>		320-350 <u>e/ f/</u>	
	mg/m ³ <u>c/</u>	g/kWh _{el}	mg/m ³ <u>c/</u>	g/kWh _{el}	mg/m ³ <u>c/</u>	g/kWh _{el}	mg/m ³ <u>c/</u>	g/kWh _{el}
Hard coal <u>d/</u>	<400 (<200, 1% S)	<1.4 <0.7	<400 (<200, 1% S)	<1.4 <0.7	<400 (<200, 1% S)	<1.4 <0.7	<400 (<200, 1% S)	<1.4 <0.7
Brown coal <u>d/</u>	<400 (<200, 1% S)	<1.7 <0.8	<400 (<200, 1% S)	<1.7 <0.8	<400 (<200, 1% S)	<1.7 <0.8	<400 (<200, 1% S)	<1.7 <0.8
Heavy oil <u>d/</u>	<400 (<200, 1% S)	<1.1 <0.6	<400 (<200, 1% S)	<1.1 <0.6	<400 (<200, 1% S)	<1.1 <0.6	<400 (<200, 1% S)	<1.1 <0.6

a/ For high sulphur content in the fuel the removal efficiency has to be adapted. However, the scope for doing so may be process-specific. Availability of these processes is usually 95%.

b/ Limited applicability for high-sulphur fuels.

c/ Emission in mg/m³ (STP), dry, 6% oxygen for solid fuels, 3% oxygen for liquid fuels.

d/ Conversion factor depends on fuel properties, specific fuel gas volume and thermal efficiency of boiler (conversion factors (m³/kWh_{el}, thermal efficiency: 36%) used: hard coal: 3.50; brown coal: 4.20; heavy oil: 2.80).

e/ Specific investment cost relates to a small sample of installations.

f/ Specific investment cost includes denitrification process.

The table was established mainly for large combustion installations in the public sector. However, the control options are also valid for other sectors with similar exhaust gases.