

Article

Carbon Footprint for Mercury Capture from Coal-Fired Boiler Flue Gas

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Table S1. Structure of the mine's thermal and electric energy consumption as well as the CHP operation emission factors.


Parameter	Unit	Amount
		
Coal production (mining)	Mg	14,768,400
Electricity consumption	MWh	1,004,481
Heat consumption (total)	GJ	649,601
HC—heat consumption index	MJ·Mg ⁻¹	43.985
EC—electricity consumption index	kWh·Mg ⁻¹	68.015
Emissions from the combustion of methane by a CHP plant	kg CO ₂ ·Mg ⁻¹ coal	20.602
Electricity from the combustion of methane	kWh·Mg ⁻¹ coal	28.431
Heat from the combustion of methane	GJ·Mg ⁻¹ coal	0.070
Emissions from GJ heat production by a CHP plant	kg CO ₂ ·GJ ⁻¹	63.460
Emissions from 1 kWh production in Poland	kg CO ₂ ·kWh ⁻¹	0.912

Table S2. Structure of electricity consumption by the PAC plant.

Production Stage/Raw Material	Electricity Consumption, kWh Mg ⁻¹	
	coal	PAC
Raw material analysis	0.28	0.1
Preparation of raw materials	3920.0	1400
Carbonization	3360	1200
Activation (steam generation, etc.)	1064	380
Sorting	112	40
Total	8456.28	3020.6

Table S3. Composition of the pyrolytic gas emitted by the PAC plant.

Component	Unit	Share
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H ₂		46.89
CO ₂		8.17
O ₂		0.44
N ₂		7.86
CH ₄	vol. %	28.26
CO		5.61
C ₂ H ₆		0.78
C ₂ H ₄		1.84
C ₃ H ₈		0.03
C ₃ H ₆		0.12
Pyrolytic gas amount	m ³ ·Mg ⁻¹ PAC	456.9

Table S4. Structure of demand for energy media in the coking plant.

Index	Amount			
	kWh·Mg ⁻¹ _{coal}	kWh·Mg ⁻¹ _{coke}	GJ·Mg ⁻¹ _{coal}	GJ·Mg ⁻¹ _{coke}
Electricity demand	68.000	91.520	-	-
Own production of electricity	36.380	48.960	-	-
Electricity purchase	31.620	42.560	-	-
Heat demand	-	-	1.487	2.000
Own production of heat	-	-	1.212	1.630
Heat purchase	-	-	0.275	0.370
Coke oven gas consumption	-	-	3.555	4.785

Table S5. Characteristics of PAC and CD sorbents.

Parameter	unit	PAC	CD
M		6.5	0.5
A		6.4	16.2
C	%	84.2	82.7
H		1.03	0.23
S		0.10	0.80
Density	g·cm ⁻³	1.80	1.92
Mesophoric surface area	m ² ·g ⁻¹	50.14	17.2
Specific surface area <i>S_{BET}</i>	m ² ·g ⁻¹	1100	35.2