BRIEFING Jun 26, 2020

Coal pollution costs Europeans billions of euros despite drop in emissions

The five most polluting coal power plant operators in the EU were responsible for an estimated 5,700 deaths from air pollution and mercury pollution, as well as 15 billion EUR in economic damages. Air pollutant emissions from EU coal plants are down by more than 50% from 2010, highlighting the benefits of shifting to clean energy and implementing stronger emissions standards, but the cost of the remaining coal power plants for public health and the economy is still grave.

The Polish PGE became the worst coal polluter among European utilities in 2018, based on newly released emissions data. PGE overtook RWE, causing an estimated 1740 deaths and economic damage worth EUR4.5 billion in 2018.

The five European utilities imposing the largest public health impacts and economic losses on European citizens in 2018 with their coal emissions were PGE, RWE, EPH, Endesa and CEZ.

These results are based on new official emissions data for industrial emitters in the EU, applying the methodology of the 2018 report “Last Gasp” (CAN-E 2018), published as a peer-reviewed paper by Huscher et al (2017), and with health impacts and economic costs of mercury emissions added based on Nedellec & Rabl (2016).

Results

Table 1. 2018 emissions of the five largest polluters.

Company	Emissions			
	NOx, t	SO2, t	PM10, t	Hg, kg
PGE	55588	68089	2193	2799
RWE	61071	26642	1557	1562
CEZ	24453	25369	1186	839
ENDESA	19990	36280	761	177
EPH	50110	52997	1190	1690

Health impacts by utility

Table 2. Estimated PGE health impacts, including number of deaths and working days lost, caused by 2018 emissions.

Health impacts, PGE		
Outcome	**Number**	**95% Confidence interval**
Deaths	1736	(631 - 5061)
of which, due to PM2.5	*1253*	*(449 - 1957)*
NO2	*242*	*(155 - 328)*
ozone	*9*	*(7 - 10)*
mercury	*232*	*(19 - 2766)*
bronchitis in children	3082	(1530 - 5334)
asthma attacks	32663	(-8565 - 73818)
chronic bronchitis in adults	751	(164 - 1350)
lost working days	433673	(385382 - 528737)
hospital admissions	561	(339 - 772)
lost IQ points due to mercury exposure	3807	(319 - 45388)
external costs, M€	4471	(1820 - 6814)

Table 3. Estimated RWE health impacts, including number of deaths and working days lost, caused by 2018 emissions.

Health impacts, RWE		
Outcome	**Number**	**95% Confidence interval**
Deaths	1436	(612 - 3487)
of which, due to PM2.5	*839*	*(306 - 1306)*
NO2	*488*	*(313 - 662)*
ozone	*-21*	*(-18 - -24)*
mercury	*129*	*(11 - 1543)*
bronchitis in children	1970	(953 - 3428)
asthma attacks	23655	(-6179 - 53436)
chronic bronchitis in adults	544	(120 - 975)
lost working days	349986	(311784 - 416464)
hospital admissions	220	(148 - 290)
lost IQ points due to mercury exposure	2124	(178 - 25321)
external costs, M€	3848	(1771 - 5724)

Table 4. Estimated EPH health impacts, including number of deaths and working days lost, caused by 2018 emissions.

Health impacts, EPH		
Outcome	**Number**	**95% Confidence interval**
Deaths	1301	(484 - 3442)
of which, due to PM2.5	*969*	*(349 - 1511)*
NO2	*193*	*(124 - 262)*
ozone	*-1*	*(-1 - -1)*
mercury	*140*	*(12 - 1670)*
bronchitis in children	2157	(1060 - 3741)
asthma attacks	24677	(-6467 - 55767)
chronic bronchitis in adults	598	(131 - 1075)
lost working days	375764	(334734 - 447332)
hospital admissions	407	(249 - 557)
lost IQ points due to mercury exposure	2298	(193 - 27401)
external costs, M€	3449	(1411 - 5254)

Table 5. Estimated Endesa health impacts, including number of deaths and working days lost, caused by 2018 emissions.

Health impacts, Endesa		
Outcome	**Number**	**95% Confidence interval**
Deaths	620	(232 - 1108)
of which, due to PM2.5	*568*	*(203 - 888)*
NO2	*14*	*(9 - 20)*
ozone	*22*	*(19 - 26)*
mercury	*15*	*(1 - 175)*
bronchitis in children	1582	(792 - 2733)
asthma attacks	18558	(-4870 - 41943)
chronic bronchitis in adults	405	(88 - 729)
lost working days	220472	(197298 - 250499)
hospital admissions	316	(179 - 447)
lost IQ points due to mercury exposure	240	(20 - 2867)
external costs, M€	1790	(696 - 2753)

Table 5. Estimated CEZ health impacts, including number of deaths and working days lost, caused by 2018 emissions.

Health impacts, CEZ		
Outcome	**Number**	**95% Confidence interval**
Deaths	613	(226 - 1660)
of which, due to PM2.5	*458*	*(165 - 714)*
NO2	*87*	*(55 - 117)*
ozone	*-1*	*(0 - -1)*
mercury	*70*	*(6 - 829)*
bronchitis in children	1032	(507 - 1791)
asthma attacks	11538	(-3024 - 26075)
chronic bronchitis in adults	279	(61 - 501)
lost working days	175266	(156073 - 209392)
hospital admissions	194	(118 - 265)
lost IQ points due to mercury exposure	1141	(96 - 13602)
external costs, M€	1616	(658 - 2464)

Table 7. *Estimated deaths and external costs by utility in 2018.*

Premature Deaths & External Costs				
	Deaths		External Costs, M€	
Company	number	95% Confidence Interval	number	95% Confidence Interval
PGE	1736	(631 - 5061)	4471	(1820 - 6814)
RWE	1436	(612 - 3487)	3848	(1771 - 5724)
EPH	1301	(484 - 3442)	3449	(1411 - 5254)
Endesa	620	(232 - 1108)	1790	(696 - 2753)
CEZ	613	(226 - 1660)	1616	(658 - 2464)

Methodology

Emissions data

Coal-fired power plants and their ultimate owners were identified in the Industrial Reporting Database (IRD) using the Europe Beyond Coal (EBC) database of operating coal-fired power plants in Europe. The IRD includes data on annual SOx, NOx, PM10, mercury and CO2 emissions for 2017 and 2018, among other species. The IRD is still missing data for some countries, most notably Germany; for facilities that didn't have emissions data in the IRD for 2018, emissions were estimated as 2017 air pollutant emission data in the E-PRTR database multiplied by the ratio of CO2 emissions in 2018 to 2017, taken from the EU Emissions Trading System data. If CO2 emissions were zero, or the plant was reported as retired or converted to other fuels in the EBC database, 2018 air pollutant emissions were assumed to be zero. The IRD data is subject to pollutant-specific reporting thresholds below which emissions do not have to be reported; when no emissions were reported this was conservatively taken to mean zero emissions, even though the operating facilities certainly had non-zero emissions. The reporting threshold can skew emissions totals down significantly, in particular for mercury.

Health impacts

The health impacts of the facility-level emissions of major air pollutants were assessed following the methodology of the 2018 report "Last Gasp" (CAN-E 2018), published as a peer-reviewed paper by Huscher et al (2017).

The Last Gasp methodology is based on detailed atmospheric modeling carried out for each air pollutant and all coal-fired power plants in Europe grouped into 15 clusters. The health impacts of emissions were derived from the atmospheric modeling results following the WHO (2013) recommendations for health impact assessment of air pollution in Europe.

The health impacts of power plants in each cluster are calculated based on the average health impact per tonne of emissions from that cluster. This is the same approach as the one used by EEA (2014), but with atmospheric modeling tailored specifically for coal-fired power plants, hence providing more appropriate estimates of population exposure.

The health impacts of mercury emissions were calculated following the health impacts per kilogram of emissions for European coal-fired power plants derived by Nedellec&Rabl (2016).

It is important to note that while the health impacts evaluated here don't include impacts from direct exposure to SO2, SO2 emissions are a major contributor to the PM2.5 health impacts through formation of sulfate particles.

Economic burden

Air pollution causes a range of negative health impacts: chronic respiratory diseases, hospitalizations, preterm births and other health effects lead to increased health care costs; economic productivity is lowered either due to sickness and inability to work or due to an employee having to call in sick to care for an unwell child or other dependant; and shortened life expectancy and increased risk of death caused by air pollution means a welfare loss to affected people.

The assessment of economic costs of the health impacts projected in this report follows the methodology and valuation used in the EEA (2014) report "Costs of air pollution from

European industrial facilities 2008–2012". The costs have been converted to 2018 prices using inflation (GDP deflator) in the EU.

The valuation of different health impacts of major air pollutants is given in Table 8, and health impacts of mercury in Table 9.

Table 8. Valuation of health impacts (based on EEA 2014).

Effect	Pollutant	Unit	valuation, EUR, 2005 prices	valuation, EUR, 2018 prices
asthmatic and bronchitic symptoms in children	NO2	years of symptoms	588	758
asthmatic and bronchitic symptoms in children	PM10	days of symptoms	42	54
bronchitis in children	PM10	cases	588	758
chronic bronchitis in adults	PM10	new cases	53600	69100
hospital admissions	NO2	cases	588	758
hospital admissions	PM2.5	cases	588	758
lost working days	PM2.5	cases	130	168
preterm births	PM2.5	births	NA	290000
deaths	NO2	cases	2200000	2840000
deaths	PM2.5	cases	2200000	2840000
sickness days, non working-age	PM2.5	cases	92	119

population				

Table 9. Factors used in assessing health impacts and economic costs of mercury emissions into the air (Nedellec & Rabl 2016).

Outcome	Cases/kg	valuation, EUR, 2010 prices	valuation, EUR, 2018 prices
Years of life lost	0.56	126,000	141,749
Deaths	0.054	NA	NA
neurological damage (lost IQ points)	1.36	16,272	18,306

References

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