AIR QUALITY

BACKGROUND PAPER

Health impacts of lignite-fired power plants

The German-Polish region Lusatia

HEAL
Promoting environmental policy that contributes to good health

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Background information and facts on health impacts and external costs of three lignite-fired power plants in the German Lausitz (Jänschwalde, Schwarze Pumpe, Boxberg) as well as two Polish lignite-fired power plants in the proximity of the border (Turów, Dolna Odra)

IMPACTS ON HUMAN HEALTH

Air pollution is still an important public health issue. It enhances the risk to develop a chronic disease of the cardiovascular or respiratory system and decreases the average life expectancy in Europe by 8.6 months. About 450 000 deaths annually are caused by air pollution with fine particulate matter.[1]

Exposure to particulate matter increases for example the risks for lung cancer, chronic bronchitis, ischemic heart attack, heart arrhythmia and heart insufficiency.[2] Exposure to elevated levels of ozone on the other hand causes acute respiratory symptoms and may cause asthma attacks.[3] Cardiovascular and respiratory diseases are among the leading chronic diseases in Europe.

Particulate matter and ozone have adverse effects on human health because they increase the risk to develop a chronic cardiovascular or respiratory disease. This effect already exists at very low levels of exposure. The World Health Organization (WHO) thus declared that no safe levels could be established below which no damage to human health would occur.[4]

A recent assessment by the European Environment Agency (EEA) concludes that more than 80-90% of the urban population in Europe is regularly exposed to higher levels of ozone and fine particulate matter than recommended in the guideline values of the WHO.[5]

Another report by the European Environment Agency shows that roughly two thirds of the costs of industrial air pollution, which amounts to 102 to 169 billion Euro annually in total, are caused by energy generation.[6] Especially the pollution with sulfur and nitrogen oxides is largely caused by the energy industry.

Once released, both pollutants react with the atmosphere to form secondary particulate matter. Nitrogen oxides also act as precursors of ozone. Both ozone and particulate matter can be transported over very long distances and thus cause impacts outside their country of origin.

EXTERNAL COSTS OF THE FIVE PLANTS

The lignite-fired power plants Jänschwalde and Schwarze Pumpe in Brandenburg, the Polish Turów next to the German-Czech-Polish border, as well as the Boxberg plant in Upper Lusatia are listed among the top 20 industrial air polluters in Europe.

Another Polish lignite-fired power plant, Dolna Odra, is located next to the border near Schwedt. According to the assessment of the European Environment Agency these five power plants together cause annual costs for human health and the environment of about 3 to 5 billion Euro altogether.[7]

The emissions of the plants, on which the EEA's calculation is based, are listed in the table below. The data were taken from the European Pollutant Release and Transfer Register (E-PRTR), which is based on standardized monitoring and mandatory reports by national authorities.

Power plant	Jänschwalde	Schwarze Pumpe	Boxberg	Turów	Dolna Odra	SUM
Emissions sulfur dioxide, tons	21 400	8 200	8 170	40 600	7 020	85 390
Emissions nitrogen oxides, tons	18 200	4 190	9 790	11 800	9 340	53 320
Emissions particulates PM_{10}, tons	675	91	180	1 400	498	2 844
Total costs, lower estimate (VOLY), million Euro	**1 232**	**495**	**713**	**722**	**270**	**3 432**
Total costs, upper estimate (VSL), million Euro	**2 002**	**731**	**1 059**	**1 299**	**437**	**5 528**

Source: spreadsheet of the European Environment Agency (2011)

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Based on the annual emission data the EEA carried out an economic evaluation of the impacts of industrial air pollution on health and the environment. Health costs are originating from additional cases of chronic diseases and acute symptoms, which are related to, for example, medication, hospital admissions and days of restricted activity among the working population. Different methods to calculate the economic value of mortality (life years lost vs. value of a statistical life) lead to a lower and an upper cost estimate.[8] The total costs for health and the environment on a facility level can be extracted from the spreadsheet of the European Environment Agency.[9]

The total costs of the five lignite-fired power plants in 2009 were approximately 3.4 – 5.5 billion Euro.

These costs are occurring annually and will continue until the lignite-fired power stations are substituted by less polluting sources of energy. Through better abatement technology the costs for health and the environment can be mitigated.

Air pollution originating from lignite-fired power plants in Brandenburg and Poland has significant consequences for public health systems and the economy. Additional treatment costs and medication create a strain for health insurers, but also mean an economic burden for the families and individuals affected. The economy is harmed by productivity losses due to days of restricted activity among the working population.

The levels of exposure that most of the population is currently experiencing have to be reduced significantly. Thus emissions of air pollutants need to be brought down as quickly as possible. Only close collaboration with European neighbors can ensure a long-term decline of air pollution across national borders.

Air quality in Brandenburg

Due to having exceeded the limit value for particulate matter at several urban monitoring stations during the years 2006 and 2010 the federal state of Brandenburg has asked the European Commission for derogation from compliance with the legally binding limit.

In its communication to the European Commission Brandenburg calls upon a significant fraction of pollution (on 57% of days when limits were exceeded) to originate from long-range transboundary air pollution, for example from Poland and the Czech Republic.[11] The air pollution action plan of the municipality of Cottbus from the year 2006 similarly estimates that about half of the urban pollution with particulate matter is actually due to ambient air pollution and not caused by local traffic.[12] Ambient air pollution is partly caused by the lignite-fired power plants in the greater region. What fraction they contribute exactly has to be assessed by the authorities in charge.

Germany and Poland are the two top countries contributing to industrial air pollution in Europe because of their high number of coal-fired power plants.[10]

Urgent need for action

To lower the environmental burden of disease and the risks for chronic diseases, and to protect vulnerable groups such as old people, children and patients, who are more susceptible to the harmful effects of air pollution, current levels of exposure have to be reduced significantly.

The European Respiratory Society, representing about 11.000 respiratory doctors, in its recent position paper *10 Principles for Clean Air*[13] calls on the EU to immediately implement measures to improve air quality. The organization further stresses that outdoor air pollution is the most important environmental health risk and argues that clean air should be a European citizens right just like access to clean water and safe food.

All existing European coal-fired power plants should retrofit their pollution control systems to modern, more effective abatement technology in order to reduce their emissions as much as possible. The externalized costs for health and the environment would thus partially be re-distributed to the energy industry, as foreseen by the *polluter pays* principle.

Contribution to climate change

Lignite-fired power plants significantly contribute to climate change. They are the largest single source of greenhouse gas emissions in Brandenburg (for example Jänschwalde emits 23 million tons CO_2 per year, 2009 data from E-PRTR). Brandenburg thus has higher per-capita CO_2 emissions than all other federal states in Germany.[14]

Climate change already impacts human health and constitutes a great future risk. The World Health Organization declared climate change to be the biggest public health challenge of the 21st century. Heat waves, as the one Europe experienced in 2003 with several 10 000 deaths, are becoming more probable. Forest fires, boosted by climate change, lead to adverse air quality and impact the population, as it was the case in Russia in 2010.

Additionally there are indications that new diseases could spread to Brandenburg.[15]

DOCTORS DEMANDING MORATORIUM ON COAL

In October 2011 more than 500 representatives from universities, medical associations and civil society organizations signed a declaration at a British Medical Journal summit on the health and security perspectives of climate change in London. In this call they urge governments to stop the building of new coal-fired power plants, unless their emissions were largely abated through Carbon Capture and Storage (CCS) technologies.[16]

Every new coal-fired power plant would be in operation for at least 40 years and would emit huge amounts of air pollutants as well as greenhouse gases every year. Increasing the number of coal-fired power plants in Brandenburg or western Poland is not recommendable, given the existing knowledge about health risks from coal power generation.

In this regard doctors and other medical professionals can give important advice, based on state-of-the-art scientific evidence. But also observations from medical practice, such as an increase of respiratory and cardiovascular symptoms or asthma attacks on days with bad air quality, can provide important substantiation.

The share of coal power in the energy mix should be reduced further in favor of less emission intensive forms of energy generation. This as well questions the exploitation of new lignite open cast mines in Brandenburg. Measures to improve energy efficiency and investments in renewable energy generation are needed now in order to decrease future dependency on lignite.

FOOTNOTES:

1 For 32 countries in Europe. [European Topical Centre on Air and Climate Change] Frank de Leeuw, Jan Horálek (2009): Assessment of the health impacts of exposure to PM2.5 at a European level. http://acm.eionet.europa.eu/docs/ETCACC_TP_2009_1_European_PM2.5_HIA.pdf

2 World Health Organization Europe (2006): Health risks of particulate matter from long-range transboundary air pollution. http://www.euro.who.int/__data/assets/pdf_file/0006/78657/E88189.pdf

3 World Health Organization Europe (2008): Health risks of ozone from long-range transboundary air pollution. http://www.euro.who.int/__data/assets/pdf_file/0005/78647/E91843.pdf

4 See 2 and 3; as well as World Health Organization (2005): Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide. Global Update 2005. http://www.euro.who.int/__data/assets/pdf_file/0005/78647/E91843.pdf

5 European Environment Agency: Air Quality in Europe – 2012 report. http://www.eea.europa.eu/publications/air-quality-in-europe-2012

6 [EEA 2011] European Environment Agency (2011): Revealing the costs of air pollution from industrial facilities in Europe. http://www.eea.europa.eu/publications/cost-of-air-pollution

7 Spreadsheet complementing the EEA 2011 report. http://www.eea.europa.eu/publications/cost-of-air-pollution/spreadsheet/at_download/file

8 Methods for calculating health costs: see EEA 2011, S.49-50

9 See 7.

10 Germany is at the top of the list of European countries regarding costs of industrial air pollution (22 – 34 billion Euro), followed by Poland (11-19 billion Euro).

11 Ministerium für Umwelt, Gesundheit und Verbraucherschutz, Land Brandenburg (2011): Mitteilung an die Europäische Kommission zu den Ursachen der Überschreitungen der 24 h-Grenzwerte für PM10-Schwebstaub im Land Brandenburg im Jahr 2010 und den zu ihrer Vermeidung ergriffenen Maßnahmen. http://www.mugv.brandenburg.de/cms/media.php/lbm1.a.2328.de/bericht_eu_pm10.pdf

12 Ministerium für Ländliche Entwicklung, Umwelt und Verbraucherschutz des Landes Brandenburg (2006): Luftreinhalte- und Aktionsplan für die Stadt Cottbus. http://www.mugv.brandenburg.de/cms/media.php/lbm1.a.2328.de/lrpcottb.pdf

13 Brunekreef B, Annesi-Maesano I, Ayres JG, Forastiere F, Forsberg B, Künzli N, Pekkanen J, and Sigsgaard T (2012): Ten principles for clean air. European Respiratory Journal 2012; 39, 525-528 http://erj.ersjournals.com/content/39/3/525.full.pdf+html

14 Statistisches Landesamt Baden-Württemberg (2009): Statitik aktuell. Treibhausgasemissionen in Baden-Württemberg. http://www.statistik.baden-wuerttemberg.de/Veroeffentl/Statistik_AKTUELL/803409008.pdf

15 Ministerium für Ländliche Entwicklung, Umwelt und Verbraucherschutz des Landes Brandenburg (2008): Maßnahmenkatalog zum Klimaschutz und zur Anpassung an die Folgen des Klimawandels. http://brandenburg.de/cms/media.php/2328/mk_klima.pdf

16 http://climatechange.bmj.com/statement

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