INVENTORY OF MERCURY EMISSION TO AIR, WATER AND SOIL IN POLAND FOR YEAR 2014

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Introduction

Poland is one of the largest mercury emitters in Europe together with Germany and Italy (EMEP, 2016). This is the result of hard coal and lignite dependency of Polish energy sector. In 2013 even 84% of electricity was generated from solid fossil fuels (EC, 2015) however this share is reduced permanently. First complex inventory of Hg emission in Poland was prepared by Panasiuk et al. (2009; 2010).

Methods

Mercury emission to air from industrial processes and fuel combustion in residential sector for 2014 was based on KOBiZE (2016) data. Additional Hg emission to air was estimated by author for the use of mercury-containing products and dental practice. Use of batteries, light sources and other electrical and electronic equipment generate Hg emission to air. This emission in Poland was estimated for 2014 based on Hg consumption (Maxson, 2006) excluding measuring and control equipment (6.6 Mg Hg), model for distribution and emissions (Kindbom and Munthe, 2007) and Polish statistical data for municipal wastes. Due to GUS (2015) data 15.1% of collected municipal wastes was designated for incineration, mainly in cement plants. Due to GIOS (2015a) report 54.4% of light sources group including compact fluorescent lamps and 34.6% of remaining electrical and electronic equipment was selectively collected. For portable batteries this level was 33.1% (GIOS, 2015b). Additionally accumulation factors for lamps and electrical devices were corrected from 35% to 20%. Mercury emission from dental practice was based on the Polish Ministry of Health data on Hg consumption and pathways of dental mercury (Maxson, 2007; Panasiuk et al., 2009). Emission from bodies cremation was reported by EC (2012). Mercury discharges to water were based on E-PRTR (2015) database for 2013. Discharges to water and soil from dental amalgam in buried bodies were calculated on basis of burial data and 20% level of releases to ground waters.

Results

Poland officially reported to EMEP emission of 9.56 Mg to air in 2014, excluding waste treatment. It consists of 5.21 Mg from energy industry, 1.01 Mg from residential and commercial combustion plants and 3.34 Mg from other industries (KOBiZE, 2016). Hg emission to air from the use of mercury-containing products (initial and later within 10 years) was estimated on level 0.82 Mg. In comparison to previous years it is increase associated with higher share of municipal waste incineration. Consecutive 3.94 Mg Hg contained in products is re-collected and stored safely. Waste stream of mercury-containing products passed to municipal landfills decreased to 1.44 Mg. Remaining 0.39 Mg is still accumulated in products in society. In dental practice incineration of 2.90 Mg Hg in infectious wastes causes emission 0.29 Mg and processes of bodies cremation causes emission of 0.06 Mg to air (Panasiuk and Glodek, 2012). Load of 4.90 Mg from dental practice is collected as hazardous wastes. For year 2014 total annual anthropogenic emission to air from industry, products and dental practice was 10.73 Mg Hg.

Direct and indirect mercury discharges to water in Poland in 2013 (last available data) were 2.99 Mg with 2.75 Mg from large and medium industrial facilities and 0.25 Mg from municipal waste water plants (Panasiuk, 2015). Municipal sewage sludge transferred to agriculture is source of emission 0.31 Mg to soil. Discharges to soil from dental amalgam in buried bodies were estimated on level 0.16 Mg.

Conclusion

In sum mercury emission to air, water and soil in Poland in year 2014 was estimated on level 14.2 Mg annually. Significant load of 11.4 Mg in wastes of mercury-containing products and from dental practice is recycled or captured from incineration processes.

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