Particulate matter emissions in PRTR

What does particulate matter mean?

The term particulate matter comprises particles with an aerodynamic diameter of less than 10 µm, which due to its size remain in the atmosphere for a long time. These maybe further distinguished between PM_{10} (particulate matter, smaller than 10 µm) and PM2.5 (particulate matter, smaller than 2.5 µm). Particulate matter belongs to the group of air pollutants.

Particulate matter is either emitted directly at the source e.g. during combustion processes or can be formed afterwards in the presence of precursor substances such as Sulfur, Nitrogen Oxides and Ammonia. This is called secondary particulate matter. In the following only primary emitted PM_{10} is considered.

Overall situation of particulate matter in Germany

In 2015, total emissions of particulate matter was about 221.000 tons (see Trendtabellen 2017). The main causer of the anthropogenic share of particulate matter are industrial processes (42%, mainly metal and mineral industries), bulk materials (23.4%, agriculture (22.6%), transport sector (14.7%) and private households (8.8%) growing combustion of wood in fire places. During combustion processes in energy sector generated amount of particulate matter remained rather constant (4.6% in 2015).

Emitter

Since 1995, emission of particulate matter Feinstaubemissionen in Germany were reduced considerably – from 329.000 tons in 1995 to 221.000 tons in 2015. The main reduction was observed in the sectors energy and transport and during industrial processes, while the emissions in the agriculture sector remained rather constant.

Before 1995, compilation of particulate matter data was associated with large uncertainties Unsicherheit in emission factors or was not possible due to missing monitoring data in the national emissions inventory.

Health risks

Because of particulate matter may travel through the respiratory tract deeply into the lungs and is therefore considered as a health risk. The effect may depend on penetration and size of the particles. Health problems may range from irritation of mucous membrane and local inflammations of the respiration tract and the bronchial tubes to enhanced forming of plaque in blood vessels. Many studies proved a clear correlation between concentration of particulate matter in the air and the number of hospitalizations due to heart cycle problems.

Rules and Strategies

Due to its health damaging potential monitoring of particulate matter has become part of international regulations and thus mirrored in national acts and resulting provisions. Since 2000,

data collection has been included in reporting requirements. In addition, concentrations of particulate matter are continuously measured in order to control current threshold or limit values.

Emission limits are set for a number of emitter. One example is the requirements of wood fired combustion installations (households and small and medium sized enterprises, see 1. Bundes-Immissionsschutzverordnung), which may emit particulate matter in large quantities.

Where current emission limit values of particulate matter in the air are exceeded clean air plans acc. to air quality directive 2008/50/EC are to be prepared aiming at reducing the load of particulate matter. An important measure to reduce these emissions for example in the transport sector is the establishment of environment zones.

Pollution release and transfer register PRTR

Based on the European PRTR regulation (E-PRTR-regulation), the PRTR is one of Germany's reporting obligation.
Emissions of particulate matter included in the PRTR are part of the total emissions in Germany. Due of the fact that operators of installation are only bound to reporting if both the capacity threshold value for a certain production process (annex I of the E-PRTR-regulation) and the emission threshold value for PM_{10} (annex II of the E-PRTR-regulation) of 50 tonnes per year are exceeded. The introduction of these threshold values aims to capture large facilities with industrial activities, which count for the majority of total pollution load. Therefore, smaller facilities are not included in the PRTR Germany.

An analysis of the reporting years 2007 to 2015 showed that the number of PRTR facilities with reporting obligations for particulate matter decreased between 2007 and 2008 (Figure 1). After this, the number varied insignificantly. Often, these variations arise out of the particulate matter emissions around the threshold value of 50 tons/year requiring reporting in one year, but not necessarily in other years.

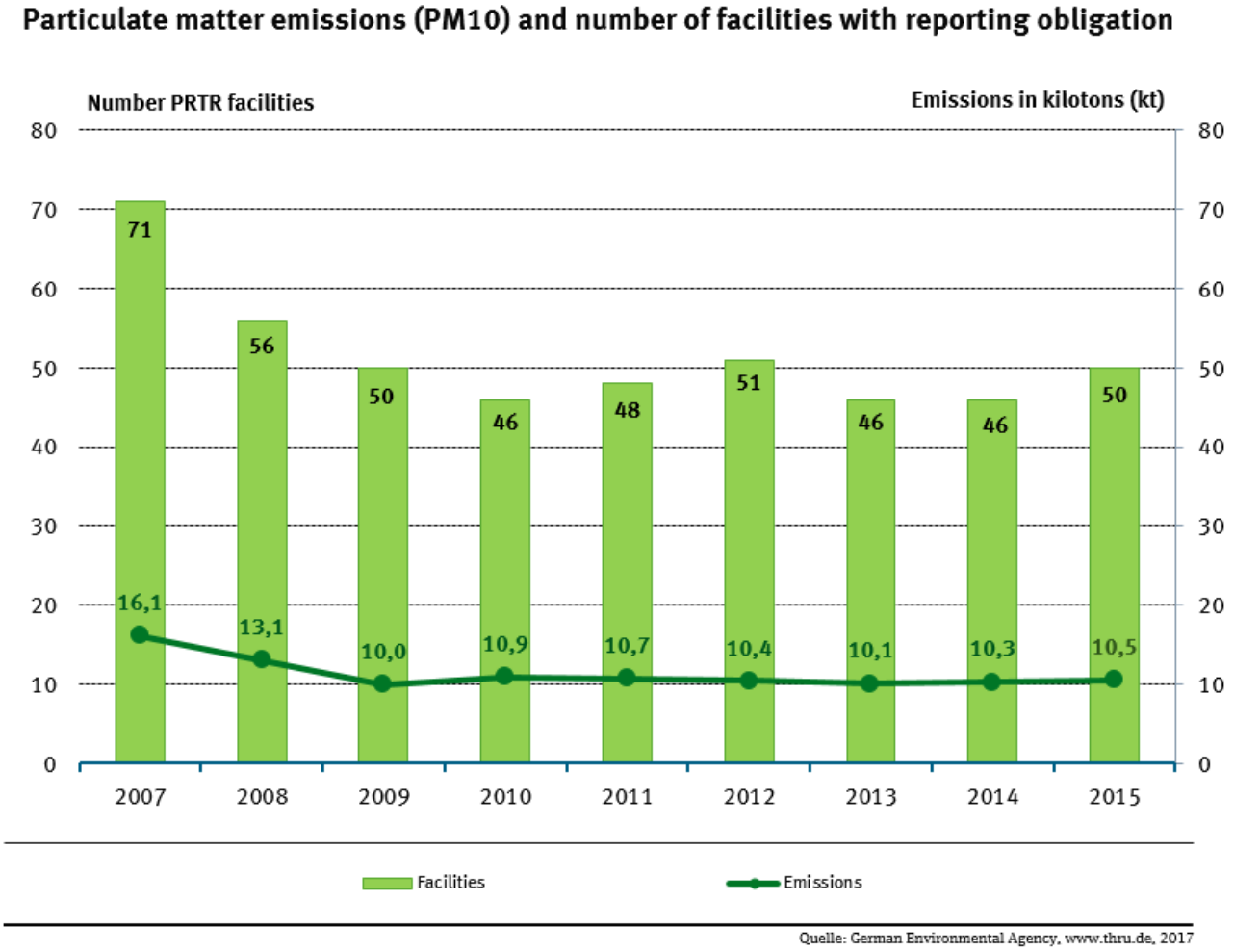

Figure 1: Particulate matter emissions (PM_{10}) and number of facilities with reporting obligation

Figure 2 shows those sectors that contributed most to the total amount of particulate matter from industrial processes in 2015 for the PRTR.

The energy sector was the main contributor to particulate matter emissions registered in the PRTR. This mainly included “Thermal power stations and other combustion installations a heat input of 50 megawatts (MW)” and the metal industry with “installations for the production of pig iron or steel (primary or secondary melting) including continuous casting with a capacity of 2.5 tonnes per hour”.

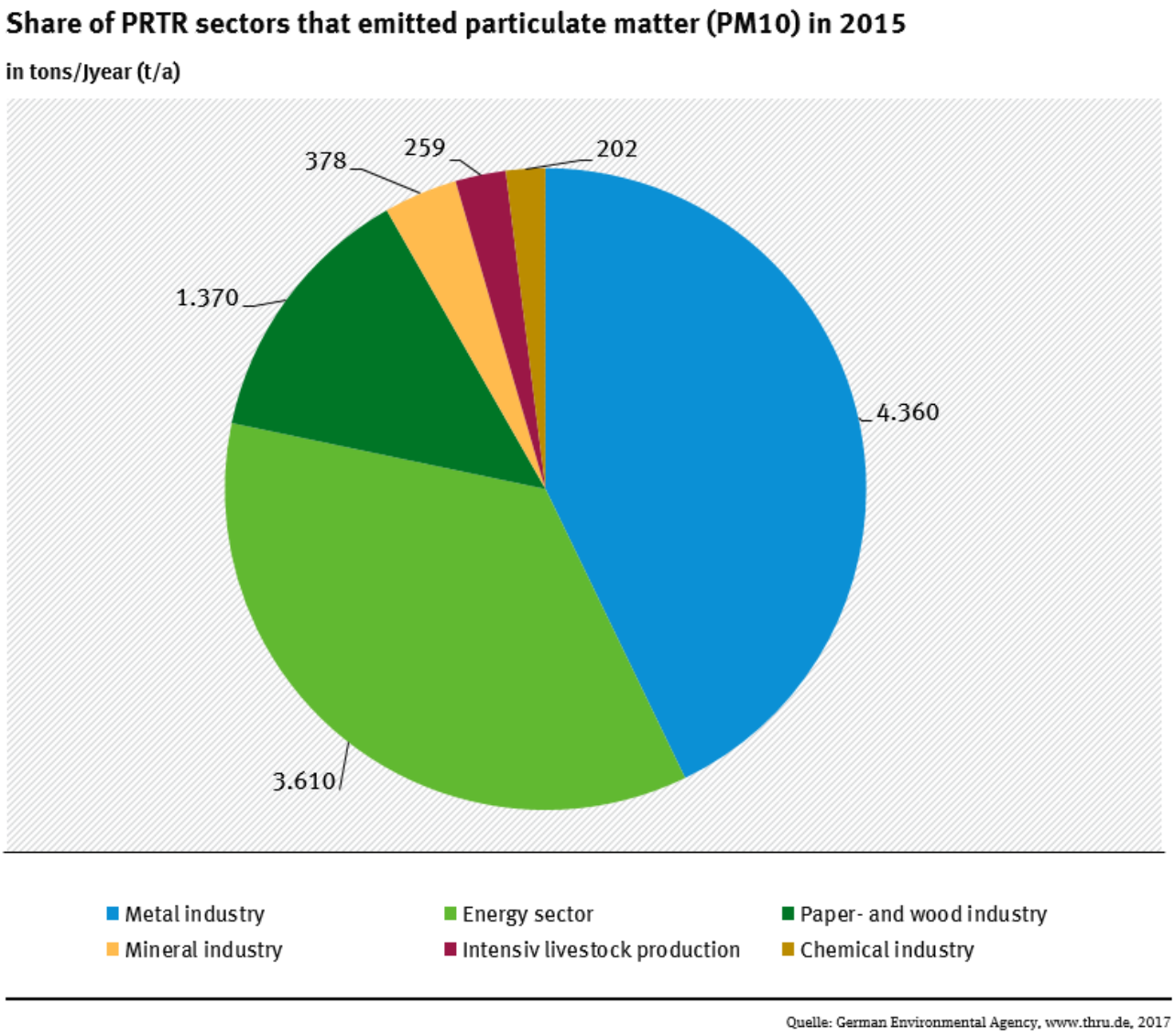

Figure 2: Share of PRTR sectors that emitted particulate matter (PM_{10}) in 2015

The largest contributors to particulate matter emissions in 2015 were ThyssenKrupp Steel Europe AG, Werk Schwelgern (metal industry with 1.160 tonnes PM_{10}) and Glunz AG Werk Nettgau (paper and wood industry) und Hüttenwerke Krupp Mannesmann GmbH (metal industry) with 931 Tonnen PM_{10} each. The Glunz AG Werk Nettgau has, with 68%, the largest share in the sector paper and wood industry.

Missing particulate matter emissions (PM_{10}) from open cast mining

A reliable quantification of these emissions is missing due to difficulties to undertake measurements and the unavailability of tools for modelling.

Some large open cast mines are Tagebau Garzweiler und Tagebau Hambach of the RWE Power AG in North Rhine-Westphalia and open cast mines of the Vattenfall Europe Mining AG in the Lausitzer area in Brandenburg (Note by the editor: **in** spring 2016 Vattenfall sold its brown-coal division in the Lausitz to the Czech group EPH).

The missing emissions from open cast mining are to be included in the sector “Mineral industry”. The reporting obligation emerges were the surface of the area effectively under extractive operation equals 25 hectares (annex I of the E-PRTR-regulation).

On behalf of and financed by RWE Power AG, the Bergische university Wuppertal is running a model for the estimation of particulate matter emissions from open cast mines. Results are expected by mid 2017 enabling to include 2018 data in the PRTR. For more transparency in the missing particulate matter emissions the RWE Power AG operator of Tagebau Garzweiler, Tagebau Hambach and Tagebau Inden (already in the PRTR at www.thru.de due to reporting of waste) has provided references via "Information for the public" (example open cast Tagebau Hambach).

Also the company Vattenfall Europe Mining AG (operator of open cast mines in Lausitzer area) and the Mitteldeutsche Braunkohlengesellschaft mbH (MIBRAG) have provided information for Tagebau Cottbus-Nord , Tagebau Welzow-Süd und Tagebau Jänschwalde, for Tagebau Profen und Tagebau Vereinigtes Schleenhain in the PRTR at www.thru.de under „Information for the public".

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