

In 2012, approximately 890 000 t of material were burned in municipal solid waste incinerators (MSWI) to produce electricity and heat throughout the Canton of Zurich. After the incineration process, about 24% (210 000 t) of this mass remain, 21% of which is made up by the slag, and 2% by the fly ash in the electrostatic precipitators.

Approximately 71 t of the 890 000 t of burnt waste is antimony (Fig. 1); the proportion of antimony to waste is estimated to be barely 0.008%. As one of the few elements, antimony shares the incineration process of the MSWI at an almost equal proportion to the slag (2012: ~31 t, ~0.016%) and the fly ash in the electrostatic precipitator (2012: ~39 t, ~0.24%). A negligible proportion accumulates in the sludge of the waste water treatment plant (2012: ~0.5 t, ~0.012 ppm).

The first efforts to recover antimony from the residues of the MSWI, should be made with the fly ash in the electrostatic precipitators, as the concentration of antimony is much higher than that of the slag, since less fly ash accumulates than slag (cf. concentrations). In 2012, for example, the average concentration of antimony in the Zurich MSWI slag was about 0.016%; that of the electrostatic precipitator fly ash was 0.24%, or over ten times greater.

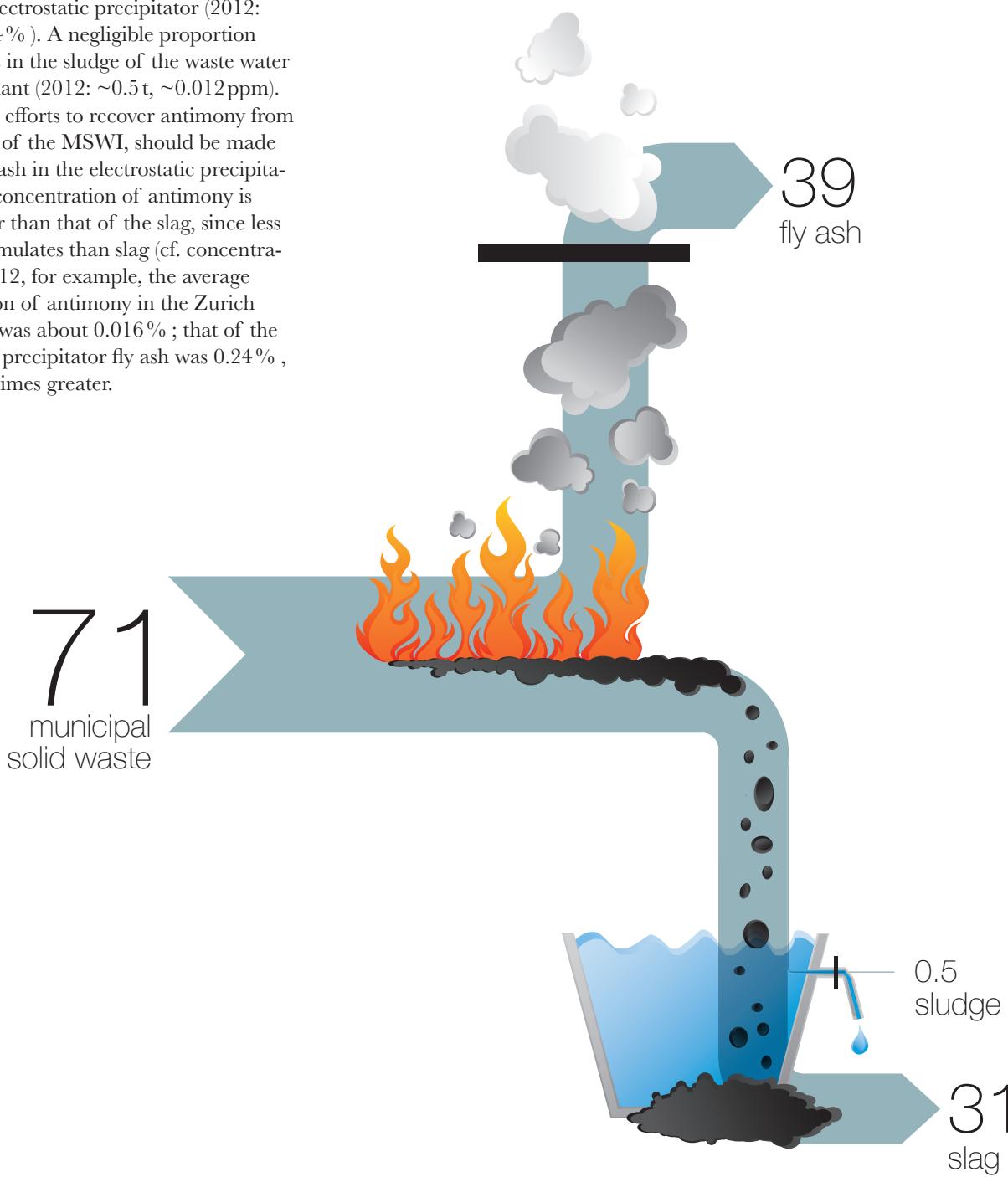
For comparison: The content of antimony in soils at shooting ranges is generally well below 0.1%. The lead particles stripped from the bullet backstops are recycled in a German recycling plant; they are likely to contain around 3% antimony.

If fly ash is subjected to an acidic wash, the antimony remains almost completely in the filter cake (~0.5%). This can be deposited with the slag (usually at a ratio of 1:10) in a landfill reactor, thereby increasing the content of the antimony in the mix compared to the slag by around 80% to 0.09%<sup>3</sup>.

The concentration of antimony in seep-

age water from pure slag strata (Sb~0.05%) is in the range of 0.01–0.17 mg/L<sup>2,4</sup> with mean values of 0.042–0.084 mg/L. For comparison: The waste water from Zurich incineration plants leads to an average content of antimony of 1 mg/L (L. Morf, pers. notice).

The environmental relevance and a possible need for action concerning the disposal of the acid washed filter dust (filter cake) containing an accumulation of antimony is currently not easy to assess. To make this possible, the quality objectives for antimony in surface waters must first be clarified.



**Fig. 1** Schematic representation of the antimony flow in MSWI in Canton Zurich<sup>35</sup>. Figures in tonnes per year [t/yr]; measured in 2012. Graphics: B. Jost.