Substance Flow Analysis of Wastes Containing Polybrominated Diphenyl Ethers - DTU Orbit (05/12/2018)

Substance Flow Analysis of Wastes Containing Polybrominated Diphenyl Ethers: The Need for More Information and for Final Sinks
The present article examines flows and stocks of Stockholm Convention regulated pollutants, commercial penta- and octabrominated diphenyl ether (cPentaBDE, cOctaBDE), on a city level. The goals are to (1) identify sources, pathways, and sinks of these compounds in the city of Vienna, (2) determine the fractions that reach final sinks, and (3) develop recommendations for waste management to ensure their minimum recycling and maximum transfer to appropriate final sinks. By means of substance flow analysis (SFA) and scenario analysis, it was found that the key flows of cPentaBDE stem from construction materials. Therefore, end-of-life (EOL) plastic materials used for construction must be separated and properly treated, for example, in a state-of-the-art municipal solid waste (MSW) incinerator. In the case of cOctaBDE, the main flows are waste electrical and electronic equipment (WEEE) and, possibly, vehicles. Most EOL vehicles are exported from Vienna and pose a continental, rather than a local, problem. According to the modeling, approximately 73% of cOctaBDE reached the final sink MSW incinerator, and 17% returned back to consumption by recycling. Secondary plastics, made from WEEE, may thus contain significant amounts of cOctaBDE; however, uncertainties are high. According to uncertainty analysis, the major cause is the lack of reliable values regarding cOctaBDE concentrations in European WEEE categories 3 and 4, including cathode ray tube monitors for computers and televisions. We recommend establishing a new, goal-oriented data set by additional analyses of waste constituents and plastic recycling samples, as well as establishing reliable mass balances of polybrominated diphenyl ethers’ flows and stocks by means of SFA.

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