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Hybrid technology for the treatment of exhaust gas from mercury as call for the requirements of the BAT/BREF conclusions in the Polish power industry

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The current IED directive, and hence very restrict requirements for mercury pollution included in BAT/BREF, force the many energy sector to seek new efficient gas purification technologies from the gaseous form of mercury. This is due to the fact that actually, none of the primary or secondary methods of removing Hg compounds are able to meet these restrictions (even commonly used methods using bromine or iodine-modified activated carbon, or modern methods used in other countries using polymer modules). Hence, the project realized by SBB Energy S.A. titled: "Hybrid adsorption systems for reducing mercury emissions using high effective polymer components", acronym HYBREM, has attempted to build an innovative hybrid technology that combines several techniques for the treatment of exhaust gases from harmful mercury compounds. It is based on polymer modules and the injection of various solid sorbents. The advantage of the built-in installation is its mobility, which can be tested on a variety of power plants. The obtained results of the flue gas purification by means of the designed pilot installation will determine whether the constructed prototype is effective under all conditions of coal-fired power plants. Collected data will be base for development a predictive numerical model which will be used for optimization on future installations to be equipped with a combination of activated carbon and adsorption media. An additional co-benefit of the mercury adsorption media is the further reduction of SO₂. The model is implemented into the Ansys Fluent code, using a set of User Defined Functions (UDF) combined with the solution procedure. The proposed hybrid mercury technique provides the possibility to reduce Hg emission without providing to the necessity of significant many modifications into of the downstream of the flue gas treatment systems gases. It is a new solution which so far, in this configuration, has not been used in European and Polish energy sector. The developed solution is consistent with the updated BAT reference document for large combustion plant, as a technology of post-combustion mercury removal, and contribute to reduction of Hg emission below of limits presented in this document.

Key words: mercury, polymer modules, pilot installation, solid sorbents