

The comparison of Estonian oil shale thermal treatment processes by BAT criteria

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The possible effectiveness criteria of oil shale thermal treatment processes appraising were discussed. The existing evaluations of resources and energy efficiency based on heat of combustion and Fischer assay oil yield are not sufficient, especially for determination of Best Available Techniques (BAT). Retorting of oil shale is the main thermal process used in Estonia for shale oil production. By-products of the process are gas, process water and solids: retorting residue and ash. The principal methods of retorting are processing of lump oil shale (lumps 25 – 125 mm) with gaseous heat carrier and processing of fines (less than 25 mm) with solid heat carrier.

Evaluations with the use of chemical efficiency and chemical potential of oil shale resource require improved methods for their determination. Besides distribution of energy resource of the raw material between products, it is advisable to consider in greater extent chemical value of products, energy consumption in the process and utilization of energy of waste products.

The content of TOC (total organic carbon) and DOC (dissolved organic carbon) in semi-coke or ash should be considered as essential criteria of BAT. One of the possible criteria for evaluation of chemical value of fuels produced from oil shale could be the element ratio of hydrogen to carbon.

Analysis and comparison of the processes used in Estonia show that both of them need optimization to enhance their chemical and energy efficiencies.