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Environmental Impact of Sewage Sludge Ash when Incorporated into Fired Clay Bricks - Case Study in Croatia

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Abstract

A suitable method for the disposal of sewage sludge (SS) is still being sought. Existing disposal methods are mostly unsuitable and have negative impacts on the environment. One of the SS disposal methods, which is mainly used in industrialized countries, is incineration. This method provides energy recovery from SS and removes organic pollutants and pathogens, still it is not a complete disposal method. Although the solid byproduct sewage sludge ash (SSA) from the incineration process is generally classified as a non-hazardous waste and cannot be disposed of in a landfill in the usual manner, it must be disposed of according to the principles of circular economy in order to complete the cycle. The physicochemical composition of SSA is similar to that of clay, so its use in the brick industry is being increasingly explored. Previous research on the use of SSA in the production of bricks in the Republic of Croatia investigated the optimal proportion of SSA at which the properties of the brick remain the same or improve. Research has shown that the optimal proportion of SSA is 10%, while the addition of 20% SSA results in lower compressive strength and higher water absorption. Further analysis of the leachability and ecotoxicity of ceramic products made with different types of SSA has been conducted. The determination of ecotoxicity of samples using bacterial culture *Vibrio fischeri* (EN ISO 11348-1:2000) showed that bricks manufactured with SSA are not ecotoxic. The leaching tests carried out according to the standard EN 12457-2:2005 confirm that bricks made with 20% SSA are classified as inert in all parameters.

Keywords: clay bricks, ecotoxicity, leaching, sewage sludge, SSA