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Risk Identification of MSW Implementation in the Cement Industry in Indonesia: A Review

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ABSTRACT

The cement industry in Indonesia is one of the most energy-intensive sectors, primarily relying on coal-based energy and significantly contributing to carbon emissions. Therefore, there is an urgent need for more environmentally friendly alternative energy sources, one of which is the utilization of Municipal Solid Waste (MSW) as Refuse-Derived Fuel (RDF). However, the implementation of RDF faces various risks that may affect its success and hinder its effectiveness. This study aims to identify the risk factors associated with RDF implementation through a comprehensive literature review. The results reveal 18 key risk factors across technical, financial, environmental, regulatory, and social aspects. These include variations in waste composition, inconsistent RDF quality, high moisture content, coating formation and blockages caused by evaporated salts, equipment corrosion, and wear, toxic emissions, limited technology, fluctuations in feedstock availability, the absence of RDF standards, high investment costs, and low public acceptance. These findings are expected to provide an initial comprehensive understanding of the risks associated with RDF implementation in the Indonesian cement industry and serve as a foundation for further research in designing appropriate risk mitigation strategies across various industrial sectors in Indonesia.

Keywords: *Municipal Solid Waste; Refuse-Derived Fuel; Cement Industry; Renewable Energy; Literature Review*