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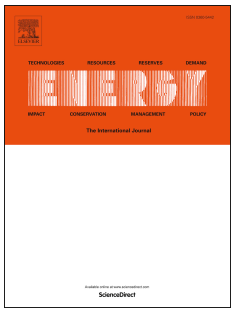

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Ammonia production from black liquor gasification and co-gasification with pulp and waste sludges: A techno-economic assessment

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Abstract

The economic feasibility of producing ammonia through the gasification of three different feedstocks produced in pulp and paper mills is investigated in this paper. The first case uses black liquor, the main by-product of the kraft pulping process, as the feedstock, and in the other two cases pulp sludge (PS) and waste sludge (WS) are co-gasified with black liquor. For all three cases, a process model in which mass and energy balances were calculated was developed. The model results were used to estimate the equipment size and estimate costs. Techno-economic models were developed and ammonia production costs were calculated. A case study for Alberta, a western Canadian province, was conducted. The results indicated that for a 10% discount rate (or internal rate of return [IRR]), ammonia production in all three cases is cost competitive with current ammonia prices. The cost of production (COP) of ammonia for all three cases ranges from 743-748 $/t. Sensitivity and uncertainty analyses were conducted on the estimated COP,

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