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**Techno-economic assessment of catalytic gasification of biomass powders for methanol production**

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**Abstract**

This study evaluated the techno-economic performance and potential benefits of methanol production through catalytic gasification of forest residues and lignin. The results showed that while catalytic gasification enables increased cold gas efficiencies and methanol yields compared to non-catalytic gasification, the additional pre-treatment energy and loss of electricity production result in small or no system efficiency improvements. The resulting required methanol selling prices (90-130 €/MWh) are comparable with production costs for other biofuels. It is concluded that catalytic gasification of forest residues can be an attractive option as it provides operational advantages at production costs comparable to non-catalytic gasification. The addition of lignin would require lignin costs below 25 €/MWh to be economically beneficial.

Keywords: Catalytic gasification; Forest residues; Lignin; Alkali; Biomethanol

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