

عنوان مقاله:

Environmental-economic evaluation of sugar cane bagasse gasification power plants versus combined-cycle gas power plants

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خلاصه مقاله:

Approximately 2.4 million tons of bagasse are produced each year in Iran, most of which are currently treated as waste adding to serious environmental concerns. Application of bagasse for energy production is a sustainable solution to supply the required energy within the sugar refineries and export the surplus electricity to the grid. Currently, the energy demand in Iranian sugar mills is mainly supplied by fossil fuels (natural gas or mazut). Bagasse fluidized bed and fixed bed gasification plants would respectively lead to save 59,250 and 21,750 tons of CO₂ annually, compared to gas power plants of the same scale. The present study aims to compare the environmental economic analysis of electricity generation in 10-MW gas-fired power plants with that electricity generation in bagasse gasification plants (with fluidized bed and fixed bed reactors) exemplarily in Iran. The bagasse fluidized bed gasification option (with IRR of 28.6%) showed the most promising economic viability compared to bagasse fixed bed gasification and gas power plant cases with IRR values of 25.09 and 21.94%, respectively. Furthermore, bagasse gasification options were potentially characterized by a better environmental performance compared to fossil-fuelled options. On the other hand, the obtained levelised cost of electricity at gas power plants (2 cents/kWh) was lower than the global range and lower than bagasse gasification cases (7-9 cents/kWh). The results revealed the vital need of biomass power plants to governmental support in order to compete with fossil power plants by participation of private .sector

کلمات کلیدی:

Combined heat and power (CHP), Economic evaluation, Gasification, Levelised cost of electricity (LCOE), Natural gas power plant, Sugar cane bagasse

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