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Fast Reactors and Nuclear Cogeneration: A Market and Economic Analysis

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Fast reactors are typically considered for their potential to make optimal use of natural resources or for their potential to minimize the amount and level of nuclear waste. The additional opportunity of fast reactors designed for cogeneration applications (i.e., production of electricity and process heat), which can bring an enormous reduction in CO₂-emissions, is made possible by the elevated temperatures characterizing the primary circuit of such reactors, compared to traditional light water reactors. This article will provide a state-of-the-art overview on the cogeneration market with emphasis on opportunities for lead, gas, and sodium fast reactors, summarize recommendations for these fast reactor systems and their interfaces with a cogeneration application, and discuss the results of a top down cost estimate for a lead fast reactor system with a typical cogeneration application. The economic analysis clearly shows that coupling a small or medium sized fast reactor to a cogeneration application seems attractive.

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