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Integrated Tech-Paradigm Based Innovative Approach towards Ecological Coal Mining

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Abstract

Coal mining technology directly affects coal production quantity and quality, which in turn affects global energy supplies, especially in rapidly urbanizing, industrializing economies. In this research, a coal production technological diffusion mathematical model is proposed, the results from which indicated that while total coal production is expected to decline in the following decades, coal will continue to provide a sizable share of global prime energy to meet the expected energy demands. A general data analysis was conducted to fully understand coal mining technological paradigmatic development and future necessary improvements to ensure more efficient, environmentally-friendly coal production. It was found that the coal mining technological paradigm followed a three-stage trajectory; competition, diffusion, and shift; in accordance with the traditional technological paradigm S-curve, and underground coal gasification (UCG) related technologies were identified as the main development direction for coal mining technologies. An integrated energy exploitation approach for ecological coal mining was then designed to deal with current environmental and energy returns on investment problems, to improve performance, and to act as a foundation for future UCG technological developments. Some policy recommendations are given to guide the implementation of the proposed ecologically oriented integrated coal mining system.

Keywords: Ecological coal mining, Literature mining, Technological paradigm, Sustainable development, Coal mining technology

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