UNDERGROUND COAL GASIFICATION: FROM CONCEPT TO COMMERCIAL APPLICATION

Radmila Karanakova Stefanovska, Zoran Panov, Risto Popovski, Blagica Doneva

Goce Delcev University, Faculty of Natural and Technical Sciences, Krste Misirkov 10-A, 2000 Stip, North Macedonia, radmila.karanakova@ugd.edu.mk, zoran.panov@ugd.edu.mk, risto.popovski@ugd.edu.mk, blagica.doneva@ugd.edu.mk

ABSTRACT

Ensuring a reliable and sustainable energy supply represents one of the most critical environmental, economic and societal challenges of the 21st century. Despite the accelerated transition to renewable energy sources, fossil fuels- especially coal are expected to remain a significant energy component in the foreseeable future. Researches indicates a continued increase in coal demand, underscoring the necessity for more efficient, economically viable, and environmentally acceptable utilization technologies. Underground coal gasification has emerged as a promising in situ technology that enables the exploitation of deep, thin, or otherwise uneconomic coal seams that are not accessible through conventional mining technologies. A lot of researches point to the potential advantages of UCG over traditional coal mining technologies, including higher recovery rates, reduced land degradation, improved economic performance, and potentially lower greenhouse gas emissions, especially when it is integrated with carbon capture and storage (CCS) technologies. This paper provides a comprehensive overview of the current state of UCG development globally, where we can critically analyze the technological maturity, its economic viability and environmental implications.

Keywords: underground coal gasification, clean coal technology, CCS, ecology, coal.