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EFFICIENT USE OF BROWN COAL IN UKRAINE

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In December 2017, the European Commission initiated a program as part of the "Clean Energy for All Europeans" package, which especially focuses on transitional coal plants. The project seeks to provide targeted support to European Union regions experiencing a protracted decline in the coal industry. In December 2019, the European Commission introduced the European Green Agreement as a continuation of its previous efforts. This agreement is an essential element of the Commission's plan to support the European Union in achieving carbon neutrality by 2050. The Just Transition Mechanism (JTM) is a crucial tool within the Green Agreement, specifically designed to ensure a fair and equitable shift towards a carbon-neutral economy, while safeguarding against the marginalization or disadvantage of any individuals or groups during this transition. The expansion of the Transition Coal Initiative in 2020 to encompass shale and peat mining regions is of utmost importance in order to effectively execute the European Green Agreement and Just Transition Mechanism.

In September 2020, the European Commission presented its proposal, which details a strategy to attain a 55% decrease in greenhouse gas emissions throughout the European Union by 2030, compared to the levels recorded in 1990. The EU's aspirations for the forthcoming decade will drive it towards attaining carbon neutrality by 2050, following a well designed path. To resolve this problem, it is crucial that we promptly implement a thorough restructuring of our energy system balance by swiftly shifting away from the traditional reliance on fossil fuels (such as coal, oil shale, and peat) due to their substantial adverse impact on the environment. Furthermore, it necessitates the construction of a more enduring economic framework, which might pose significant challenges for several regions [1, 2].

The execution of the Coal Regions in Transition initiative began in December 2020, with a particular emphasis on the Western Balkans and Ukraine. The goal is to support these countries and regions in shifting from coal to a carbon-neutral economy, ensuring a just and unbiased transition. The program seeks to provide support to coal-producing regions in neighboring countries of the European Union, such as Bosnia and Herzegovina, Kosovo, Montenegro, Northern Macedonia, Serbia, and Ukraine

[3]. It is crucial to evaluate the future usage of fossil fuels in Ukraine in a way that minimizes any negative impact on the climate. To successfully handle this issue, it is advisable to conduct a comprehensive evaluation of the current reserves of fossil fuels, together with the most recent technologies for their exploitation [4, 5].

The implementation of oxidative desulfurization of high-sulfur lignite from Ukraine has been proposed in three distinct domains: electricity production, electricity production and technology, and technology application sector. The optimal conditions for each place are as follows:

– power generation: The OLR (oxidant-to-liquid ratio) is 0.01875 m/s; the water vapor content in the oxidant is 4.5 % by volume; the temperature is 425 ^{0}C; the OFR (oxidant-to-fuel ratio) is 0.6 m^3/h per kg; the time is 10 minutes;

– power generation and technology: OLR (oxidant-to-liquid ratio) is 0.01875 m/s; water vapor concentration in the oxidant is 50.0 % by volume; temperature is 425 ^{0}C; OFR (oxidant-to-fuel ratio) is 0.6 m^3/h per kg; time is 10 minutes;

– specifications: The Organic Loading Rate (OLR) is 0.025 meters per second. The oxidant contains water vapor with a volume fraction of 70 %. The temperature is 425 ^{0}C. The Oxygen Flow Rate (OFR) is 2.4 cubic meters per hour per kilogram. The duration of the procedure is 15 minutes.

A graphic illustrating the possible sequence of the oxydesulfurization process for lignite has been presented. The computations for the material and thermal balances of the processes have been finalized. Research has demonstrated that employing the technique directly at steam power plants can significantly diminish the release of sulfur compounds into the environment during the combustion of lignite. The average decline falls between 53.5 % and 56.0 %.

Hydrogen sulfide, comprising around 5.7–12.5 % of the desulfurized gases, is present in the gases produced during the oxidation process used to eliminate sulfur from lignite. Hydrogen sulfide can either undergo further concentration or be promptly converted into sulfur. The gases that have undergone hydrogen sulfide removal must be reheated to provide additional heat. After completing this step, the chilled flue gases can be discharged into the atmosphere.

The presence of water vapor in the oxidant does not directly affect the extent of sulfur conversion in the lignite. However, it does affect the progress of COM conversion. To optimize the production of destruction and gasification products, it is advisable to introduce water vapor into the desulfurization gases with the intention of increasing the concentration of H_2S. For instance, if a combination of steam and air is employed, with the steam volume being half that of air, the concentration of H_2S in the desulfurization gases will increase by a factor of 1.6. The link between the quantity of flammable and non-flammable steam and gaseous byproducts generated during the conversion of organic fuel content (efficiency ratio conversion) increases twofold.

The desulfurization process produces tar by decomposition, with a weight percentage that varies from 18.85 % to 26.58 % relative to the input material. This tar meets the requirements for being classified as "100" grade furnace fuel oil based on the majority of the indications. Lignite is considerably more economical than furnace fuel oil. Tar breakdown can act as a catalyst that improves the flexibility and ease of handling of modified bitumen derived from petroleum.

A novel form of transdermal materials, known as bioactive humic-polymer hydrogel, has been developed and evaluated. The composition comprises gelatin, hydroxypropyl methylcellulose, and sodium alginate as its components. The materials have been altered by including varying quantities of humic acids, ranging from 2.5 % to 7.5 % in terms of weight. Research has shown that the addition of humic acids to these modified systems helps create bioactive humic-polymer hydrogels that have a more compact and rigid structure. This is accomplished by an augmented quantity of hydrogen bonds and the formation of larger clusters, leading to a greater level of cross-linking. Empirical research has shown that including humic acids into hydrogels has a considerable impact on important operational features, such as the extent of expansion and the moisture-lipid balance of the skin. Transdermal materials consisting of a biologically active humic polymer hydrogel, including gelatin, hydroxypropyl methylcellulose, and sodium alginate that have been treated with humic acids, have shown significant improvement in skin condition. When employed as cosmetic patches, these compounds effectively convert parched and rough skin into a suppler and smoother state.

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