

Hydrogen separation from coke oven gas – the unused potential

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The European Union puts an increasing emphasis on environmental protection, which is confirmed by further restrictions and legal arrangements related to the reduction of emissions of the dust and greenhouse gases. These restrictions are aimed mainly at coal being the basic fossil fuel in both Poland and the greater part of Europe. The exception is coking coal, which is included in the EU list of critical raw materials, which can be a source of green energy.

As a result of the coking process of hard coal is coke, that is mainly used in the production of steel. The by-product of this process is coke-oven gas generated in an amount of approx. 350 m³ from a tone of dry coking coal. The coke oven gas includes hydrogen (about 55-58% vol.), as well as methane (about 25% col.) and other gases. The hydrogen can be separated from the coke oven gas in the process of pressure swing adsorption (PSA) or membrane separation to obtain a product with a purity of 99.999%. It is the level of purity that meets the requirements of hydrogen fuel cells used for the production of electricity and heat.

As a result of the reaction in the fuel cell, electricity and heat as well as water are generated, therefore we can call it a zero-emission energy generation technology. Fuel cells are used both as stationary electricity generators and mobile generators used as a source of energy for e-mobility. The development of hydrogen technologies may contribute to the reduction of air pollution in urban centers, constitute a source of emergency power supply or one of the strong pillars of dispersed energy economics.

Hydrogen obtained from hard coal coking processes may soon be a source of green energy, thus changing thinking about the coking and mining industry of hard coal.