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THE '3R' ANTHRACITE CLEAN COAL TECHNOLOGY: ECONOMICAL CONVERSION OF BROWNCOAL TO ANTHRACITE TYPE CLEAN COAL BY LOW TEMPERATURE CARBONIZATION PRE-TREATMENT PROCESS

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ABSTRACT

The preventive pre-treatment of low grade solid fuels is safer, faster, better and less costly versus the "end-of-the-pipe" post treatment solutions. The "3R" Recycle-Reduce-Reuse integrated environment control technology provides preventive pre-treatment of low grade solid fuels, such as brown coal and contaminated solid fuels to achieve high grade cleansed fuels with anthracite and coke comparable quality. The goal of the 3R technology is to provide cost efficient and environmentally sustainable solutions by preventive pre-treatment means for extended operations of the solid fuel combustion power plants with capacity up to 300 MWe power capacities. The 3R Anthracite Clean Coal end product and technology may advantageously be integrated to the oxyfuel - oxy-firing, Foster Wheeler anthracite arch-fired utility type boiler and Heat Pipe Reformer technologies in combination with CO2 capture and storage programs. ADVANTAGES: Feedstock Flexibility: application of pre-treated multi fuels from wider fuel selection and availability. Improved burning efficiency. Technology Flexibility: efficient and advantageous interlink to proven boiler technologies, such as oxyfuel and arc-fired boilers. Near Zero Pollutants for hazardous-air-pollutants: preventive separation of halogens and heavy metals into small volume streams prior utilization of cleansed fuels. >97 % organic Sulphur removal achieved by the 3R thermal pretreatment process. Cost Reduction: decrease of overall production costs when all real costs are calculated. Improved Safety: application of preventive measures. For pre-treatment a specific purpose designed, developed and patented pyrolysis technology used, consisting of a horizontally arranged externally heated rotary kiln. The flexible operation provides wide range of 25 % to 125 % of nominal capacities. The volatile hazardous air pollutants are safely removed in the reduced volume of gas-vapour stream and burned out in the post burner at 850°C(2sec±50°C), while the Clean Coal solid end product is utilized for clean energy production. "Product like" pilot plant with >100 kg/h throughput capacity has been built and successfully tested in Hungary in 2005. The 3R technology opens new technological and economical opportunities for solid fuel power generation with sustainable near zero emission performance.

KEYWORDS
clean coal, carbonization, anthracite, thermolysis, pre-treatment, prevention, oxyfuel, arc-fired, pyrolysis
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