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DIRECT COAL INJECTION: KEY TO LOW EMISSION BLAST FURNACE GRANULATED COAL INJECTION SYSTEM

Description

States Impacted:

Michigan, Indiana

Benefit Areas:

Environment Technology
Leadership, Lower Energy
Consumption

Participants:

U.S. Department of Energy,
Bethlehem Steel Corporation,
British Steel Consultants
Overseas Services, Inc.;
CPC-Macawber, Ltd.; Flour
Daniel, Inc.; ATSI, Inc.

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Under the Department's Clean Coal Technology (CCT) program, a cost-shared effort with Bethlehem Steel Corporation has demonstrated that steel producers can reduce their need for coke using a "granular coal injection" technology, while also reducing the nitrogen oxides, sulfur dioxide, and air toxic pollutants associated with coke making.

At its Burns Harbor, Indiana site on Lake Michigan, Bethlehem Steel has demonstrated the "granular coal injection" technology on high-capacity blast furnaces, with granulated coal as a substitute for coke. Limestone is used to capture the sulfur pollutants generated during coal combustion. Direct coal injection results in virtually no measurable SO₂ or NO_x emissions.

Recent trials at the Burns Harbor site have focused on the use of Western granulated and Colorado Oxbow Coal -- a high volatile coal. The advantages of using a granular coal injection facility rather than a pulverized coal injection facility are lower energy consumption and increased cost savings. Since the energy consumption for pulverizing compared to granulating the same coal is significantly higher -- use of granulated coal reduces the cost of power for size reduction by 40%, a significant savings.

Goals

The goal is to minimize the energy requirements of the process by using granulated coal instead of pulverized coal. The use of coal reduces the amount of coke necessary for the production of iron and since less coke is required, the emissions of SO₂ and NO_x are reduced.

Tangible Benefits

National: The Burns Harbor demonstration has shown the technology to be a cost-effective way to reduce coke usage and the attendant environmental damage of coke production, i.e., air toxic emissions. Based on its success, a license for the technology has been sold to the United States Steel Company. In addition, by using granulated coal, size reduction costs are also lowered, a cost savings passed on to the consumer.

Regional: Low volatile coal is prevalent throughout the East, and reduces the need for coke which is an asset to the production of iron.

Local: Prior to using the coal injection technology, coke had to be purchased to supplement the coke produced at the Burns Harbor Plant. At a production rate of 14,000 net tons of hot metal per day (NTHM/day), the blast furnace is currently self-sufficient with coke supplied at the plant. However, during times of high productivity, a small amount of coke has to be purchased. The successful injection of low volatile coal closes a large portion of the coke supply/use gap.