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Development of a Flash Ironmaking Technology Based on Hydrogen or Natural Gas - Implications on Energy and Greenhouse Gas Emissions

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A Flash Ironmaking Technology for the production of iron directly from iron ore concentrate is under development at the University of Utah. This technology bypasses pelletization of the concentrate and eliminates the cokemaking step necessary in the currently predominant blast furnace technology. In this technology, the concentrate is reduced by hydrogen or H_2 + CO gas mixtures formed from the *in situ* reforming of natural gas in a flash reactor. Natural gas currently represents an economically advantageous reductant/fuel for flash ironmaking. But hydrogen, when available in large quantities and produced by carbon-free methods, would make the technically and environmentally superior choice. After tests in smaller reactors were completed, a mini-pilot reactor capable of operating at 1200 - 1550 °C with a concentrate feeding rate of 1 - 5 kg/h has been installed. Commissioning of the reactor with an emphasis on the preheating of the reactor, production of reducing gas mixtures and the concentrate feeding and product particle collection has been completed. The results of experimental runs in this facility, together with other aspects of the overall project such as CFD simulation and design of an industrial-scale pilot plant, will be discussed.