



R-GAS Coal Gasification Technology

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GTI's R-GAS coal gasification technology establishes plug flow in the gasifier through rapid and efficient mixing, allowing the gasification reactions to occur at high temperature. This reduces residence time, providing peak performance in a compact design. The gasifier pressure vessel is protected by a water-cooled liner designed for high heat flux, keeping the metal at safe temperatures during operations with gasification temperatures above 2,700°C in the reaction zone and maintaining the liner-exit temperatures above ash fusion temperature (AFT) (1,500 -1,690°C). The partial-quench design allows for both dry and wet removal/recovery of fine ash.

R-GAS technology offers a pathway for direct gasification of high ash content, high AFT coals. Its efficient, high-performance design eliminates the need for feedstock blending and/or fluxant addition, as is required with existing commercial technologies, and therefore provides a cost-competitive solution for the clean utilization of high AFT coals. Together with Yangquan Coal Industry Group (YQ), GTI is scaling up the R-GAS technology to a commercially viable 800MTPD unit, which is to be demonstrated at YQ's plant in Taiyuan, China. Wet recovery process will be employed in the current demonstration plant, making use of the existing blackwater system at the facility. The ability to retrofit a total quench configuration will also be available if desired.

GTI's 18TPD pilot R-GAS facility has completed test runs to evaluate three different varieties of YQ high AFT coal. Over 300 hours of pilot plant operation with these coals had demonstrated carbon conversion up to 99%, operations both with and without steam injection, and direct utilization of feed stocks with ash fusion temperatures exceeding 1,600°C and ash content exceeding 28wt%, dry-basis. The success of the pilot plant studies provided a solid basis for a commercial-scale R-GAS unit.

Already completed the process design package, HAZOP analysis and detailed engineering, the project partners are presently engaged in procurement and construction activities, with commissioning and startup anticipated in 2019. The demonstration unit expects to achieve carbon conversion and cold gas efficiency (CGE) up to 99.9% and 80%, respectively. Successful demonstration of the R-GAS gasification technology will provide a new solution for the efficient





CLEAN COAL TECHNOLOGIES 2019
CONFERENCE 3-7 JUNE, HOUSTON

and clean utilization of high-AFT coal. Moreover, this demonstration will prove the commercial viability of R-GAS technology, paving the way for scale-up to larger units and deployment for use in future plants with both high AFT and traditional-rank coals, for which performance is estimated to exceed 84% CGE (IL#6 coal).

