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R-GAS™

GASIFICATION

A photograph of a large industrial gasification plant at night. The scene is illuminated by artificial lights, highlighting the complex network of pipes, walkways, and large cylindrical vessels. The structure is multi-tiered, with various levels of scaffolding and equipment. The overall atmosphere is industrial and technical.

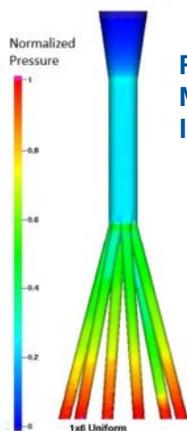
GTI Energy is a leading technology development organization. Our trusted team works to scale impactful solutions that shape energy transitions by leveraging gases, liquids, infrastructure, and efficiency. We embrace systems thinking, innovation, and collaboration to develop, scale, and deploy the technologies needed for low-carbon, low-cost energy systems.

R-GAS™ GASIFICATION

Leveraging decades of rocket engine development, GTI Energy's gasifier utilizes aerospace-inspired injectors and high-temperature materials

GTI Energy is maturing an innovative and high efficiency gasification technology for coal, biomass, and waste conversion to liquid fuels and chemicals and power generation. This game-changing technology, leveraging decades of investment from both U.S. aerospace and energy sectors, was developed from concept to pilot-scale by Aerojet Rocketdyne and is now owned by GTI Energy. GTI has branded this gasification technology as the R-GAS™ process.

The R-GAS™ technology has been successfully operated at pilot-scale (18 tpd) on sub-bituminous coal, bituminous coal, high ash fusion temperature anthracite coal, and petroleum coke—all with excellent test results. This testing has been conducted at GTI Energy's pilot-scale facility located on an 18-acre campus in metro Chicago, IL with more than 1,000 hours of hot fire testing achieved since commission of the pilot plant in December 2009. Long duration testing was completed with a very high ash fusion temperature anthracite feedstock. This series of tests validated the robustness of the R-GAS™ process, with performance and thermal environments consistent with a predicted 2-year injector life and a 10-year liner life that would result in 99% availability. Additional testing and evaluation is also now underway to characterize performance of R-GAS with biomass and other renewable feedstocks.



Feed Splitter for Multi-element Injection



STATUS: Scaling-up the R-GAS™ technology is underway with GTI Energy's development partner in China, Huayang New Materials Technology Group Co., Ltd., with the construction and commissioning of a commercial demonstration facility capable of gasifying high ash fusion temperature coal feedstocks at a capacity of 800 metric tons per day. Commissioning and operations have been initiated to validate long-duration reliability, operability, and capital costs.

Key Features

- Dry feed for high-efficiency feedstock flexibility
- Multi-element feed splitter
- Rapid mix injector plus plug flow reactor for 90% smaller volume
- Advanced cooling design for robust thermal margins; long component life
- Rapid spray quench
- Long mean time between failures (MTBF), short mean time to repair (MTTR) for high availability

Benefits

- High cold gas efficiency:
 - 2–4% > than other dry feed gasification processes
 - 7%–9% > than slurry gasification processes
- Lower CAPEX: ~15–25% plant cost reduction vs. lowest cost entrained flow technology
- 15%–25% reduction in cost of product (power, chemicals, liquids)
- High thermal margins enable operation on feedstocks with high ash fusion temperature (AFT)
- Eliminates black water system
- Reduced water usage

Applications

- Hydrogen for refineries
- Synfuels and chemicals production
- Electric power generation

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