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# PARTIAL OXIDATION GAS TURBINE



GTI is a leading research, development, and training organization addressing global energy and environmental challenges. We're applying energy and aerospace experience to lower energy costs and provide cleaner sources of fuel and power.

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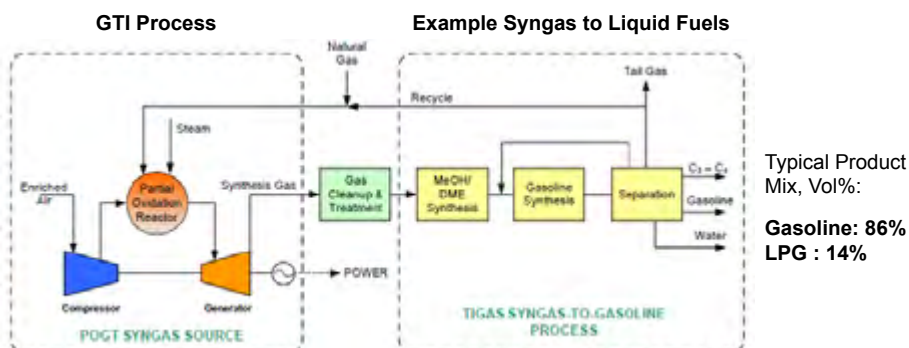
## Lowering GTL Front-End Process CAPEX/OPEX

GTI's partial oxidation gas turbine (POGT) technology was selected for development by ARPA-E as to be part of a natural gas-to-liquid fuels (GTL) process in 2012. GTI collaborated with Aerojet Rocketdyne to modify and test a compact gasifier to operate as a high-temperature, high-pressure natural gas partial oxidation (POx) reactor that would be combined with an advanced turbo-expander being designed for this application. GTI acquired this POGT technology from Aerojet Rocketdyne in July 2015.

GTI performed systems testing on the reactor and economic evaluations on the entire GTL system. Because the method produces both power and liquid fuel, it is an attractive option for associated gas now flared in oil production fields (including offshore platforms). In addition, the economic assessments also suggest that it has promise in other applications where power off-take is available. The amount of co-produced power can be controlled, allowing for flexibility as electricity demands change. Modular equipment will allow the size of the process plant to be tailored to match the amount of natural gas at the on-site location, minimizing the plant footprint.

**STATUS:** Application of the POGT technology for GTL plants offer potential economic advantages compared to conventional POx and autothermal reforming (ATR) GTL processes. As the next step, a 1,000 barrels/day integrated POx and expander unit needs to be demonstrated at a brown-field site.

## POGT CONCEPT



## KEY FEATURES

- Compact, portable design
- Low-cost equipment
- Short fabrication schedule <12 months
- Design adaptable for continuous and intermittent recycle of by-product and/or waste streams
- Spray quench for low-cost path to target H<sub>2</sub>:CO ratio
- Active cooling, plus materials selection to avoid metal dusting, for long life

## APPLICATIONS

- Distributed, small-scale conversion of low-value natural gas (NG) resources
- ~11 MM SCFD NG feed at 1,000 BPD liquid fuel product
- ~82 MM SCFD NG feed at 10,000 BPD liquid fuel product

## BENEFITS

- Reduces steam consumption in reactor and lowers WHB costs
  - Steam/methane molar input ratio reduced to 0.2-0.4 from 0.6 for ATR
  - Regen-cooled POGT generates major fraction of plant steam
- Minimizes recycle of CO<sub>2</sub>-rich gas from downstream FT process and achieves H<sub>2</sub>/CO ratio without a water gas shift converter
- Generates substantial amounts of electrical power for plant operation and export

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