RTI Energy Technology Development Facility

Facility Overview

- 20 m x 18 m, 12.5 m peak height
- Covered storage areas
- Integrated stair and mezzanine system
- External control room
- Utilities:
  - Compressed air
  - Micro-bulk nitrogen
  - Micro-bulk CO_2
  - Low-pressure process steam
  - Flue-gas supply
  - Chilled water
  - 200 kW of 480 V power
  - Vent header/thermal oxidizer

Current Technology Uses

- Catalytic Biomass Pyrolysis
- Small-Scale Engine Reformer Technology
- Advanced Solid Sorbent-Based CO_2 Capture Process
- Carbon Capture with Non-Aqueous Solvents (NAS)
- High Operating Temperature Transfer and Storage (HOTTS) Process – Pilot Prototype System

RTI International's new Energy Technology Development Facility (ETDF) provides the physical space to demonstrate process technologies at the critical transition from bench to pilot scale. The facility is available as a user facility for commercial and government clients. RTI's highly trained staff of engineers, scientists, and project managers can help solve process development challenges from lab to pilot scale. Rigorous safety protocols guide all activities.

Current Technology Uses

Catalytic Biomass Pyrolysis

RTI has commissioned a catalytic biomass pyrolysis unit that converts one ton of biomass per day into a stable bio-crude that can be further processed using conventional refining technology. The highly instrumented system is based on a transport reactor design for continuous circulation of regenerated catalyst. A variety of prepared biomass feedstocks can be fed into the reactor using a robust double lock-hopper feeder system. Extensive parametric testing of process conditions, feedstocks, and catalysts can be used for gathering engineering data for technology scale-up and assessing the impact of bio-crude properties on the downstream upgrading step.

Small-Scale Engine Reformer Technology

RTI International, the Massachusetts Institute of Technology (MIT) and Columbia University have partnered to demonstrate the feasibility of utilizing an internal combustion engine as a syngas generator in conjunction with methanol production. The team has developed and is currently testing a engine based syngas generation system that can convert 50,000 scfd of natural gas to syngas. The tests include conversion of the syngas to methanol.

Small-Scale Engine Reformer

1 Ton/Day Biomass Pyrolysis Unit

RTI's Solid Sorbent CO_2 Capture Prototype System

RTI's Non-Aqueous Solvent CO_2 Capture Pilot Prototype System

High Operating Temperature Transfer and Storage (HOTTS)

1 Ton/Day Biomass Pyrolysis Unit Operations

- Operational since September 2013
- 4 Catalysts Tested
- 5 Feedstocks Tested
  - Loblolly Pine
  - Hybrid Poplar
  - Corn Stover
  - Hardwood Pellets
  - Red Oak
- Over 200-gal of loblolly pine bio-crude produced for upgrading

More Information

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Advanced Solid Sorbent-Based CO_2 Capture Process

RTI constructed and commissioned a pilot prototype of RTI's advanced solid sorbent-based CO_2 capture technology. This prototype system is intended to be a testing platform to advance our technical understanding of a fluidized-bed sorbent-based CO_2 capture process, building on the work already done on fixed-bed sorbent testing and reactor modeling. It is being used to collect and demonstrate critical performance metrics, including CO_2 capture efficiency, heat transfer efficiency, sorbent fluidizability and physical strength, as well as to determine the ideal operating conditions for optimal performance. Initial performance tests demonstrated that this pilot system is capable of stable, continuous operation achieving > 90% CO_2 removal efficiency.

Carbon Capture with Non-Aqueous Solvents (NAS)

To support development of RTI's novel NAS CO_2 capture technology, a pilot prototype system has been constructed and commissioned within RTI's ETDF. This is a versatile pilot unit that is used to evaluate the performance of CO_2 solvents and compare them to state-of-the-art aqueous amine solvents for the removal of CO_2 from a variety of simulated flue gases. The prototype unit has a conventional gas scrubbing process arrangement. It was designed to be a highly instrumented and controlled experimental system, capable of performing detailed evaluations of solvents and to operate for extended periods to support long-term performance evaluation and demonstrate the NAS process configuration.

High Operating Temperature Transfer and Storage (HOTTS) Process – Pilot Prototype System

In 2014, RTI constructed and commissioned a pilot-scale system for moving and storing high-quality heat which can be integrated into industrial processes. The HOTTS process contains a novel, particle-based heat transfer fluid that flows freely and can withstand temperatures exceeding 1100 °C. The pilot-scale unit has the capability of a mixed gas atmosphere and operating pressures above 100 psig to enhance heat transfer.

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