



# RTI Energy Technology Development Facility

## Facility Overview

- 13,000 sq ft with 8 bays for process skids (indoor or covered outdoor)
- Integrated stair and mezzanine system
- External control rooms and offline lab

## Utilities

- Compressed air
- Bulk CO<sub>2</sub> and nitrogen
- Bulk hydrogen via tube trailers
- Low-pressure process steam
- Flue gas supply
- Natural gas supply
- Chilled water
- Power available up to 480 V
- Enclosed flare and thermal oxidizer

## Core Process Units:

- Catalytic biomass pyrolysis
- Gas-to-liquids conversion unit
- Point-source carbon capture

## Facility Expansion (coming soon in 2025):

- 12,000 sq ft of additional covered bay space for pilot-scale demonstrations
- 3,000 sq ft of indoor workspace, labs and control rooms
- 1 MW of solar PV for renewables-to-X demonstrations

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

## Carbon Capture with Non-Aqueous Solvents (NAS)

RTI's bench-scale gas absorption system is a highly instrumented and controlled experimental system for detailed evaluation of CO<sub>2</sub> capture solvents using simulated or real (via RTI's fuel combustor) flue gas streams. The system has a conventional gas-scrubbing absorption tower and a rotating packed-bed unit. It is equipped with process measurement and control devices and uses constant-temperature, low-pressure steam for accurate and reliable mass and energy balances to support the measurement of the thermal energy consumed by the process unit. Numerous gas and liquid sampling ports monitor process operations and varying flue gas compositions over extended test campaigns.

## Fuel Combustion Unit

RTI's fuel combustion unit is capable of producing real flue gas (i.e., real combustion emissions) from solid and gaseous fuels ranging from coal and biomass to natural gas. The unit consists of a solid fuel feed hopper, combustor unit, gas blower, and feed piping that ties into various process units in the ETDF. Burner flue gas can be tailored to a range of CO<sub>2</sub> concentrations by supplementing with a CO<sub>2</sub> slip stream from the CO<sub>2</sub> capture unit or separate CO<sub>2</sub> dewar, or by diluting with air to simulate specific operating conditions of interest. The combustor produces fuel-derived flue gas up to 500 liters/minute.



Biomass pyrolysis unit

Bench-scale gas absorption unit

Fuel combustion shed

Enclosed flare stack

## Gas-to-Liquids (GTL)

RTI's GTL capabilities include a Fischer-Tropsch (FT) process unit capable of converting syngas (a mixture of carbon monoxide and hydrogen) to synthetic crude for sustainable aviation fuel (SAF) production and can also be configured for methanol production. RTI has successfully integrated several syngas production technologies including internal combustion engine-based methane conversion, a photocatalytic CO<sub>2</sub> reformer, and an electric reverse water gas shift system and demonstrated methanol and SAF production.



Gas-to-liquids process unit

## Catalytic Biomass Pyrolysis

RTI's catalytic biomass pyrolysis unit converts 1 ton of biomass per day into a stable biocrude that can be further processed using conventional refining technology. The highly instrumented system is a circulating fluidized bed reactor with continuous catalyst regeneration. A variety of prepared biomass feedstocks can be fed into the reactor using a hopper feeder system. Extensive parametric testing of process conditions, feedstocks, and catalysts can be used for gathering engineering data for technology scale-up. The impact of biocrude properties on downstream upgraded products such as renewable diesel, sustainable aviation fuels, and specialty chemicals can also be assessed.

### 1 Ton/Day Biomass Pyrolysis Unit Operations

- Operational since September 2013
- 4 Catalysts tested
- Feedstocks tested
  - Loblolly pine
  - Douglas fir
  - Hybrid poplar
  - Corn stover
  - Hardwood pellets
  - Red oak
  - Surrogate biosolids
- Over 200 gallons of loblolly pine biocrude produced for upgrading

### Products Produced

- Renewable diesel
- Sustainable aviation fuel
- Intermediates and specialty chemicals
- Polymers and solid products

*RTI will open a new 15,000 sq ft expansion building in fall of 2025. Located next to the original lab, the expansion building will include 12,000 sq ft of additional process bay space and 3,000 sq ft of indoor, climate-controlled workspace, offline lab and control rooms. The new facility will also be adjacent to a planned solar field for demonstration of energy processes powered by renewable energy.*



## More Information

Marty Lail  
[mlail@rti.org](mailto:mlail@rti.org)

Sameer Parvathikar  
[sparvathikar@rti.org](mailto:sparvathikar@rti.org)

RTI International  
3040 E. Cornwallis Road,  
PO Box 12194  
Research Triangle Park, NC 27709-2194  
USA

[www.rti.org](http://www.rti.org)

RTI International is an independent, nonprofit research institute dedicated to improving the human condition. Clients rely on us to answer questions that demand an objective and multidisciplinary approach—one that integrates expertise across the social and laboratory sciences, engineering, and international development. We believe in the promise of science, and we are inspired every day to deliver on that promise for the good of people, communities, and businesses around the world. For more information, visit [www.rti.org](http://www.rti.org).

RTI International is a trade name of Research Triangle Institute. RTI and the RTI logo are U.S. registered trademarks of Research Triangle Institute.  
RTI 8582 R7 0924