

Energy Technology R&D and Services at RTI International

RTI develops advanced process technologies in partnership with leaders in the energy sector

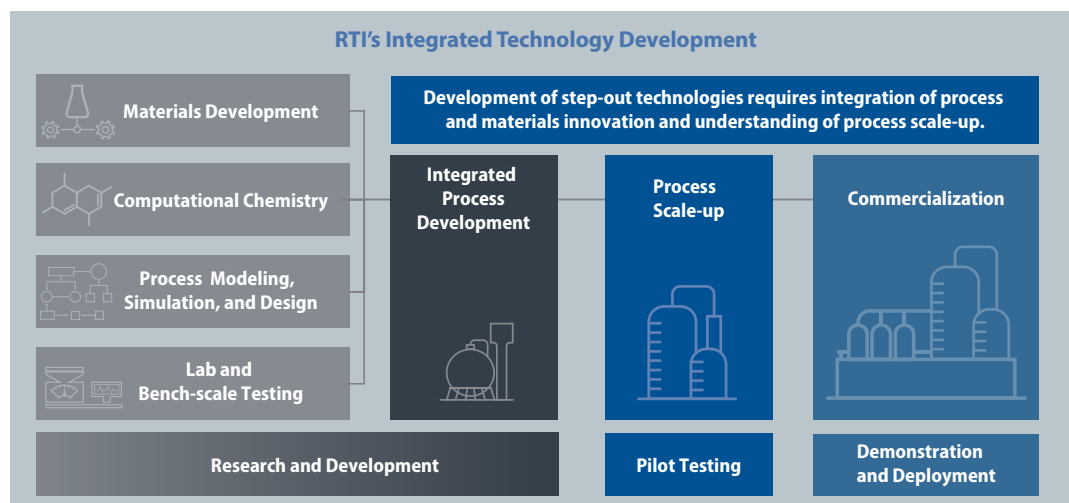
- Full alignment with industry objectives
- Concept to demonstration
- Defined commercialization pathways
- Flexible intellectual property arrangements
- Leveraging government R&D funding with industry-focused development

RTI'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.

What We Do

RTI International develops innovative process technologies in the areas of CO₂ capture and utilization, gas and biomass conversion to liquids (fuels, chemicals), industrial water treatment and resource recovery for industrial and government clients. Our research and development supports national and worldwide goals of reliable, sustainable, economically viable, and secure energy supplies.

Our engineering team offers end-to-end capabilities to help our clients design, develop, evaluate, integrate, scale, and demonstrate new energy technologies through rigorous and objective approaches that accelerate new technology development to market opportunities.



Our engineers and scientists address some of the most challenging energy-related problems faced by the chemical, petrochemical, manufacturing, gas processing, and transportation fuel and electric power industries. Whether we are designing pilot-scale technology demonstration systems or conducting laboratory-scale reactor testing on innovative catalysts, RTI engineers and scientists perform applied R&D to deliver high-quality results and add value for our clients.

Energy Technology Innovation

Carbon Capture, Utilization, and Conversion

- Power and industrial applications
- CO₂ utilization for chemicals production
- Direct air capture
- Blue hydrogen

Biomass Conversion

- Catalytic and reactive fast pyrolysis
- Biocrude fractionation and upgrading
- Renewable diesel and sustainable aviation fuel
- Bioproducts such as specialty chemicals, polymers, and natural fibers

Energy Storage, Fuels and Chemicals Production

- Sector coupling using hydrogen and ammonia for long-duration energy storage and agriculture
- Modular production technologies for sustainable aviation fuels, methanol, and ammonia
- Fischer-Tropsch production for gas to liquids conversion
- Syngas cleaning, conversion and utilization
- Distributed natural gas and biogas conversion to syngas
- Process electrification

Advanced Materials

- Catalyst, sorbent, and membrane development
- Advanced characterization and scale-up
- Metal-organic framework synthesis and applications
- Advanced coatings and encapsulation development
- Core competence in fixed and fluidized bed materials

Wastewater Treatment and Resource Recovery

- Technologies to treat contaminants in water (PFAS, heavy metals)
- Rare earth elements and energy resource recovery
- Anti-biofouling/corrosion technology
- Anaerobic membrane bioreactor technology
- Greenhouse gas emissions control



Our Services

Materials Development

Catalysts and Sorbents

- Novel formulation and surface chemistries
- Metal organic frameworks synthesis and application-specific engineered forms
- Comprehensive screening and characterization tools
- Advanced coating and encapsulation methods
- Spray dried particles and extruded materials
- Scale-up with commercial catalyst suppliers

Membranes

- Novel formulations and testing for water treatment applications

CO₂ Solvents

- Solvent screening
- Comprehensive vapor-liquid equilibrium and reaction calorimetry capabilities
- Scale-up to ton quantities with network of manufacturers

Process Modeling, Simulation, and Design

Aspen Plus, HYSYS, and ProMax

- Heat and material balances
- Design specifications
- Sensitivity analyses and process optimization

Preliminary Design Packages

- Mechanical design and 3D modeling
- Equipment and system design

Techno-Economic Analyses and Life Cycle Analysis

- Industry standard tools
- Consistency with established federal baselines
- Third-party verification with industry partners

Process Development and Design

Strong competencies in developing, designing, constructing, and operating bench- and pilot-scale systems for novel applications

- Absorption towers for CO₂ capture
- Regenerative units for high efficiency and low energy
- Rotating packed beds
- Fixed and fluidized sorbent beds
- Novel reactor designs
- Life cycle testing under real flue gas conditions
- Emissions profiling
- Carbon capture measurement from real flue gas combustion unit

Available reactor systems operate over wide ranges of pressures, temperatures, and gas flows with real and simulated feed gas mixtures representative of actual commercial operation

Scale-up and Implementation

RTI works with industry partners to perform engineering-scale design and testing as the final development step before the technology is ready for commercial deployment

- Bench- to pilot-scale process design, construction, and testing
- Basic engineering design packages
- Partnerships with toll manufacturers and engineering, procurement, and construction (EPC) firms
- Technical consulting and large-scale project management

Unique Facilities

over 30,000 square feet of laboratory space dedicated to advanced technology development on RTI's main campus in Research Triangle Park, North Carolina, is often used for co-research projects with industry partners or testing and evaluation services.

- Over 17,000 square feet of analytical and materials chemistry laboratories and high bay process development laboratories
- 13,000-square-foot pilot development facility, which includes customizable and expandable process bays

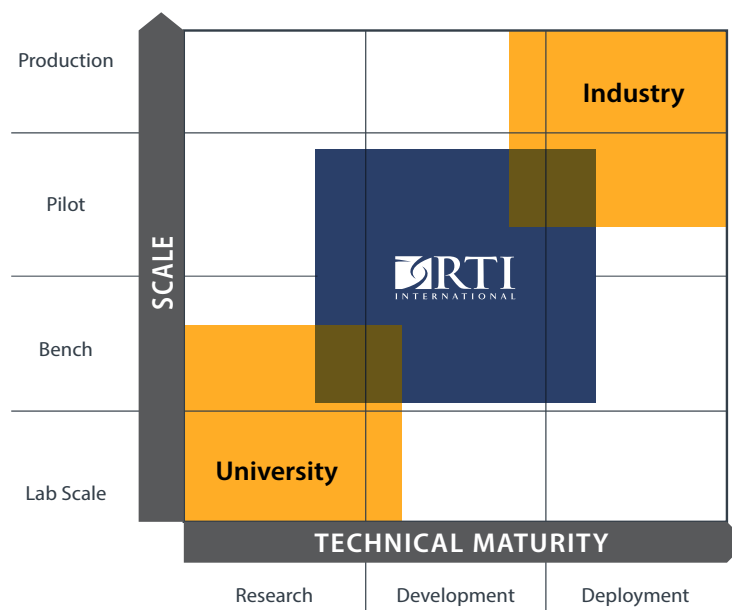


Process Scale-up

We adapt our technology licensing approach to meet the specific needs and strategies of our clients.

How We Do Business

RTI develops advanced process technologies, from concept to large-scale demonstration, in partnership with leaders in energy.



Doing Business with RTI

Through decades of advanced energy R&D, RTI has developed extensive capabilities, expertise, and a track record of moving technologies from concept to large-scale demonstration. We leverage government funding to fuel our technology innovation pipeline and cooperate with universities and industry partners in all stages of technology development to accelerate commercial deployment. RTI is responsive to our clients' needs while maintaining a focus on energy technology areas that align with our core competencies and capabilities to provide the most efficient and cost-effective R&D services possible.

More Information

Marty Lail, Senior Director Decarbonization
Sciences; mlail@rti.org

Sameer Parvathikar, Senior Director,
Sustainable Energy Solutions;
sparvathikar@rti.org

Dave Dayton, Senior Fellow, Director of Biofuels; ddayton@rti.org

Mustapha Soukri, Director Materials and Environment; msoukri@rti.org

www.rti.org/energy

RTI International is an independent, scientific research institute dedicated to improving the human condition. Our vision is to address the world's most critical problems with technical and science-based solutions in pursuit of a better future. Clients rely on us to answer questions that demand an objective and multidisciplinary approach—one that integrates expertise across social, statistical, data, and laboratory sciences, engineering, and other technical disciplines to solve the world's most challenging problems. For more information, visit www.rti.org.

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