RTI INTERNATIONAL

How we work with the U.S. Department of Energy

Solutions for a clean and just energy transition using cutting-edge technologies, the best available data and science, and effective and equitable policies.

As a trusted partner to the U.S. Department of Energy (DOE), our team uses science- and technology-based solutions to catalyze the transformation of the nation's energy systems. RTI International has supported DOE offices on over 130 projects with a combined value of more than $353 million—much of the work centers on clean energy technology such as biofuels, carbon capture, carbon dioxide utilization, and green ammonia. With more than 60 years of experience, our researchers are at the forefront of improving the human condition. We're helping to solve energy and environmental issues to ensure a sustainable and equitable future for all.

Our Expertise

Clean Energy Research

Delivering high-quality research and development (R&D) using cutting-edge laboratories and scale-up facilities. We advance clean energy technologies from ideation to pilot scale to commercialized systems. Our research, development and engineering capabilities spans advanced materials; carbon capture and conversion; biomass pyrolysis and biocrude upgrading; renewable energy storage; blue and green chemicals production; advanced materials; and wastewater treatment.

Energy Modeling and Optimization

Providing insights using modeling tools and forecasting systems for hydropower generation, integration of renewable energy onto the grid, grid resilience, and economic impacts. We deliver solutions to:

- evaluate tradeoffs between environmental impacts and grid needs to support Federal Energy Regulatory Commission relicensing and other policy evaluations;
- demonstrate the representation of hydropower in grid models, as hydropower can be a significant source of flexibility for energy systems;
- and optimize the value of hydropower to the energy system by looking at pumped storage operations, improvements to operational management, and the impacts from implementing other optimization projects.

Energy Use and Demand-Side Management

Improving the understanding of energy use using demand-side management principles to close the gap between energy demands and supplies. From data collection to program design, implementation, and verification, our services include scientifically rigorous surveys, analytical methods, economic analyses, process engineering, and technology development.

Technologies, Services, and Capabilities

Technology Development, Testing and Scale-up

- Carbon capture and utilization to mitigate greenhouse gas emissions
- Biomass conversion to transportation fuels and chemicals
- Energy efficiency to reduce use and peak demands
- Renewable energy storage and sector coupling
- Natural gas conversion
- Industrial wastewater treatment
- Synthesis gas (syngas) processing into fuels
- Materials development, including catalysts, adsorbents, membranes, and acid-gas solvents

Analysis & Modeling Services

- Electricity generation
- Hydrologic risk
- Consumer preferences
- Cost-benefit and cost-effectiveness
- Econometrics and economy-wide modeling
- Geospatial analyses and data visualizations
- Land use modeling (e.g., biofuel production)
- Techno-economic analyses
- Life-cycle analysis
- Energy process design, optimization and simulation
- Vulnerability assessments

Data Collection

- Surveys
- Expert elicitations
- Focus groups
- In-depth interviews
- Observation studies

Program & Policy Evaluation

- Formative research
- Process evaluation
- Outcome and impact evaluation

Other Capabilities

- Communication science (e.g., dissemination, risk communication, decision support, behavior change)
- Community benefits planning; Justice40; Diversity, Equity, Inclusion, and Accessibility; and workforce development
- Equity-centered research (e.g., community-based participatory research, community impacts and benefits analysis)
- Machine learning and artificial intelligence
- Systematic and scoping reviews
- Scientific peer reviews
- Virtual reality and web-based training and education

Experience

Advanced Research Projects Agency–Energy

Next-Generation Ammonia System Integration Utilizing Intermittent Renewable Power

RTI developed an innovative ammonia synthesis system that can operate at lower temperatures and pressures than previously established technologies. The Next-Generation System integrates ammonia production and utilization with stable grid electricity and intermittent wind and solar energy. Deployment of modular technologies will provide an opportunity to decarbonize ammonia production.

Office of Energy Efficiency and Renewable Energy

Integrated Separations to Improve Biocrude Recovery for Biofuels and Bioproducts

We developed an advanced biofuels technology that integrates catalytic biomass pyrolysis and hydrotreating to produce advanced hydrocarbon biofuels and high-value chemicals. This project addressed technical issues across the entire value chain from feedstock, through conversion, to biofuels and bioproducts. The project demonstrated the technical feasibility of producing biofuel at a minimum selling price of $2.50/gasoline gallon equivalent by 2030 when supplemented by the recovery of higher value bioproducts.

Research & Development (R&D) Impact Analysis and Evaluation Guide

We support EERE in analyzing the social return on investment in R&D programs, including solar, geothermal, vehicle technologies, building technologies, and battery technologies. The guide helps users with impact assessments and identification of best practices and lessons learned to guide future initiatives.

Intensified Water-Lean Solvent Carbon Dioxide (CO_2) Capture System for Cement Flue Gas

We are working with a cement manufacturer in California and other partners to pilot test of RTI's non-aqueous solvent for CO_2 capture using actual flue gas from the cement kiln at 1 ton per day capacity.

Energy Information Administration

Residential Energy Consumption Survey (RECS)

For the 2015 and 2020 RECS, our researchers supported EIA with the data collection and analysis methods necessary to provide up-to-date household energy use statistics that are foundational to estimating energy costs, meeting future energy demands, and improving energy efficiency.

Motor Gasoline and On-Highway Diesel Fuel Price Surveys

We support EIA with a comprehensive survey program that produces accurate, reliable, and timely information about the average cost of gasoline and diesel fuel in the US and various regional levels. Data are collected and published on the same day each week.

Office of Fossil Energy and Carbon Management

Syngas Clean-up Demonstration

RTI installed a 50 MW demonstration-scale application of warm synthesis gas (syngas) desulfurization process technology at Tampa Electric's Polk Power Station in Florida. RTI's technology removes contaminants such as sulfur and heavy metals at warm process temperatures, eliminating the need for substantial syngas cooling and expensive heat recovery systems.

Bench-Scale Testing of Optimized Direct Air Capture (DAC) Integrated Processes

We collaborated with partners to design, build, and test an integrated bench-scale contactor process for continuous direct air capture of CO_2. The goal of the bench-scale project was to address key technical challenges and advance the technology readiness level (TRL) to TRL-5, while also determining economic feasibility.

National Energy Technology Laboratory

NETL and FECM: Transformational Non-Aqueous Solvent-Based Carbon Dioxide Capture Process at Technology Centre Mongstad (TCM), Norway

RTI and its partners advanced a transformational water-lean solvent-based post-combustion CO_2 capture technology by performing engineering-scale testing using an existing large-scale pilot amine plant at TCM. RTI's process was tested successfully at laboratory, bench, and small pilot scales, showing a 40 percent reduction in solvent regeneration energy requirements, as well as lower thermal and oxidative solvent degradation rates compared with the conventional monoethanolamine process.

Carbon Capture Plant Front-End Engineering Design (FEED) Study for Cement Manufacturing

We are working with a cement manufacturer in Texas and other partners to perform a FEED study for carbon dioxide capture from cement flue gas by using non-aqueous solvent with 95% carbon dioxide capture efficiency.

National Renewable Energy Laboratory

Deployment of Algal/Advanced Biofuels

RTI worked with a consortium to develop a hydropyrolysis process to convert algal biomass into hydrocarbon fuels that can be used to power transportation. The work involved laboratory-scale reactors used to identify robust, active catalysts and optimal process conditions for minimizing the oxygen content of the liquid fuel product.

Improving the Representation of Hydropower in Grid Operations Modeling

We improved representation of hydropower availability in production cost models. The developed method couples river basin and reservoir simulation models into NREL's production cost model, allowing integration of hydrologic forecasts and operational constraints to set realistic, site-specific hydropower limits in production cost models. RTI subsequently developed a tool for ORNL to assess tradeoffs between grid needs and environmental impacts under current and future climate conditions.

Offices We Serve

- **Headquarter offices**
  - Advanced Research Projects Agency - Energy (ARPA-E)
  - Energy Efficiency and Renewable Energy (EERE)
  - Energy Information Administration (EIA)
  - Fossil Energy and Carbon Management (FECM)
  - Office of Science (SC)
- **National laboratories**
  - Idaho National Laboratory (INL)
  - Lawrence Berkley National Laboratory (LBML)
  - National Energy Technology Laboratory (NETL)
  - National Renewable Energy Laboratory (NREL)
  - Oak Ridge National Laboratory (ORNL)

Contract Vehicles & GSA Schedules

- **Energy Information Administration Omnibus Procurement IV (EOPIV) [subcontractor]**
- **GSA Multiple Award Schedule [Prime]**
- **OASIS Pool 1 [Prime]**
- **OASIS Pool 2: Social Sciences [Prime]**
- **OASIS Pool 4 [Prime]**

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