

### Project Summary

<b>Project Title:</b>	R-GAS™ Advanced Gasification Pre-Pilot Demonstration for Biofuels (BioRGAS)
<b>Principal Investigator/ Project Director:</b>	Dr. Pedro Ortiz-Toral
<b>Name of Applicant:</b>	Gas Technology Institute (GTI)
<b>Solicitation Number:</b>	DE-FOA-00023961 (Area of Interest 1a)

**Objectives:** The R-GAS™ Advanced Gasification Pre-Pilot Demonstration for Biofuels (BioRGAS) project will demonstrate that aviation fuel, diesel, or marine fuel can be produced at commercial scale from biomass and sorted municipal solid waste (SMSW) for less than \$2.75 per Gallon of Gasoline Equivalent (GGE), and with a reduction in greenhouse gas (GHG) emissions of greater than 70% over the petroleum derived equivalent. The proposed pathway is R-GAS™ entrained flow gasification followed by Fischer-Tropsch synthesis of fuels from the resulting syngas. The project will demonstrate the feed and gasification units of this entrained flow gasification pathway at a 6 standard ton per day (STPD) scale. The objective of Budget Period (BP) 1 is to independently verify the proposed technical and programmatic baseline plans to successfully meet the topic area metrics. The objective of BP2 is to select a maximum of 3 types of biomass and/or SMSW, with associated pre-processing, for integrated feed system/gasification demonstration testing in BP3, from up to 8 candidate feedstock/pre-processing combinations and evaluation in our flow system. The final BP3 objective is to complete a cumulative total of at least 500 hours of gasifier operation, with at least one 100-hour of a continuous run and satisfy the overall project objectives by completing commercial scale techno-economic analysis and lifecycle analysis.

**Methods to be employed:** GTI has selected a low risk work plan that involves an informed decision process on selection of economical and viable feedstock selection and preparation technologies. We have in-house tools including economic models, Aspen plus process modeling with capital cost estimation, internal capital cost databases, and GREET lifecycle analysis software to perform the analysis required to make these decisions. The biomass and SMSW processing methods to be evaluated are torrefaction, steam explosion, and non-thermal drying and pulverization. GTI has the pilot scale ultra-dense phase pneumatic conveying equipment, gasification hardware, and the necessary utilities and auxiliary equipment to process and dispose of the syngas. This will be leveraged for the proposed flow evaluation and gasification testing. Data acquired during these tests will be used for scale up modeling and a detailed techno-economic and lifecycle analysis on a commercial plant.

**Benefits and outcomes:** The primary benefit is the development of technology will enable low cost sustainable and low environmental impact biofuels production. Our plant cost benefits include reduction in equipment sizing, eliminating the refractory lining, and eliminating the requirement for tar reformers because the high reactor temperatures do not allow tar formation. Our diversity and inclusion plan has identified the benefits of the program to include developing technology that will be developed and deployed in rural area with high poverty rates, bringing well-paying jobs and clean technology to these under-represented communities.

**Major participants:**

GTI, Ekamore, and Idaho National Laboratories