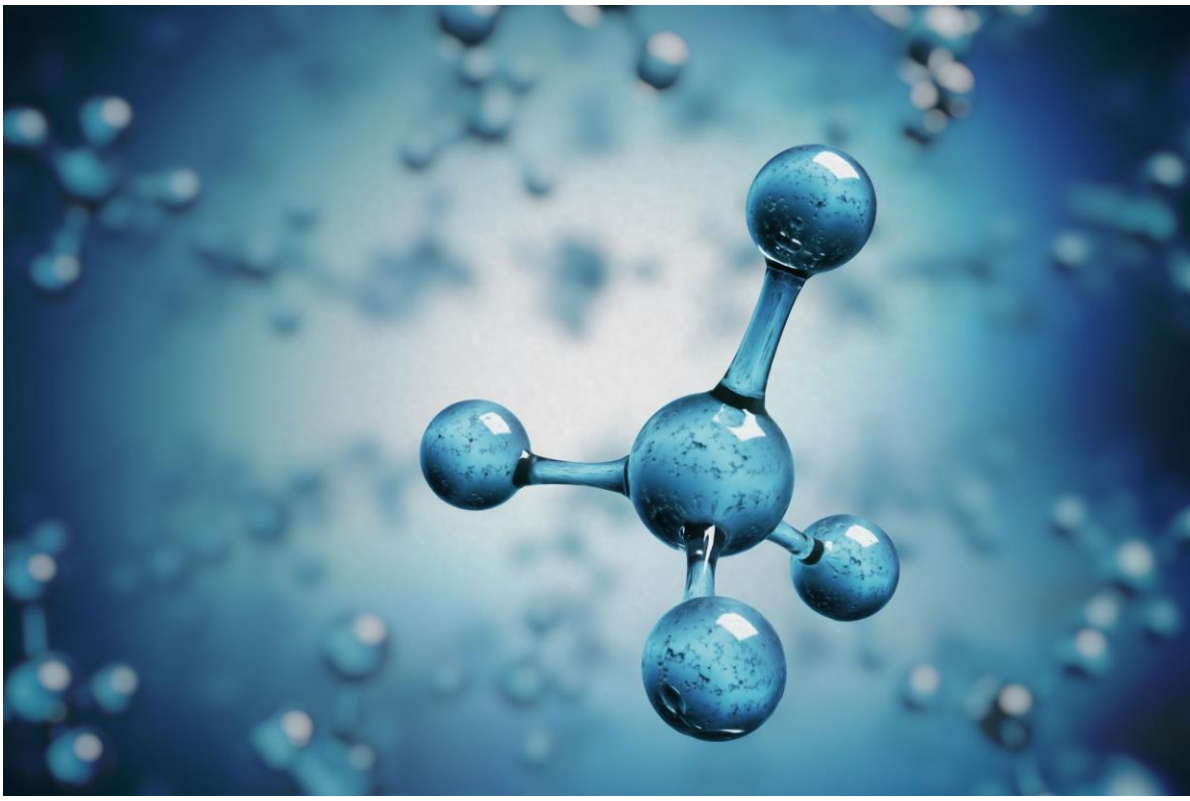
NYSEARCH Spotlight

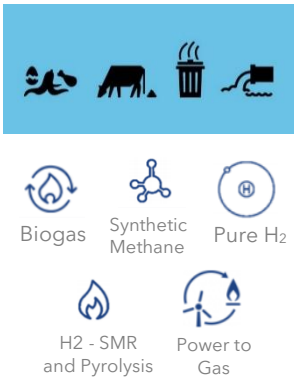
March 2021
Issue 9

Dedicated to serving its utility member companies with focus on natural gas RD&D, technology development & commercialization, and joint industry collaboration

INSIDE



Decarbonization R&D road-mapping

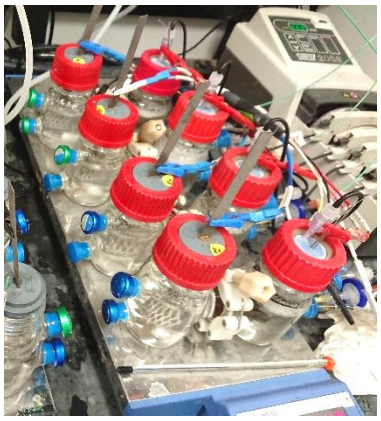


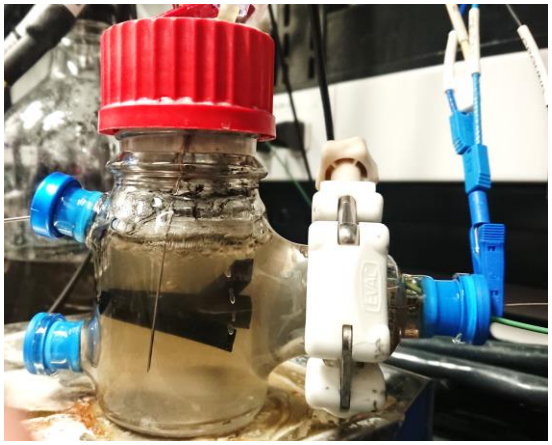
Amidst the core R&D work at NYSEARCH, a new roadmap has been in the works since May 2020 to address the growing interest, regulations, and R&D gaps for decarbonization of the natural gas industry.

Following the successful Decarbonization Workshop with several members and RNG-focused SME's in May 2020, along with additional subgroup meetings, a strategic roadmap has been developed outlining traditional RNG and blended H_2 R&D projects.

Currently, NYSEARCH has seven active projects addressing some of today's known RNG and H_2 gaps with more projects being developed. As NYSEARCH continues to expand the Decarbonization Roadmap, collaboration and collective member feedback will be vital to define and pursue the highest impact R&D for this rapidly progressing program.

This newsletter issue highlights a handful of active and developing NYSEARCH projects focused on Decarbonization.





Ideal microbial strain identified for Power-to-Gas intermittency study

Power-to-Gas pathways to decarbonization provide a solution to use excess renewable electricity being generated along with the current natural gas infrastructure for producing and storing methane.

The goal of this study is to evaluate microbial electromethanogenesis as a viable method for power-to-gas operations specifically evaluating the chemical and biological changes associated with intermittency.

Grid intermittency needed to be further investigated to understand the performance of microbes under electron starvation periods. In a comparative test, *M. maripaludis*, revealed itself as the most promising microbe for further intermittency studies. *M. maripaludis* showed fast recovery times after current interruptions and the recovery of methane production was found to be independent of protein expression and cell growth. This microbial strain will be used in further testing.

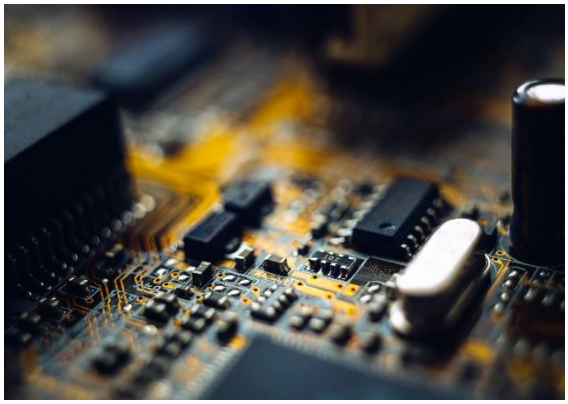
Impact of siloxanes on end-use appliances testing continues

An identified gap from collective state-of-the-art analyses indicates that RNG quality is a high priority gap specifically understanding the effects of siloxanes.

The objective of this project is to determine the limit of siloxanes that will preclude significant safety, reliability, performance, and maintenance impacts on end-use appliances in the US and Canada.

A first round of appliance testing using a high concentration of siloxanes (~12 mg Si/m^3) has been completed. No significant performance changes were noted in this first round of testing. Several maintenance issues did arise on the tankless water heaters and the parts were serviced and re-installed for continued testing.

The next round of testing will test at a lower concentration of siloxanes.



Identifying and developing a Siloxane Analyzer

RNG quality is a high priority gap specifically understanding the effects of siloxanes. To fully understand effect, we need to know how much siloxanes are in the system.

NYSEARCH developed an evaluation program to identify siloxane analyzers that best meet the needs of members and further develop that analyzer to specifically meet all requirements to measure siloxanes accurately and reliably.

Testing is currently delayed due to logistical challenges caused by the COVID-19 pandemic.

Evaluating hydrogen blend impacts on elastomers

Understanding impacts to the integrity of gas infrastructure is another high priority in decarbonization research. Building from a previous NYSEARCH/GTI program evaluating elastomers in varying gas compositions, a program to evaluate effects of hydrogen blends has been established.

The objective of this project with GTI is to determine to what degree, if any, blending hydrogen into a fuel gas will change the physical properties of elastomers used as materials of construction in a natural gas delivery system.

Baseline testing was first completed to compare results from exposure to hydrogen blends. Testing on NBR (high density rubber) and SBR (medium density rubber) samples after exposures to 5% and 20% hydrogen blends is completed. Material physical changes are currently being evaluated such as shrinking, swelling, creep, and stress relaxation.

Projects in early stages or being developed

These projects listed below are in early stages of work and/or being developed to meet the R&D roadmap milestones established for NYSEARCH.

- **Study Impact of Trace Constituents in RNG on Natural Gas Grids and Consumer Appliances –** This study will evaluate impact of trace constituents in RNG/NG on gas infrastructure and consumer appliances.
- **Study of Natural Gas Dispersion with Blended Hydrogen in Residential Structures –** A study to examine the physics of hydrogen dispersion when blended with natural gas.
- **Odor Detection for Blended Hydrogen** – A program to determine impact of 1% to 20% hydrogen blends on odor detection thresholds of specific mercaptans. Same test methodology from original Odor Detection Threshold Study will be applied.
- **Living Lab for Blended Hydrogen –** A living lab would provide means of a rigorous pilot test to evaluate the impacts of blended hydrogen to both infrastructure and end-use residential appliances. Furthermore, the results and lessons learned from the living lab would inform subsequent demonstrations including an isolated mixed plastic and steel natural gas distribution system and an isolated steel pipeline demonstration.