mesa·az

June 25, 2018

Energy, Efficiency and Renewable Energy (EERE)
U.S. Department of Energy
Efficient Carbon Utilization in Algal Systems, DE-FOA-0001908

Dear Review Panel,

The City of Mesa (COM) is pleased to express its commitment to the "Membrane Carbonation for 100% Efficient Delivery of Industrial CO_2 Gases" proposal, led by Arizona State University (ASU). COM has a long-standing collaboration with ASU and principal investigator, Dr. Bruce Rittmann, including projects to convert food waste into energy. COM is motivated to find economically viable and environmentally sustainable uses for the biogas produced from our anaerobic digesters (AD). Our northwest water reclamation plant has two AD system that generate 68 million standard cubic feet (68 MMSCF) of biogas annually, has adjacent space, power and resources for accommodating onsite algae cultivation, and is conveniently located just 4 miles east of Dr. Rittmann's labs at the ASU Tempe campus. Currently biogas is used to run an onsite generator during peak electrical load periods for peak shaving, but otherwise is flared, so there is great interest from the COM to utilize the biogas to turn this waste product into a value stream and to help reach the city's sustainability goals. The northwest plant site also gets lots of visibility being in close proximity to the Chicago Cubs spring training facility, major freeway's (101 and 202) and planned office space, so there is significant potential for promoting COMs partnership with ASU to provide innovative solutions to the city's needs. Further, the COM is pleased to support work that takes places within the city as will be done with the proposed outdoor experiments at the ASU polytechnic campus located in Mesa.

Cultivating microalgae onsite at our wastewater treatment facilities has the potential to have great synergy because **1)** we produce significant quantities of reclaimed water suitable for cultivating algae, **2)** the centrate from our AD systems can provide critical nutrients for microalgae, including nitrogen and phosphorus, **3)** the generated algae biomass is a valuable carbon source that could be used to address carbon deficiency in our liquid phase processing, which currently requires adding significant quantities of methanol, which is both hazardous and costly, **4)** algae biomass can be processed and sold as liquid fuels and products, and yield biogas with increased methane content that will **4)** increase the efficiency of our onsite power generation systems and **5)** may be suitable for delivering pipeline-quality natural gas, each of which have significant economic and ecological value. Each of these value streams gives COM significant enthusiasm for this project.

This project has generated significant interest across several divisions at COM including **1)** Scott Bouchie, Director of Environmental Management and Sustainability, to help the city meet its sustainability goals, **2)** Jake West, Director of Water Resources, to help make its wastewater

mesa·az

treatment processes more efficient, and **3)** Frank McRae, Director of Energy Resources, to explore energy revenue opportunities from the biomass and methane produced. Together we commit participation from our divisions to advance the goals of the research project in the following ways throughout the course of the 36-month project:

1. **Provide data regarding biogas production and wastewater treatment**. COM commits 16 hours per year for 3 team members to provide the ASU team with biogas production data, wastewater treatment data and other data to facilitate techno-economic and life cycle analysis of the CO_2 delivery technology and feasibility for co-locating microalgae cultivation within COM wastewater treatment and AD facilities.
2. **Research feedback and biannual meetings with ASU**. COM commits 24 hours of time for 4 team members twice per year to review progress reports prepared by the ASU team and attend meetings with ASU and provide a perspective of large-scale wastewater treatment and AD biogas production.
3. **Analyze uses of onsite carbon sources**. COM commits 20 hours per year from 3 people to analyze how the biomass generated onsite could be utilized beneficially within our wastewater treatment and energy production processes.
4. **Biogas samples and storage containers**. COM commits 20 hours per year of time from an operator and to provide the ASU team access to retrieve at least 55,000 L of biogas for testing at ASU, including compressing the biogas from 80 psig as stored at our COM facility up to 200 psig for transport to ASU facilities.

The above resources will be provided to the project as in-kind contributions toward the project's cost share requirements, with an estimated value of $22,392. We look forward to working with the ASU team toward making a huge step forward in realizing economically viable and environmentally sustainable uses for biogas and microalgae.

Sincerely,

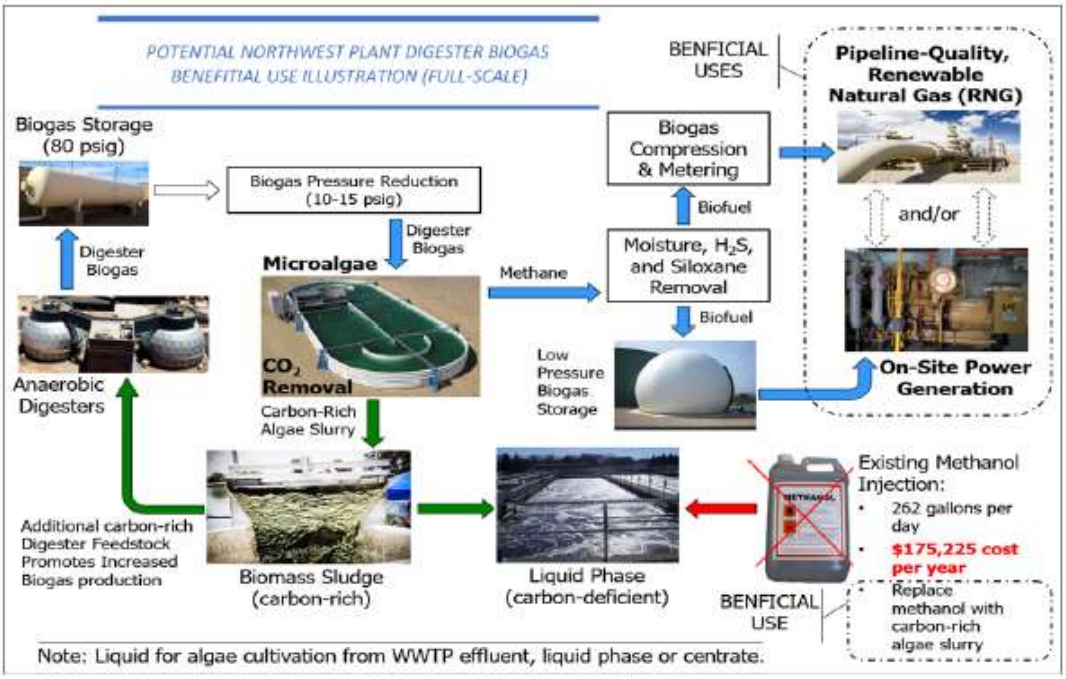
FOR JAKE WEST

Scott Bouchie
Director, Environmental Management and Sustainability Department
City of Mesa, Arizona
730 N Mesa Drive, Mesa, AZ
(480) 644-4366
Scott.Bouchie@mesaaz.gov

Jake West
Director, Water Resources Department
City of Mesa, Arizona
640 N Mesa Drive, Mesa, AZ
(480) 644-3371
Jake.West@mesaaz.gov

Frank McRae
Director, Energy Resources Department
City of Mesa, Arizona
640 N Mesa Drive, Mesa, AZ
(480) 644-2273
Frank.McRae@mesaaz.gov

Northwest Plant CO_2 Capture to Algae Cultivation > Beneficial Uses



1. Renewable Natural Gas Revenue.
2. Eliminate use of Methanol.
3. Additional carbon-rich digester feedstock for increased biogas production.

Northwest Plant CO^2 Capture to Algae Cultivation Potential (Full-Scale)