Summary for Public Release

Renewable Power-to-Gas: A
Technical Feasibility and Market Demonstration of Biomethanation as a
Means for Biogas Upgrading and Renewable Natural Gas Production

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Summit Utilities, with funding from the U.S. Department of Energy's Bioenergy Technologies Office, and in concert with the National Renewable Energy Laboratory (NREL), Electrochaea, Plug Power, and Southern California Gas Company (SoCalGas), proposes to develop and deploy a next-generation pilot-scale Power-to-Gas solution. The project aims to assess the technical feasibility of coupling renewable hydrogen production and a biomethanation process, utilizing a stream of biogas from an anaerobic digester processing dairy manure in Clinton, Maine. The resulting product methane, called renewable natural gas (RNG), will be injected into Summit's common carrier natural gas pipeline system. The project will achieve the strict gas quality specifications for pipeline injection and work with accreditors to qualify this process for participation in carbon markets.

In 2019, SoCalGas worked with NREL and Electrochaea with funding from the Department of Energy to install and commission a first-of-its-kind high-pressure bioreactor system at NREL's campus in Golden, Colorado. There, researchers operated the system to validate the two-step process, where hydrogen produced by an electrolyzer from PlugPower was combined with carbon dioxide in a bioreactor containing Electrochaea's proprietary micro-organisms to produce greater than 97% methane in the product gas. Summit plans to incorporate innovations developed at NREL to help reduce the cost of RNG produced from the dairy digester by 25% below competing gas separation technologies and demonstrate 1,000 hours of continuous operation, helping to de-risk the technologies and accelerate commercialization.

The success of Summit's project will serve as a roadmap to future Power-to-Gas development by proving the efficacy and carbon intensity of using biomethanation on raw dairy biogas, test capital and operational efficiencies, and utilize field data to open downstream commercial markets. Outputs from the research project will inform the feasibility of utility-scale RNG production via biomethanation in the U.S., illustrating a path for biomethanation technology to move from demonstration to a scale that can compete with gas upgraded through separations technology. Biological RNG production from recycled carbon dioxide and renewable hydrogen production via electrolysis holds the potential to store low-cost or otherwise curtailed renewable electricity in the existing and expansive natural gas network, using the existing infrastructure for the transmission and storage of renewable energy.