# Optimal Pathways to Achieve Climate Goals – Inclusion of a Renewable Gas Standard

Prepared by: Center for Renewable Natural Gas
Center for Environmental Research & Technology (CE-CERT)
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Corresponding author: Arun S.K. Raju, Ph.D., arun@engr.ucr.edu; +1-951-781-5686

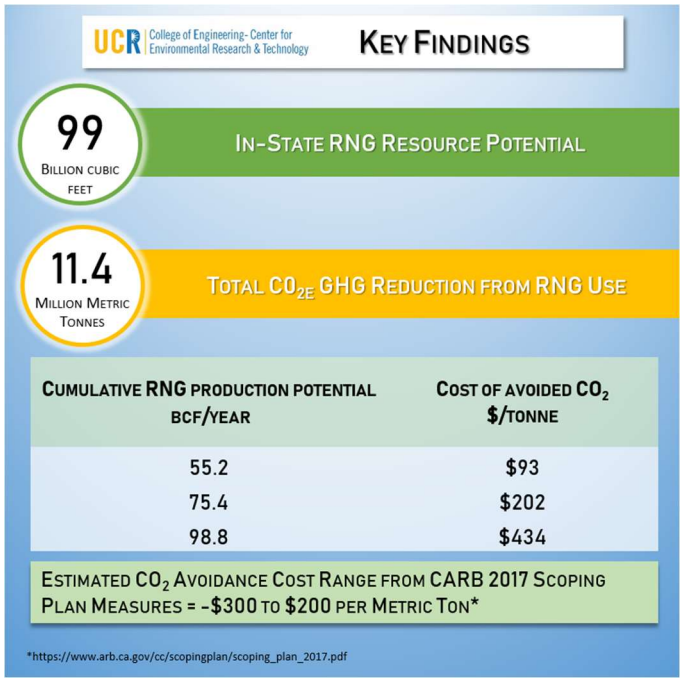
## Executive Brief

There is broad scientific consensus that current Greenhouse Gas (GHG) emission and global surface temperature warming trends demonstrate the need for rapid and significant mitigation of net GHG emissions to the atmosphere. In response, many jurisdictions have aggressively focused on decarbonizing the electricity sector, and significant progress has been achieved in the past two decades. Technology availability and infrastructure compatibility and other factors have played an important role in the ongoing transformation of the electric grid. However, the progress is not easily replicated in other sectors. Continued replacement of fossil energy sources with carbon neutral resources in all the major sectors must occur to achieve California's GHG reduction targets. This effort must also take into account the effects on energy security, cost effectiveness and criteria and air toxic pollutant emissions (local air pollutant emissions). Achieving these complex and sometimes divergent goals requires the ability to understand the nature of long term demands, technology and market developments, resource and infrastructure requirements, and other factors. Diversification of resource and technology options and optimization of approaches and pathways is essential to ensure risk mitigation, and to develop reliable and pragmatic solutions.

The University of California, Riverside's Center for Renewable Natural Gas performed a study to evaluate the role Renewable Natural Gas (RNG) can play in a comprehensive strategy that can be deployed across different sectors, including transportation, building, and commercial and industrial use. This analysis is conducted using a two-step process: first, high percentage of renewables integration in to the electric grid was assessed by analyzing Renewables Portfolio Standard (RPS) scenarios. California's RNG production potential, and associated costs and benefits were analyzed in the second step. The RPS analysis is used as a baseline that represents a successful and effective GHG mitigation approach against which a Renewable Gas Standard (RGS) can be compared.

The costs and emission reductions associated with the state's electric sector through current and potential future RPS scenarios were evaluated using the Resolve model. The results provide context to compare the magnitude of emission reductions achievable through a Renewable Gas Standard (RGS) program and the associated carbon abatement costs. RNG production potential is estimated using four feedstock groups: Landfill gas upgrading, animal manure, biosolids from Wastewater Treatment Plants (WWTPs), and food and green waste. A cumulative total of approximately 99 billion cubic feet (bcf) of RNG can be produced annually from a portion of these feedstocks in California. This RNG can result in a reduction of approximately 11.4 Million Metric Tonnes of $CO_2$ equivalent (MMT $CO_2e$) GHGs per year with carbon abatement costs ranging from $50 to over $400 per Metric Tonne (MT) of $CO_{2e}$ GHG. *However, a significant amount of the carbon reductions are cost effective based on current circumstances.*

The benefits of replacing fossil fuels with RNG are broad and multifaceted. These include reduced landfilling of waste, criteria and toxic pollutant emission reductions compared to other fossil fuels, and




Short-Lived Climate Pollutant (SLCP) emission reductions. A key advantage of RNG compared to other renewable fuels is its potential to make significant contributions immediately in the heavy duty transportation sector. RNG has the unique advantage of a mature, and extensive storage and distribution infrastructure and the availability of NG vehicle technologies. Analysis results show that the carbon abatement costs through RNG use are comparable to other regulatory approaches, including the successful RPS program. An RGS would require increasing percentages of renewable gas to be injected into the natural gas pipeline infrastructure to meet specific renewable percentage targets compared to total natural gas consumption. Such a policy would provide a significant step forward for an enhanced framework and the regulatory driving force that can substantially increase renewable gas production and use in the state. GHG emissions are often intricately tied to the local, national and global economies, quality of life, and other factors. A diverse portfolio of approaches is important in order to achieve sustained, long term emission reductions across sectors and from all source categories. *More importantly, large scale renewable gas production would address some emissions from sources that are unlikely to be mitigated in the near term through other measures*.

Recommendations and next steps to realize RNG's potential role in California's climate strategy:

- Address the key barriers to commercial RNG production and use; and develop strategies to expedite production.
- Further incorporate renewable gas production and other $CO_2$/methane mitigation strategies as part of an optimal climate mitigation approach that takes advantage of all pathways with high GHG reduction potential.
- Develop an enhanced policy framework that will enable RNG production in significant quantities from in-state resources building on current capture mandates (SB 1383) which can jump start in-state production but produce modest volumes.
- Adopt an RGS with gradual increased percentage thresholds to help provide stable financing for expanded RNG production to assist in cost effective GHG reductions. To further expand RNG supply potential and facilitate cost effective GHG reduction, consider policies that enable continued out of state supply of RNG, not unlike out of state electric resources enabled under current RPS requirements.

Given the far reaching consequences of a potential 2 °C global average temperature rise and the urgency in preventing it, every meaningful GHG reduction strategy must be pursued seriously. RNG can play a unique and significant role without excluding other approaches and represents an immediate opportunity. As the global leader in combating climate change, California is the ideal candidate to demonstrate the realization of RNG's potential.