

Renewable Natural Gas – Hope or Hype?

Initial research into cost-effectiveness and market barriers

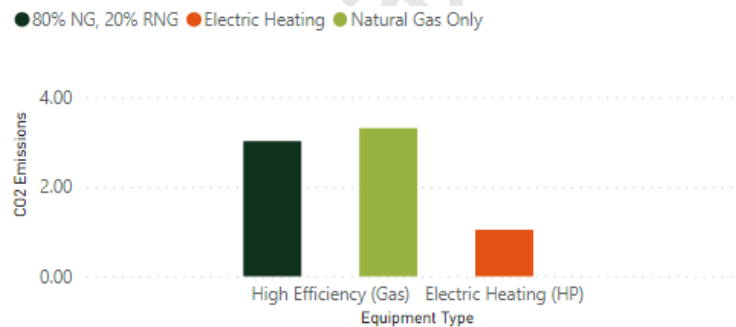
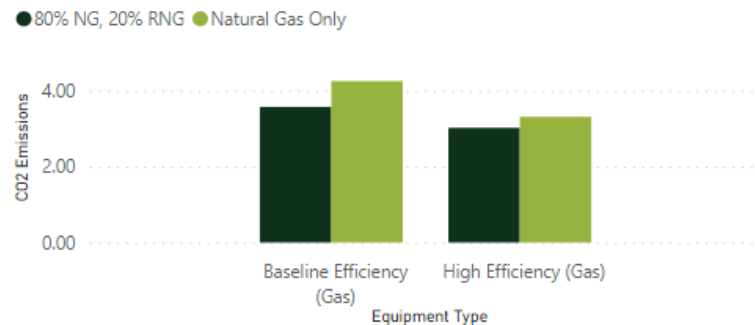
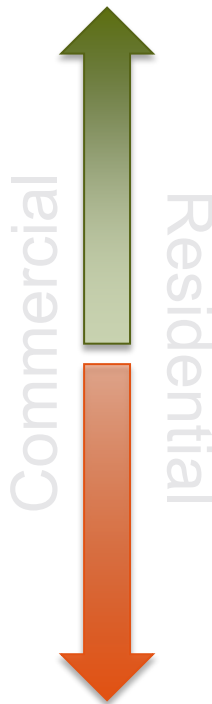
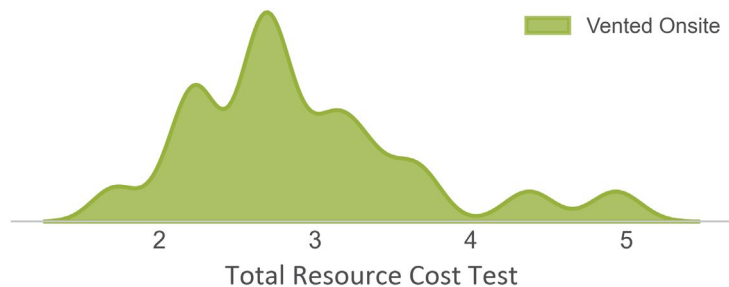
Ben Cheah

CALIFORNIA CLIMATE CHANGE



BIOGAS

A Potential Tool for Change



BIOGAS

Sources



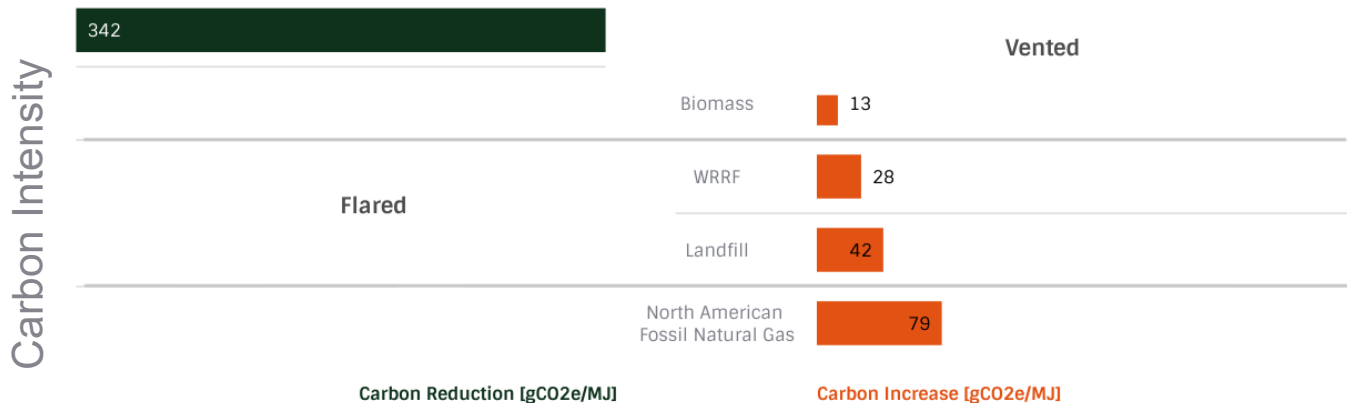
Baseline Methane Requirement

• Vented - Methane related to atmosphere

• Flared - Methane destruction required

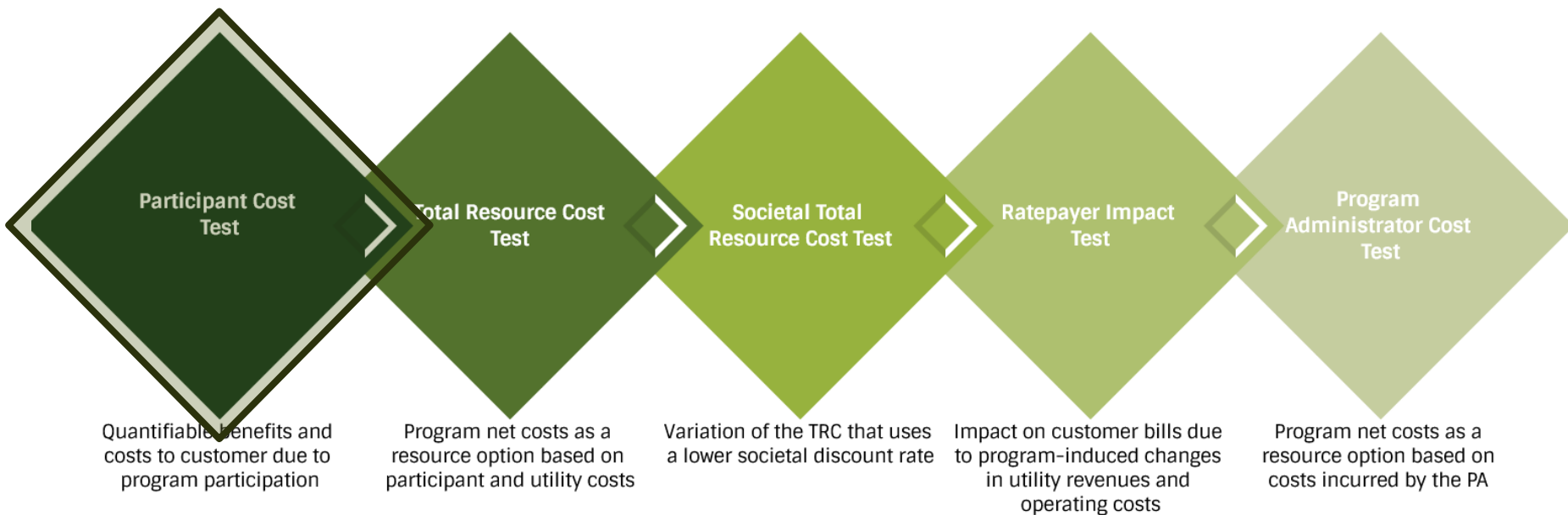
• Flared - Methane destruction required

• Mixed



COMMERCIAL ANALYSIS

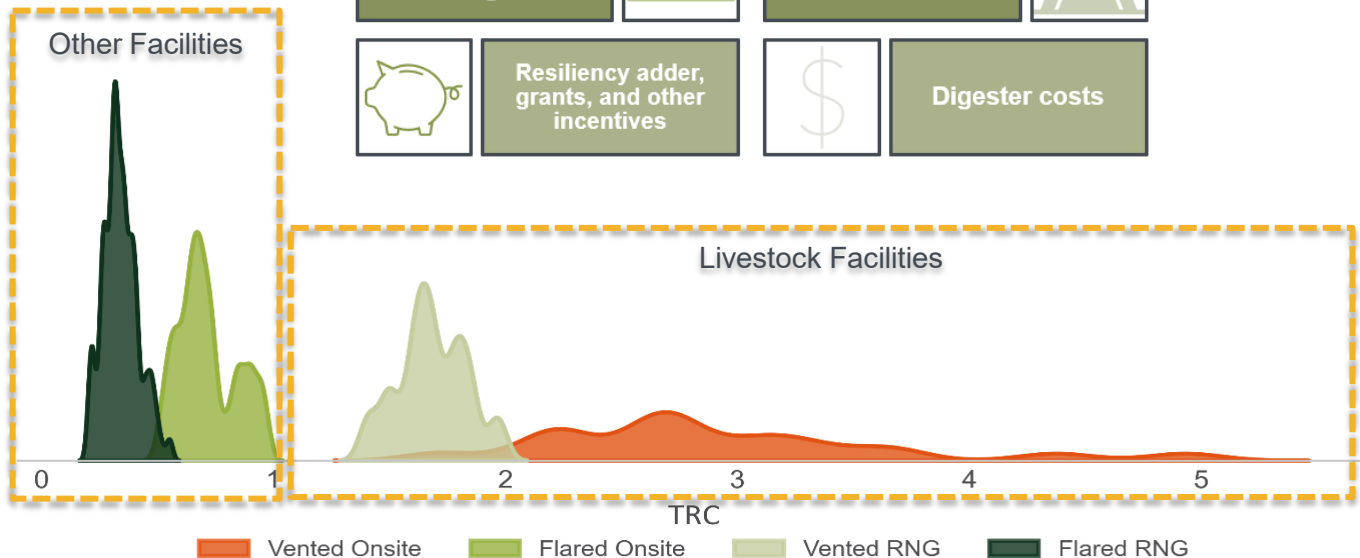
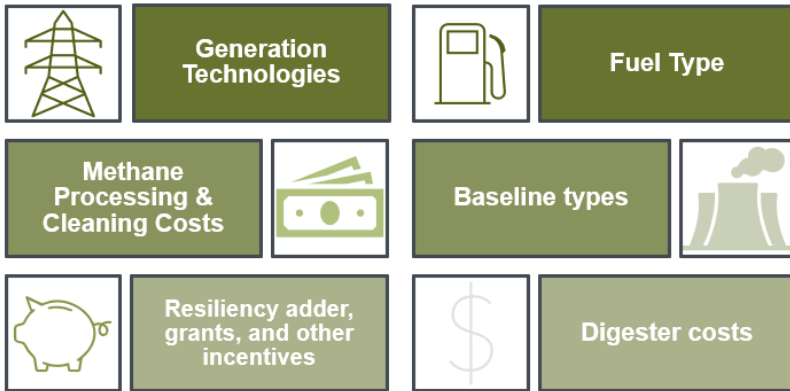
Cost-Effectiveness



BIOGAS

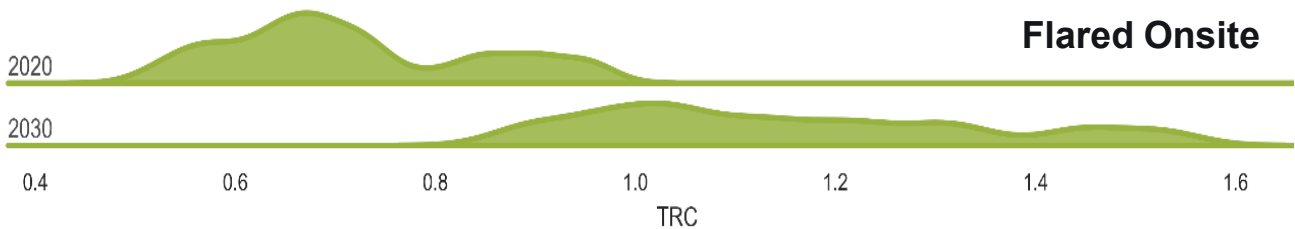
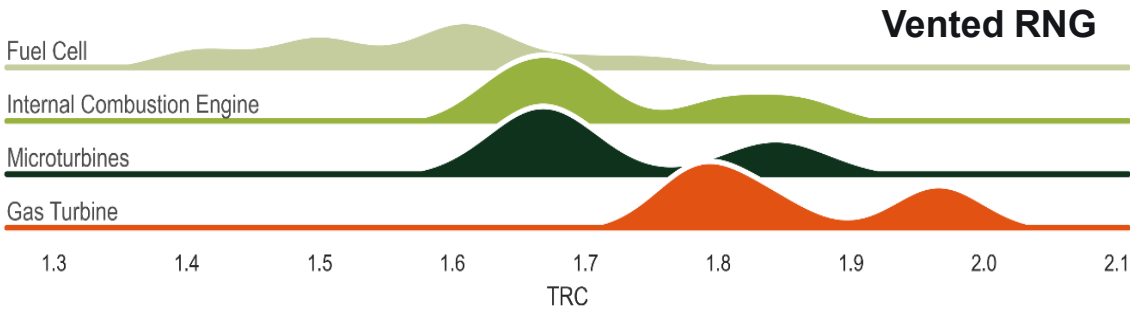
Commercial Cost Effectiveness Results - TRC

400+ distinct scenarios



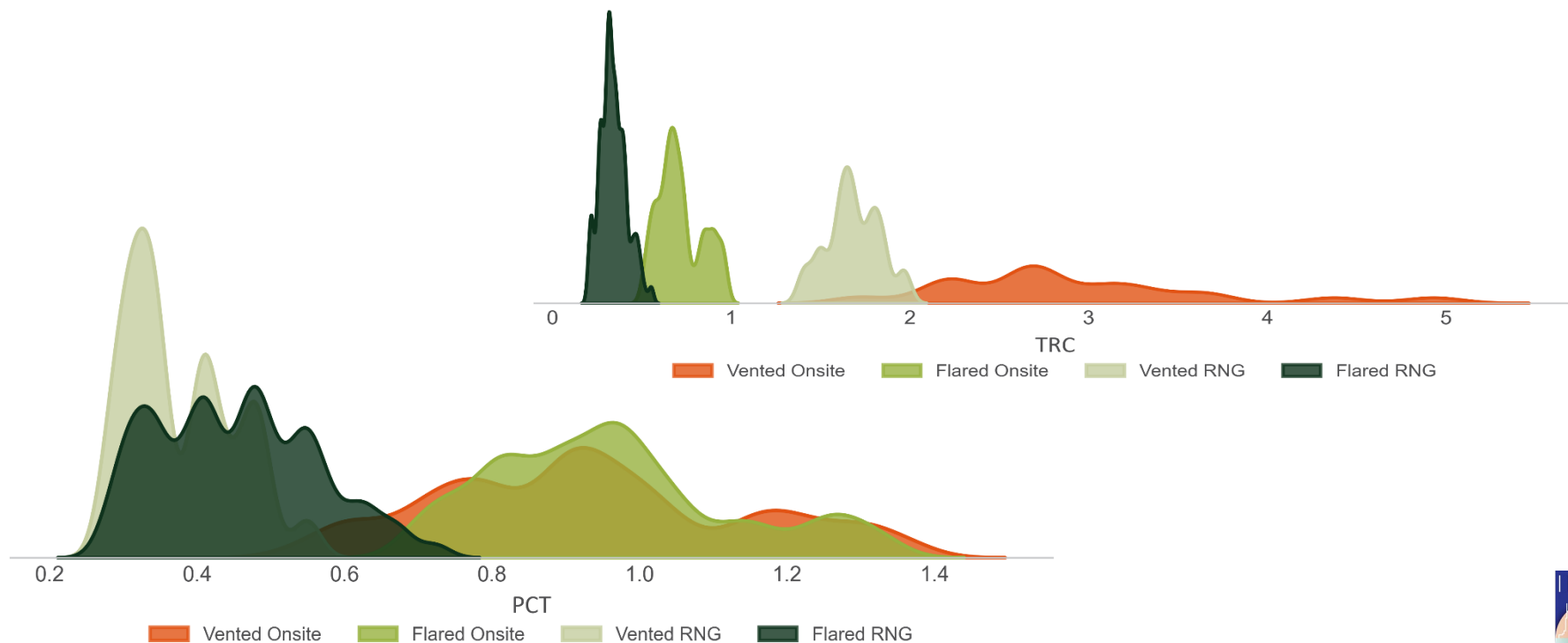
COMMERCIAL ANALYSIS

Cost Effectiveness Results - TRC



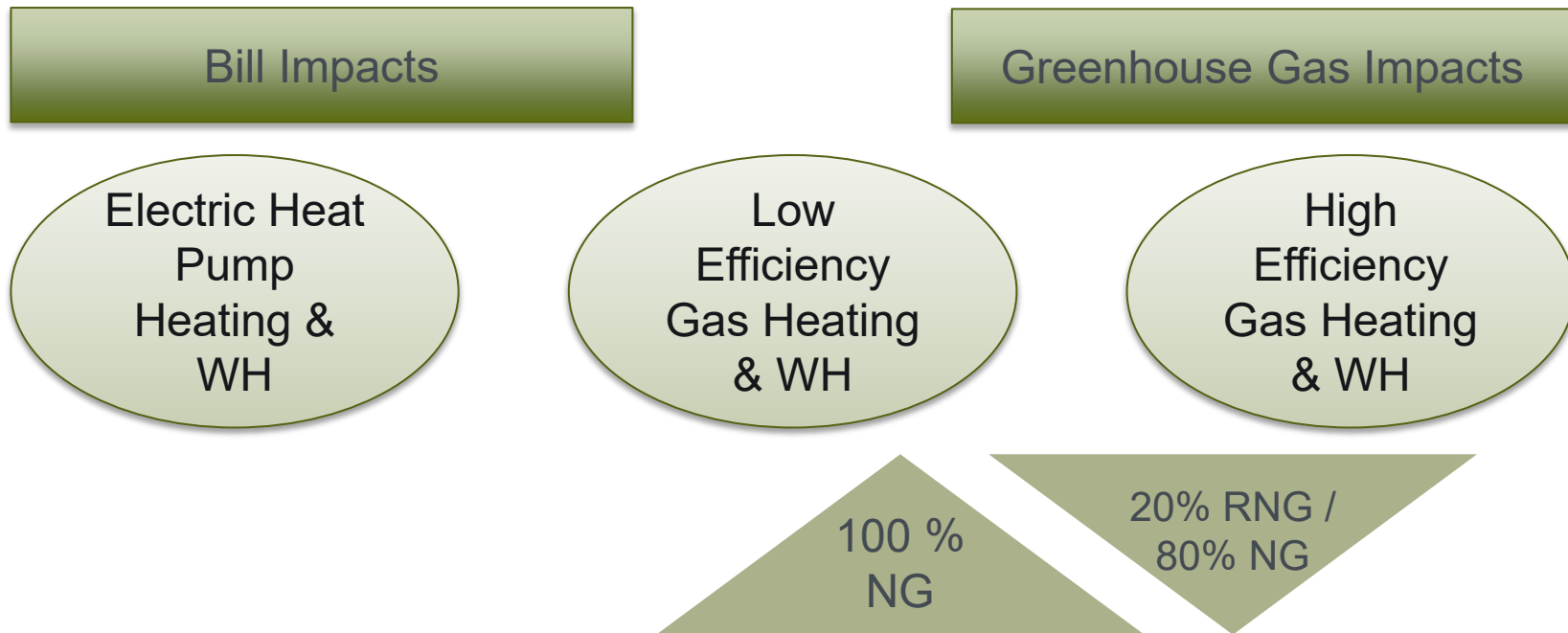
COMMERCIAL ANALYSIS

Cost Effectiveness Results - PCT



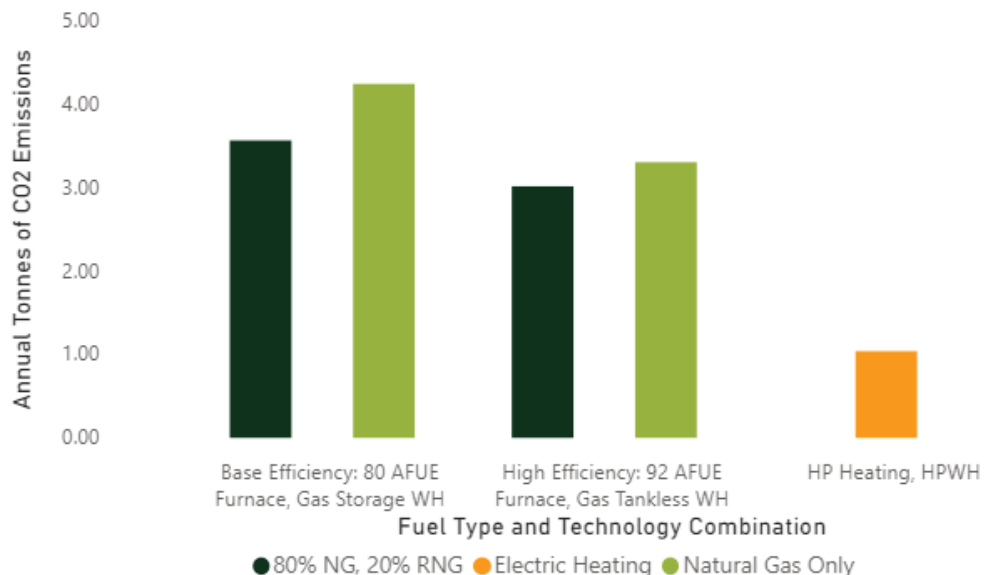
RESIDENTIAL ANALYSIS

Methods



RESIDENTIAL ANALYSIS

Greenhouse Gas Impacts

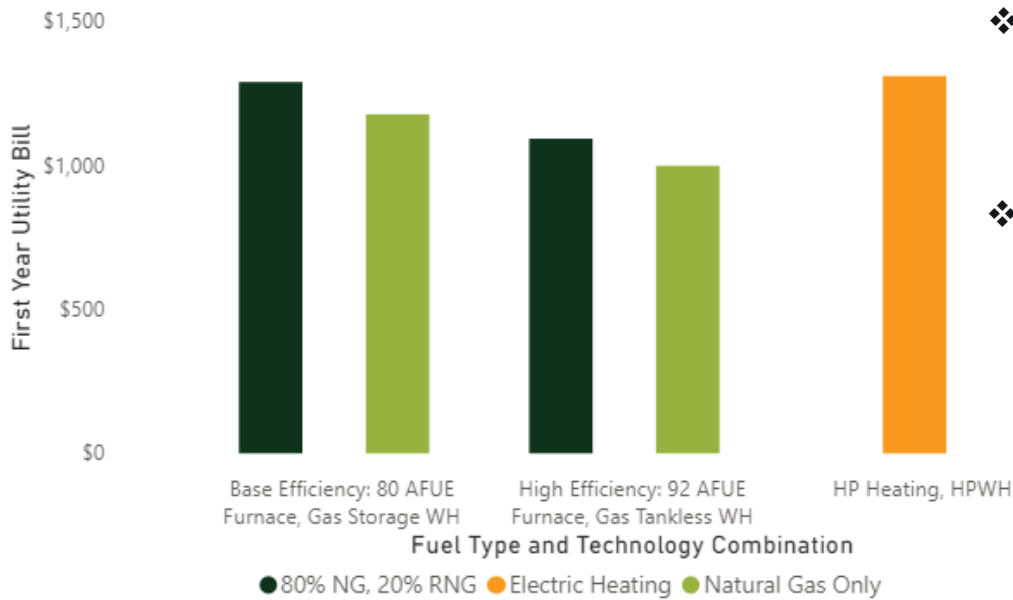


- ❖ Electric HP systems show about a third of the annual CO₂ emissions of HE NG systems.
- ❖ The RNG/NG fuel mix emits slightly less annual CO₂ than their all-NG counterparts
- ❖ The RNG/NG fuel mix emits significantly more CO₂ than their electric HP counterparts.



RESIDENTIAL ANALYSIS

Customer Bill Impacts



- ❖ Electric HP systems are more expensive to operate than the base efficiency NG systems.
- ❖ Systems utilizing the RNG/NG fuel mixture cost the customer about 21% more than those systems just using NG fuel
- ❖ HE 100% NG systems are the cheapest to operate from a customer standpoint.

TAKE AWAYS

RNG can be a near-term solution to reduce emissions without electrification needs to replace appliances



*Vented baselines have higher TRC than flared baselines.
- Increasing incentives available to livestock facilities*

Significant impacts on RNG Costs & Emissions by RNG Source.

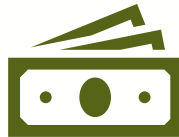


Encouraging high efficiency technologies and lower carbon intensities in both electricity and RNG has the potential to contribute to a low carbon future.



Transportation Programs (LCFS) affect the supply of RNG.

*GHG reduction & cost effectiveness rely on many CA-specific assumptions.
- Cost of fuel, avoided costs...*



Future installations will provide cost effective benefits, even if they do not today.





VERDANT

THANK YOU

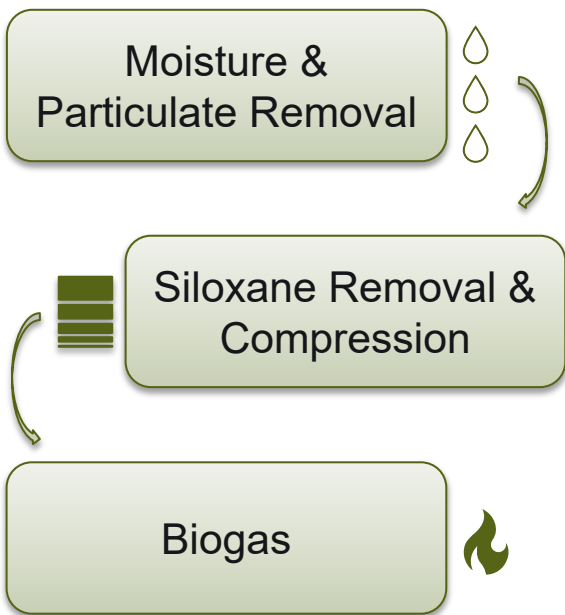


www.verdantassoc.com

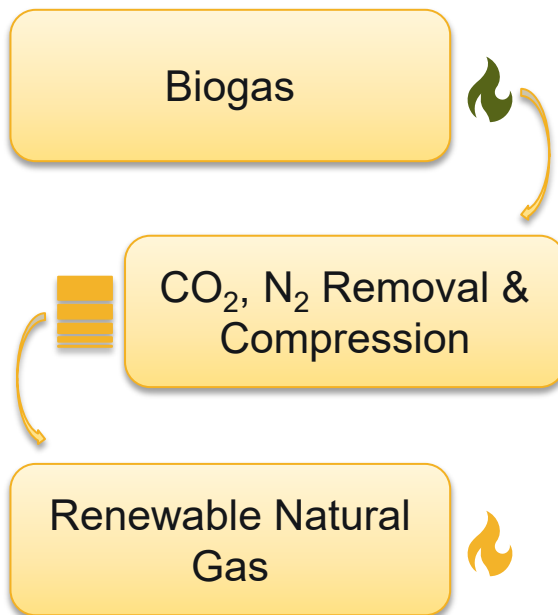
BIOGAS

Uses

Electricity Generation



Pipeline Injection



Transportation

