



#### **Natural Gas Pathways:**

Towards a Clean and Renewable Energy Future for California

Southern California Gas Company 2018



Glad to be of service.®

#### California Climate Change Policy Need for "Near-Zero" End Uses and Low Carbon Gas



Where do emissions come from?

SoCalGas A & Sempra Energy utility

California focused on electrifying end uses; and "de-carbonizing" electricity

- De-carbonize generation
- Electrify transportation
- Electrify energy end uses

SoCalGas focused on "near-zero" end use technology -- "electric equivalent" ; and "de-carbonizing" the pipeline

- Develop Near-zero gas technology
- Develop Near-zero NGV's
- Decarbonize gas supply

### It's *NOT* Either/Or.



### **De-Carbonizing Energy:** Natural Gas Pathways

# Low carbon gas technology focuses on:

- HD Transportation
- Distributed Energy Resources
- Small-scale, Fast-ramping Generation
  Matched with Renewables
- Power Generation with Carbon Capture









- Fuel Cells
- Micro-turbines
- Combined

**Heat & Power** 

#### **De-Carbonizing the Pipeline:** Waste or Biomass: Biomethane to Renewable Gas





### **Renewable Gas Development**

- State organic waste reduction goals support RNG development
  - 50% reduction in the statewide disposal (landfilling) of organic waste from the 2014 level by 2020 and a 75% reduction by 2025.
- Short Lived Climate Pollution Plan -reduce methane by 40%
- SB 1383 -- ARB, CEC and CPUC to develop policies to support market:
  - Establish energy infrastructure development policies
  - Procurement policies
  - Encourage biomethane market development.
  - 5 dairy pilots by utilities





#### **De-Carbonizing the Pipeline:** Power-to-Gas: Excess Renewable Electricity to Renewable Gas



Also Addressing the Storage Challenge

SocalGas A Sempra Energy utility

Glad to be of service.

### **Power-to-Gas Projects:** Provides green hydrogen pathway and grid storage



### **First in US:** P2G Facility at UCI

April 15, 2015



## U-T San Diego

#### **UTILITY TO TEST ENERGY STORAGE**

Southern California Gas looking at pipelines for excess solar power

By Naureen S. Malik BLOOMBERG NEWS 5:06 A.M. April 15, 2015

#### **California Utility to Make Gas From Solar for Pipeline Storage**

**NEWS RELEASE** 

SoCalGas Launches First Power-to-Gas Project in U.S.

Converts Electricity from Renewable Sources to Hydrogen and Methane; and Tests Use of Existing Natural Gas Pipelines to Store Surplus Power

THE ORANGE COUNTY

REGISTER

UCI tries solving this problem: We have sun and wind for power, but how do we store it?

Glad to be of service.®

### **E3 Study:** Integration of New Low/Zero Carbon Options





Energy+Environmental Economics

#### Strategic use of gaseous fuels supports near- and long-term goals

- In nearer term, opportunities for efficiency, "near zero" technology and new uses for natural gas (transportation)
- In medium- to long-term, new lowcarbon sources of gas need development and introduction

- Pipeline de-carbonization works together with electrification towards Climate Change objectives
- Pipeline de-carbonization offers Cost Effective and Resilient Pathways
- De-carbonization can play an important role Integrating Variable Renewable Generation Resources
- Pipeline de-carbonization reduces emissions in sectors that are otherwise difficult to electrify, including heavy duty vehicles; residential and commercial end uses, and industrial end uses
  - Managing "Energy Grid" (gas and electric together) = efficiency and cost avoidance

٠

### **Electrify Everything?**

#### Some Advocate:







Decarbonize Electricity, then Electrify All Uses:

#### **Transportation Electrification**

• Data show LD sector for electrification; but HD sector for RNG and LoNOx engines

#### **Building Electrification**

• Gas highly efficient for end uses, for-kind replacement not beneficial until 50% RPS. RNG superior in reducing GHGs.

#### • Pass New Legislation and Regulation:

#### **Mandate New Homes be All Electric**

- Builders need to meet consumer demand Retrofit All Homes by 2030
- Consumer choice?
- Massive and expensive equipment changeouts, installation costs and increased monthly operating costs.

SoCalGas A Sempra Energy utility

Glad to be of service.<sup>®</sup>

#### **Navigant Study:** RNG Beats Building Electrification



Annual GHG Emissions Savings and Required RG Percentage Under Different Electrification Scenarios



- 16% rate of RNG throughput meets or exceeds GHG reductions from 100% electrification of building sector by 2030. Mandatory building electrification unneeded. SCE goal (30% de-carb) achieved at less than 5% rate.
- Avoids massive change out of equipment, high purchase and installation costs, and long term operating costs.
- Renewable gas re-uses California's waste streams as energy, achieving climate change objective proposed by those seeking to eliminate all use of gas.
- Can ensure success of SLCP. Law requires 40% capture of methane from CA waste stream – sewage, landfills, dairies and agriculture. Capture of "SLCPs" is 30% of all GHG reductions needed in ARB Scoping Plan to reach 2030 goals.

NAVIGANT

Renewable Gas Scenario

Proportion of RG required to achieve the

same GHG emission savings by 2030

### **Navigant Study:** Building Electrification Costs

The cost to upgrade wiring and electrical panels plus the cost of purchasing new electric appliances is more than \$7,200 per home. Phase 1 (Existing Single-Family Homes)

- Electrifying a typical SoCal single-family home could cost the homeowner almost \$900 per year.
- This could mean roughly \$2,600 for new appliances and roughly \$4,600 for new wiring/electric panel upgrades.
  - This would result an annual cost increase of \$4.3 to \$6.1 billion across California's 7 million single-family homes.
- Electrifying a home reduces its GHGs by 35-39% in 2020 or only 2.3% of the state's GHG emissions.

\*According to the California Air Resources Board, residential buildings in California account for about 6% of the state's total GHG emissions today.



### Consumer Survey: 3000 California Voters.

Voters prefer the use of natural gas for heating and cooking all over the state. Results also demonstrate that voters overwhelmingly oppose any electrification mandate.

- Voters like gas -- strong majorities choose gas for their home appliances, especially cooking. Nearly 80% of CA voters want gas for their stove tops. Less than 10% of voters would choose an all-electric home.
- In terms of cost, nearly 2/3 (62%) of voters believe gas is cheaper than electricity. And, in terms of monthly budgeting, the electric bill is voters' top concern – beating out the cable bill by more than a 2 to 1 margin. Less than 4% have concerns with their gas bill.
- 2/3 of CA voters oppose eliminating the use of gas, and 2/3 of voters also agree that gas should continue to be a future energy choice to keep "utility bills affordable".
- Importantly, 80% of voters oppose prohibiting use of gas appliances, especially if gas could no longer be used for cooking (80%), or if it increases energy bills (80%).

#### **Natural Gas Pathways of Tomorrow**

