



Priscilla R. Hamilton
Environmental Affairs Program Manager
Southern California Gas Company

555 W. 5th Street
Los Angeles, CA 90013
(213) 244-8237
PHamilton@semprautilities.com

March 19, 2018

Philip Fine, Ph.D.
Deputy Executive Officer
South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar, CA 91765

RE: Net Emissions Analysis Tool (NEAT) Working Group Meeting #3

Dear Dr. Fine:

Southern California Gas Company (SoCalGas) appreciates the time and effort of South Coast Air Quality Management District (SCAQMD) staff to develop an innovative, technology-neutral tool that assesses both the environmental benefits and economic impacts of residential appliance upgrades. SoCalGas values the opportunity to provide comments on the Net Emissions Analysis Tool (NEAT or tool) and we look forward to continued engagement with the working group as the tool evolves.

- I. SoCalGas recommends updating the Alternative Technologies List to include gas heat-pump water heaters, micro combined heat and power products, and residential-scale fuel cells.**

Gas Heat-Pump Water Heater (GHPWH)

Most of the gas-fired residential water heater market in California is supplied by minimum-efficiency gas-fired storage water heaters. The most common size, a 40-gallon unit, will typically have an Energy Factor (EF) ranging from 0.59 to 0.62. More than 10 million homes today utilize these minimum-efficiency water heaters due to their low cost.¹

Stone Mountain Technologies, in conjunction with several large water heater manufacturers, has developed and is currently demonstrating an advanced high-efficiency GHPWH. Five prototype units are being demonstrated in Southern California now, with market entry projected for late 2019 or early 2020.

¹ See California Energy Commission (2014) "Water Heating Requirements" at:
http://www.energy.ca.gov/2013publications/CEC-400-2013-001/chapters/05_Water_Heating_Requirements.pdf

Looking beyond current options for high-efficiency residential gas water heating, the GHPWH has a projected uniform energy factor (UEF) of 1.30, in comparison to gas condensing-storage or condensing water heaters, with UEFs typically between 0.80 and 0.95. The GHPWH utilizes a gas-fired, single-stage, ammonia-water heat pump cycle coupled with about a 70-gallon storage tank and is designed to be a straightforward retrofit that does not require modifications to the half inch gas piping, and allows the use of three-quarter inch PVC vent piping. With a projected unit cost of \$1,600 at higher volumes, this could be a cost-competitive retrofit to “leapfrog” all other efficient gas water heating options (condensing storage, tankless, etc.).

Micro Combined Heat and Power (Micro CHP)

Micro CHP products will likely be commercially available in the near-term given recent efforts made by the California Energy Commission (CEC). In December 2017, the CEC awarded a \$1.5 million grant to Gas Technology Institute to demonstrate two Micro CHP products: Marathon Engines’ 4.5 kW Ecopower unit and an EC Power 25 kW unit.² Both units produce heat and electricity from natural gas, with a maximum efficiency of 96 percent for the Marathon unit and 93 percent for the EC Power unit (assuming full waste-heat utilization). SoCalGas is also working with the CEC to develop a study assessing the market potential for Micro CHP in California.

Residential-Scale Fuel Cells

Fuel cells are an attractive non-combustion energy source as they create electricity from an electro-chemical reaction with zero and near-zero smog-forming emissions.³ While residential-scale fuel cells are a new technology in California and not currently included in Title 24 for power generation, the CEC is currently conducting rulemakings on 2019 building energy efficiency standards.⁴ SoCalGas believes this technology holds promise and is developing a demonstration project with a home builder for a 1.5 kW fuel cell integrated with photovoltaics in a mixed fuel zero-net energy home. The total efficiency with waste heat utilization is 85 percent. The demonstration is expected to be completed in early 2019.

II. Barrier removal costs should be incorporated into the NEAT tool given the age of California’s housing stock.

When assessing the economic impacts of wide-scale residential appliance upgrades, the age of California’s housing stock needs to be considered. Sixty percent of California’s housing units were built before 1980.⁵ Of the 8.4 million housing units in California constructed before 1980,

2 See California Energy Commission. Revised Notice of Proposed Award for “Improving Natural Gas Energy Efficiency, Waste Heat-to-Power, and Near-Zero Emission Distributed Generation Systems. Found at: http://www.energy.ca.gov/contracts/GFO-17-501_NOPA_Revised.pdf

3 See U.S. Environmental Protection Agency Combined Heat and Power Partnership (2015) “Catalog of CHP Technologies, Section 6. Technology Characterization – Fuel Cells” at: https://www.epa.gov/sites/production/files/2015-07/documents/catalog_of_chp_technologies_section_6_technology_characterization_-_fuel_cells.pdf

4 See CEC, Rulemaking on 2019 Building Energy Efficiency Standards, at: <http://www.energy.ca.gov/title24/2019standards/rulemaking/>

5 As of 2016, California has 13.9 million housing units. See U.S. Census, American Community Survey, 2016 5-year estimates. Table DP04 at: <https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml>

46 percent (3.9 million) are in the four-county region of Los Angeles, Orange, Riverside and San Bernardino.⁶ These 3.9 million housing units in the South Coast Air Basin face an array of physical barriers that increase the cost of installing a new gas or electric appliance. For example, a home may need electrical rewiring, reconfigured or upgraded plumbing, or other physical alterations to accommodate a modern, high-efficiency water heater or heating system. Furthermore, many homes built before 1980 include asbestos containing materials, including thermal and electrical insulation materials, ducting, wall board, and ceiling tiles that may require removal and containment prior to retrofitting heating and cooling systems including furnaces, air handlers, and vent systems.

Based on feedback from field contractors providing energy-efficiency measures for residential customers, barrier issues impact a significant number of homes and prevent the successful expansion of energy-efficiency measures in many older homes. SoCalGas is working to secure and manage federal, state, regional and local funding to address and remediate physical and logistical barriers to energy-efficiency and low-income assistance programs. To more accurately account for the cost of these issues, SoCalGas recommends staff include a best and worst-case cost scenario into the NEAT model to account for potential barrier removal costs. Examples of a range of common costs from SoCalGas' Barrier Removal Plan⁷ include:

- **Attic Insulation: \$70 to \$2,050**
 - Knob and Tube Electrical Wiring Removal / Replacement: up to \$1,150
 - Duct Work Repair: up to \$400
 - Asbestos Remediation: up to \$900

- **Water Heater Replacement: \$65 to \$3,000**
 - Electrical Outlet Installation: up to \$65
 - Condensate Drain Installation: up to \$75
 - Structural Integrity Repair: up to \$250
 - High-Efficiency Marginal Cost: up to \$2,450

- **Space Heating Replacement: \$65 to \$3,000**
 - Electrical Outlet Installation: up to \$65
 - Structural Integrity Repair: up to \$250
 - Asbestos Remediation: up to \$900
 - High-Efficiency Marginal Cost: up to \$2,000

6 Op. cit.

7 SoCalGas Energy Savings Assistance (ESA) Program. Barrier Removal Plan for the City of South Gate.

III. California Alternative Rates for Energy (CARE) rates should be incorporated into the Embedded Electric-Rate Structure Editor Tool.

Through its CARE program, SoCalGas offers eligible, low-income customers a 20 percent discount on their monthly energy bill.⁸ As of January 2018, SoCalGas offers CARE rates to 1.5 million households in its service territory.⁹ Most of SoCalGas' CARE households (1.3 million) reside in the four-county region of Los Angeles, Orange, Riverside, and San Bernardino.

As policy-makers develop Energy Savings Assistance programs for low-income communities, it is important to have the option to determine an affordable mix of energy sources and clean technologies. SoCalGas recommends staff include CARE rates for both gas and electric utilities into the NEAT model.

IV. Options for electricity emission factors in the tool should reflect a realistic or achievable renewables scenario.

SoCalGas understands staff's objective to build bounded, extreme scenarios (all additional electricity from photovoltaics and all additional electricity from peaker plants). One hundred percent of additional power from photovoltaics implies that every solar panel installation will have on-site battery storage given solar is not available at night when many appliances are operated by consumers. Including this as an option without the full cost of the required energy storage in the tool creates a policy scenario where consumer decisions are unrealistic. We encourage staff to reconsider incorporating a realistic or achievable renewables scenario.

V. SoCalGas recommends SCAQMD staff use a methane leakage rate of 1.2 percent from the U.S. Environmental Protection Agency (EPA) in the NEAT tool.

EPA's inventory of greenhouse gas emissions is based on consistent reporting requirements for the U.S. natural gas industry. Furthermore, EPA's detailed methodology for estimating greenhouse gas emissions provides a common and consistent mechanism for the United Nations Framework Convention on Climate Change (UNFCCC).¹⁰ The U.S. government believes EPA's inventory of greenhouse gas emissions fulfills its commitment to UNFCCC.¹¹ To be consistent with what is reported and verified at national and international

8 See SoCalGas California Alternative Rates for Energy (CARE) at: <https://www.socalgas.com/save-money-and-energy/assistance-programs/california-alternate-rates-for-energy>

9 SoCalGas's service territory includes the following Counties: Fresno, Imperial, Kern, Kings, Los Angeles, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara, Tulare, and Ventura.

10 See EPA (2016) "Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 -2014 available at: <https://www.epa.gov/sites/production/files/2016-04/documents/us-ghg-inventory-2016-main-text.pdf>

11 Op. cit.

levels, SoCalGas believes SCAQMD should use EPA's methane leakage rate of 1.2 percent in the tool.¹²

VI. Conclusion

SoCalGas appreciates your consideration of these recommendations. We look forward to working with staff and other stakeholders in future working group meetings. If you have any questions, please do not hesitate to contact me.

Sincerely,



Priscilla R. Hamilton
Environmental Affairs Program Manager
Southern California Gas Company

Cc: Michael Krause
Zorik Pirveysian
Sang-Mi Lee, Ph.D.
Scott Epstein, Ph.D.
Marc Carreras Sospedra, Ph.D.
Kelly Gamino

¹² Author's full calculations and assumptions available upon request. Calculations based on EPA (2016) "Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 -2014 available at: <https://www.epa.gov/sites/production/files/2016-04/documents/us-ghg-inventory-2016-main-text.pdf> and U.S. Energy Information Administration, "Natural Gas Gross Withdrawals and Production", at: https://www.eia.gov/dnav/ng/ng_prod_sum_dc_NUS_mmcfa.htm.