DOCKETED	
Docket Number:	18-IEPR-09
Project Title:	Decarbonizing Buildings
TN #:	224588
Document Title:	Sierra Club Comments on SoCalGas and Navigant Report
Description:	N/A
Filer:	System
Organization:	Rachel Golden/Sierra Club
Submitter Role:	Intervenor Representative
Submission Date:	8/24/2018 11:40:04 AM
Docketed Date:	8/24/2018

Comment Received From: Rachel Golden
Submitted On: 8/24/2018
Docket Number: 18-IEPR-09

Sierra Club Comments on SoCalGas and Navigant Report

Additional submitted attachment is included below.

August 24, 2018

Via online filing

California Energy Commission
Dockets Office, MS-4
1516 Ninth Street
Sacramento, CA 95814-5512

Subject: Sierra Club Comments on SoCalGas and Navigant Report *Analysis on the Role of Gas for a Low-Carbon California Future* (18-IEPR-09)

Dear Commissioner McAllister, Commissioner Hochschild, and Energy Commission staff:

In late July 2018, Southern California Gas Company (SoCalGas) and Navigant Consulting, Inc (Navigant) released a report analyzing the ability of renewable natural gas, or biomethane, to reduce greenhouse gas emissions from buildings to a level commensurate with building electrification (SoCalGas Report).[1] Sierra Club has serious concerns that the report's inaccurate assumptions and narrow scope lead to unsound findings, and we request that the Energy Commission take these comments into consideration in preparing the Building Decarbonization section of the Integrated Energy Policy Report (IEPR).

The SoCalGas Report concludes that replacing fossil natural gas use in buildings with biomethane can reduce greenhouse gases on a level commensurate with building electrification. However, this conclusion is directly contradicted by the growing body of independent analysis, such as the latest report by E3 for the California Energy Commission, finding that building electrification is the lower-cost and lower-risk climate change mitigation strategy.[2] The SoCalGas Report is based on a set of assumptions slanted toward gas, which underestimate the potential greenhouse gas reductions from building electrification while overestimating its bill impacts and costs. The SoCalGas Report does not realistically assess the extremely limited supply of biomethane available, and suggests that California can literally buy its way out of the

[1] Navigant Consulting, Inc., *Analysis of the Role of Gas for a Low-Carbon California Future* (July 24,
[2] E3, *Deep Decarbonization in a High Renewables Future* (June 2018).
https://www.ethree.com/projects/deep-decarbonization-california-cec/

climate crisis by purchasing out-of-state credits for 75-100% of its biomethane supply. Tellingly, when the SoCalGas Report removes the assumption that a massive quantity of out-of-state biomethane credits are available, it finds that building electrification is the lower cost strategy—even with the worst-case electric equipment efficiency and cost assumptions used.

We note six key problems with the SoCalGas report:

1. **Unrealistic biomethane supply assumptions:** The report assumes large quantities of biomethane are derived from biomass sources like agricultural residue, which are not greenhouse gas neutral and still damage the climate.

2. **Not a scalable solution:** The report is limited to meeting buildings' natural gas demand in SoCalGas territory in 2030, but this focus is far too limited to inform California's decarbonization strategy. To meet California's climate goals, we need a solution that can meet the needs of the whole state in 2050, and that do not limit other state's ability to decarbonize. Additionally, the only scenarios where biomethane costs less than electrification depend on 75% to 100% of the biomethane supply being sourced from out-of-state, far above California's population weighted average – meaning the strategy is not scalable to the rest of the country.

3. **Ignores the significant greenhouse gas emissions from fugitive methane**: The analysis ignores the fact that the gas system notoriously leaks the methane it carries.

4. **Disregards air quality and environmental justice related problems with reliance on biomethane as a fuel source:** The report leaves out the inherent environmental justice problems with biomethane as a fuel source, including the reliance on landfills in environmental justice communities and the air quality impacts of methane combustion.

5. **Biased efficiency and cost assumptions:** The report systematically relies on the worst case efficiency and cost assumptions for electrification, and the best case assumptions for gas, which underestimates the greenhouse gas emissions reduction potential from electrification and over-estimates its cost.

6. **Underestimates growth in renewable energy**: By assuiming the minimum statutorily required amount of renewable energy will be online in 2030 – despite Southern California Edison, the Los Angeles Department of Water and Power, and the California Public Utilities Commission's renewable procurement projections that exceed SB 350 – the report underestimates the GHG reduction potential from electrification.

A. Discussion

1. The SoCalGas Report's estimates of the supply of biomethane are unrealistically high.

There is nowhere near enough potential biomethane available to justify forestalling building electrification. The SoCalGas Report's assumption that 140 billion cubic feet of biomethane are available annually to partially reduce natural gas demand in buildings is fundamentally flawed, as it relies on biomethane from sources with significant environmental impacts, and from out of state – two approaches that are not consistent with California's climate change mitigation strategy.

The biomethane supply and cost estimates used in the SoCalGas report come from a whitepaper by the consulting firm ICF.[3] The methodology used in the ICF report is not sufficiently explained in the whitepaper, which states only that its estimates were determined through review of other studies on biomethane supply (from which ICF's estimates differ markedly) and based on "other resources" that are not identified.[4] The estimates of biomethane potential presented by ICF include sources of biomethane often omitted from other studies (or included with caveat) due to their negative environmental impacts. As explained in the chart below, biomethane can be made from many sources, and not all sources are equivalent in their greenhouse gas emissions intensity or other environmental impacts.

Figure 1. Differences in Biomethane Sources

Biomethane Feedstock	Description	Climate Impact
Organic Waste	• Manure from dairy farms • Landfill gas • Wastewater treatment plant gases	Because these wastes normally decompose anaerobically, the decomposition releases fugitive methane. Making renewable gas from these sources "captures" this fugitive methane for use.
Biomass	• Agricultural residue • Forestry residue	These wastes normally decompose aerobically -- *i.e.* through composting -- so no fugitive methane is created. Converting these wastes into renewable gas creates methane where none existed.

[3] SoCalGas Report, p, 45, *citing* Sheehy and Rosenfeld, ICF, "Design Principles for a Renewable Gas Standard" (2017), https://www.icf.com/resources/white-papers/2017/design-principles-for-renewable-gas ("ICF Report").

[4] ICF Report, p. 7. Adding additional confusion, the numbers provided in the column "ICF Estimates" do not sum to the figures listed in the Total row. *See* ICF Report, Exhibit 3, p. 8.

Energy Crops	• Grasses and other crops grown specifically to produce biomethane	This method requires agricultural land to be devoted to growing energy crops, requiring conversion of current agricultural land used for food crops, or requiring new agricultural land to be created from forests or other landscapes, which has climate impacts.

When biomass and energy crops are excluded from ICF's estimates of biomethane potential, the estimated supply from California sources drops by around 40%, and the estimated national supply drops by 57%-91% (depending on the source of the estimate).[5]

The SoCalGas Report requires 140 billion cubic feet (cf) of biomethane to be available for its service territory in 2030, meeting 46% of building gas use in SoCalGas service territory.[6] All other independent estimates of California's biomethane potential from waste project that much less biomethane is available.

Figure 2. Estimates of Biomethane Potential from Waste

Source	Potential biomethane from waste in California (Bcf/year)	Percent of California 2015 natural gas use in buildings that biomethane could replace[7]	Percent of California 2015 total natural gas use that biomethane could replace[8]
UC Davis, low estimate[9]	14	2%	0.6%
American Gas Foundation ("non-aggressive" estimate)[10]	41	6%	1.8%

[5] ICF Report, Exhibit 3, p. 8; Exhibit 5, p. 10. Sierra Club cannot provide a reliable estimate of ICF's biomethane potential in cubic feet, because the there appears to be an error in the report's calculation of its total.

[6] SoCalGas Report, p. ix.

[7] EIA, *Natural Gas Consumption by End Use*. https://www.eia.gov/dnav/ng/ng_cons_sum_dcu_SCA_a.htm (reporting 636,963 million cubic feet delivered to residential and commercial consumers in 2015).

[8] EIA, *id.* (reporting 2,301 billion cubic feet total natural gas consumption).

[9] Amy Myers Jaffe *et al.*, *The Feasibility of Renewable Natural Gas as a Large-Scale, Low Carbon Substitute*, Institute of Transportation Studies, University of California, Davis (2016), https://steps.ucdavis.edu/the-feasibility-of-renewable-natural-gas-as-a-large-scale-low-carbon-substitute/. The UC Davis "low" figure estimates the "economically viable" biomethane production assuming a $120 per credit incentive under the Low Carbon Fuel Standard.

Union of Concerned Scientists[11]	45	7%	2.0%
NREL[12]	58	9%	2.5%
UC Davis, high estimate[13]	82	13%	3.6%
American Gas Foundation ("aggressive" estimate)[14]	94	15%	4.1%

Even relying on the inflated estimates of ICF, the only scenarios in the SoCalGas report where a renewable gas option costs less than the electrification option are those where 75% to 100% of the biomethane supply is produced out-of-state, and may or may not ever make it to California.[15] An approach that relies on paper transactions for biomethane produced thousands of miles from California presents serious reshuffling problems and is not a credible climate strategy. Additionally, a key objective of California's climate strategy is that it be scalable to the rest of the country. Requiring California to commandeer more than its population-weighted average share of national biomethane potential leaves insufficient supply for other states and means that this strategy is an infeasible national solution.

2. *The SoCalGas Report's biomethane solution is not scalable to meet statewide 2050 greenhouse gas reduction goals.*

The solution California chooses to meet its 2030 climate goals must be scalable to meet the state's 2050 goals. As the graph from the Air Resources Board demonstrates, the 2030 target is only a mid-point to meeting the state's 2050 commitments, and much deeper, sustained reductions in greenhouse gases will be required.

---

[10] American Gas Foundation, *The Potential for Renewable Gas: Biogas Derived from Biomass Feedstocks and Upgraded to Pipeline Quality,* p. 39 (Sept. 2011), http://www.gasfoundation.org/researchstudies/agf-renewable-gas-assessment-report-110901.pdf.

[11] David Babson, *Turning Trash into Low-Carbon Treasure: The Benefits and Implications of Waste-derived Power and Fuel*, Union of Concerned Scientists (Aug. 2015), https://www.ucsusa.org/sites/default/files/attach/2015/08/Trash-to-Treasure-fact-sheet.pdf.

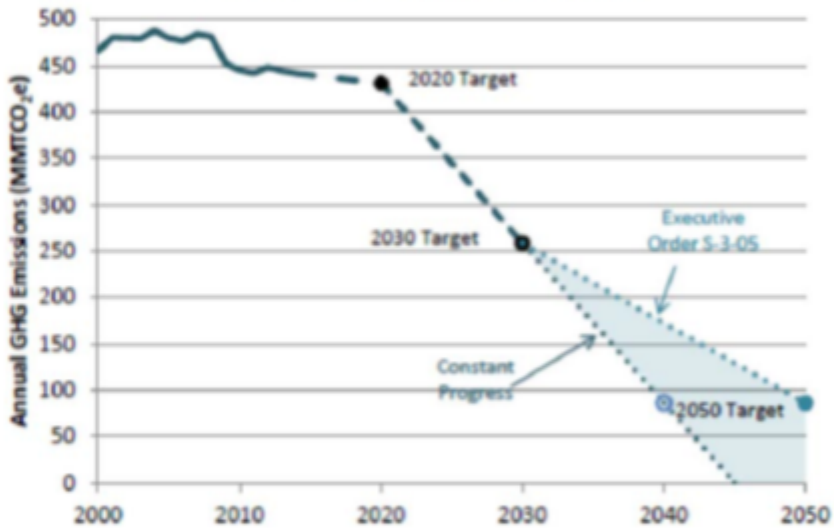
[12] NREL, *Biogas Potential in the United States*, p. 3 (Oct. 2013), http://www.nrel.gov/docs/fy14osti/60178.pdf. The report's estimate of 1.1 million tonnes of potential biomethane in California was converted into cubic feet using methane's density of 0.0424 pounds per cubic feet at 14.73 pounds per square inch of pressure and 60 degrees Fahrenheit.

[13] Jaffe *et al.*, *supra*, p. 76. The high estimate assumes that significant additional financial incentives are added to the LCFS credits assumed in the low estimate.

[14] American Gas Foundation, *supra*, p. 40.

[15] SoCalGas Report, p.xiv, Figure ES-2.

Figure 3. California's Path Forward[16]



However, the SoCalGas report limits its focus to meeting a percentage of building natural gas demand in its service territory only, and only in 2030. When the solution proposed in the report is considered in the context of California's *statewide, 2050* climate goals of reducing greenhouse gases to 80% below 1990 levels, it quickly becomes clear that a biomethane solution to reduce greenhouse gas emissions from buildings is not feasible.

SoCalGas customers consume roughly 51% of the natural gas used in buildings in California.[17] Therefore, in order to meet the 2030 goal of reducing greenhouse gases by 40% in buildings, the state would need about twice as much biomethane as is assumed in the SoCalGas report: about 280 billion cubic feet per year. Going further, statewide 2050 goals require an 80% reduction in greenhouse gases, meaning the statewide supply of biomethane would need to roughly double again, to 560 billion cubic feet per year – more than 5 times more than the American Gas Association's "aggressive" estimate for California biomethane supply, and more than double the ICF's high estimate, which includes biomass resources with significant greenhouse gas impacts.[18] As shown in Figure 2, above, biomethane from waste could meet only 2-15% of building natural gas use in California statewide. This small amount of replacement is not nearly sufficient to justify forestalling building electrification.

[16] Air Resources Board, 2017 Climate Change Scoping Plan Update (Jan. 2017) p. 26, https://www.arb.ca.gov/cc/scopingplan/2030sp_pp_final.pdf.

[17] *See* SoCalGas Report, Table ES-1, p. vi (showing baseline gas consumption in SoCalGas territory totaling 3,451 million therms per year, or approximately 332 billion cubic feet per year. *Compare with* EIA, *id.* (showing 2016 total gas use in buildings of approximately 649 billion cubic feet per year.

[18] See Figure 2, above; ICF Report, Exhibit 3, p. 8.

In order to meet California's statewide, economy-wide climate goals, the limited quantity of biomethane that is available should be used for the applications that are most difficult to electrify, like industrial processes for which electric options are not available. It is not prudent to devote scarce biomethane resources to end uses like building heating where highly efficient electric options are currently available.

3. *The SoCalGas Report Ignores Greenhouse Gas Impacts from Methane Leakage*

Once renewable gas from any source enters the pipeline system, its environmental impacts are the same as fossil natural gas. If methane leaks from a pipeline, it has the same global warming impact—28 to 86 times that of carbon dioxide—regardless of whether it is fossil natural gas or biomethane. Earlier this summer, scientists found that methane leakage is significantly higher than previously thought: they found that from the drilling site up to the customer's gas meter, about 2.3 percent of methane is expected to leak from the pipeline into the atmosphere, which is at least 60% higher than U.S. EPA estimates.[19] Additionally, there is also gas leakage inside homes and other buildings. A recent report by Lawrence Berkeley National Laboratory found that a significant amount of methane (estimated at 0.5%) leaks inside our homes on a daily basis, causing indoor air quality concerns as well as climate impacts.[20]

Any analysis of the greenhouse gas impacts of biomethane must consider the methane that leaks from the gas system in its analysis in order to arrive at an accurate assessment of the climate impact of biomethane.

4. *The SoCalGas Report does not include the environmental justice, health, and air quality impacts of a biomethane solution.*

It is left unacknowledged throughout SoCalGas's report that producing and combusting biomethane has serious implications on human and community health. Burning biomethane in household appliances releases the same criteria pollutants as fossil natural gas, including nitrogen dioxide, carbon monoxide, nitric oxide, formaldehyde, acetaldehyde, and ultrafine particles, all of which are harmful to human health.[21] Furthermore, the sources of waste for

---

[19] Environmental Defense Fund, "New Study Finds U.S. Oil and Gas Methane Emissions Are 60 Percent Higher Than EPA Reports," (June 21 2018). https://www.edf.org/media/new-study-finds-us-oil-and-gas-methane-emissions-are-60-percent-higher-epa-reports-0

[20] Marc L. Fisher *et al.,* Lawrence Berkeley National Lab, *An Estimate of Natural Gas Methane Emissions from California Homes* (Aug. 2, 2018). https://pubs.acs.org/doi/10.1021/acs.est.8b03217

[21] See, Jennifer Logue et al., "Pollutant Exposures from Natural Gas Cooking Burners: A Simulation-Based Assessment for Southern California" Environmental Health Perspectives Vol. 122 No. 1 pp. 43-50, (2013); Victoria Klug and Brett Singer."Cooking Appliance Use in California Homes—Data Collected from a Web-based Survey." Lawrence Berkeley National Laboratory (August 2011); John Manuel, "A Healthy Home Environment?" Environmental Health Perspectives, Vol. 107, No. 7 1999, pp. 352–357;

biomethane, including dairies and landfills, pollute air and water and have significant negative impacts on the health of nearby communities, which are more likely to be environmental justice communities. Any truly equitable solution to meet California's climate goals must consider these critical externalities of continuing to rely on combusting biomethane.

5. *The SoCalGas Report models electric appliances that are much less efficient and much more expensive than currently available products.*

The SoCalGas report systematically uses worst case efficiency and cost assumptions for electrification, and best case assumptions for gas, leading to a grossly misleading comparison of the cost of electrification versus a biomethane approach to decarbonization. By modeling the minimum allowable efficiency standards for electric appliances and the higher end of the costs, the analysis grossly underestimates the greenhouse gas reduction potential of electrification, and overestimates monthly electricity bills.

a. Efficiency assumptions

The SoCalGas report models electric appliances much less efficient than currently available products – and in some cases, even models electric options that are no longer sold, because much higher performing appliances are available. Furthermore, the appliances sold today continue to improve. It is simply not realistic to assume electric appliances with such low ratings will be used *in 2030*.

> Example 1: The report uses the federal minimum efficiency standard for an electric heat pump water heater (HPWH), which far lower than the heat pumps on the market today. Our survey of available residential water heaters did not yield a single HPWH appliance with the low rating used in the SoCalGas Report, Energy Factor (EF) 2.0, which is the federal minimum efficiency assumption.[22] Typical EF for HPWH sold in the market today is 3 to 3.7 – 54 to 66 percent more efficient than the products modeled in the SoCalGas Report.[23] When projecting what HPWH will be available in 2030, it is reasonable to expect that efficiency will continue to increase beyond what is available today.

Nasim Mullen et al. "Impact of Natural Gas Appliances on Pollutant Levels in California Homes" Lawrence Berkeley National Laboratory, 2012.

[22] Google Shopping search for residential 50 gallon HPWH (Aug. 24, 2018): https://www.google.com/search?rlz=1C1GGRV_enUS750US750&tbm=shop&q=residential+hpwh++purchase&tbs=vw:l,mr:1,pdtr0:1740489%7C151.41647338867188%24219.5538787841797,pdtr1:964952%7C964953,cat:621,pdtr2:981108%7C981109&sa=X&ved=0ahUKEwieiM-u3-_cAhUDOa0KHY9VCeAQsysIqwIoAA&biw=933&bih=579

[23] *See* EPA EnergyStar Product Finder for Heat Pump Water Heaters, available at https://tinyurl.com/ybfeu73r.

Example 2: The SoCalGas Report assumes low-efficiency electric resistance for cooking, clothes dryers and commercial water heaters despite the availability of much more efficient products. In the table below, we present a comparison of the SoCalGas electric appliance assumptions contrasted with high-efficiency electric appliances that are available on the market today. In reality, an electrification program would use heat pump water heaters that consume three times less electricity than conventional electric resistance water heaters. Similarly, electric induction stoves are faster and use less energy than electric resistance stoves, and most consumers choose Energy Star dryers that save 25% of the energy used by a lower quality dryer.

Figure 4. Comparison of Electric Appliance Efficiencies

End use	**SCG Repot assumptions for electric appliances**	**High efficiency electric appliances available in 2018**
Water heating (residential)	Heat pump water heater - Energy Factor 2.0 (federal minimum)	Heat pump water heater - Energy Factor 3.0 - 3.7[24] in U.S.
Water heating (commercial)	Electric resistance (99% efficient, or COP=.99)	Heat pump water heater (COP for Heating 4.8-5.9 and COP for cooling 3.8-4.9)[25]
Space heating (residential)	Heat pump space heater SEER 14 / HSPF 8.2 (federal minimum)	Heat pump space heater SEER 30-42 / HSPF 12.5-15[26]in U.S., HSPF 19 in Japan.
Space heating (commercial)	Electric boiler (99% efficient, or COP=.99)	Heat pump space heater (IEER 30.1 - 33.6)[27]
Clothes drying	Electric resistance	Heat pump (CEF of 3.71-6.47) [28]

[24] EPA EnergyStar Product Finder for Heat Pump Water Heaters, *supra.*
[25] *See, e.g.,* Redwood Energy, *A Guide to Electric Water Heaters for Retrofits and New Construction,* https://drive.google.com/file/d/0Bz0jnjBiwjkuS2ZoNjR6SGV1MF84OFY5OFlURmhYVzZkd2k4/view?usp=sharing; A.O. Smith Brochure, *Commercial Electric Heat Pump Water Heaters*, https://www.hotwater.com/lit/brochures/aosze01000.pdf.
[26] *See* Air Conditioning, Heating, and Refrigeration Institute (AHRI), Product Database, available at https://www.ahridirectory.org/Search/SearchHome?ReturnUrl=%2f.
[27] *See* AHRI Database, *supra.*
[28] EPA, Energy Star Product Finder for Heat Pump Clothes Dryers, available at https://tinyurl.com/y7clnrqn.

Cooking (residential)	Electric resistance (FSTC baseline[29])	Induction (84% efficient)[30]
Cooking (commercial)	Electric resistance (FSTC baseline)[31]	Induction (84% efficient)[32]
Boiler (commercial)	Electric resistance (99% efficient)	Air-to-water heat pumps (Water Loop Heat Pump COP 3.5- 6.5)[33]

Example 3: While the SoCalGas Report has an "energy efficiency" scenario for natural gas and renewable gas, there is no efficiency scenario for electrification. The report acknowledges that "[h]igher efficiency electric technologies would reduce operating costs for the electrification projections while increasing first costs, but that is not within the scope of this analysis."[34] This is another example of the lack of parity in the analysis between of electrification and methane.

b. Equipment prices

The SoCalGas Report consistently models prices for electric appliances that are at the upper end or exceed prices in the market today. This approach does not take into account how prices will come down for advanced electric appliances with increased deployment, market transformation and supportive policies like bulk purchasing.

The SoCalGas report acknowledges that their price assumptions for electric appliances are consistently higher than the costs used in state agency regulatory databases like the CPUC's Database of Energy Efficiency Resources (DEER) and higher than the assumptions in other building electrification cost studies, including UC Berkeley/LBNL, Itron 2014 Measure Cost Study, Navigant/CBIA "The Cost of Residential Appliance Electrification" (April 2018).[35]

[29] FSTC Baseline is the Food Storage and Technology Center's comparison of a baseline commercial range with typical cooking ranges of 65-85% for electric systems and 25-35% for gas. *See* https://www.energy.gov/sites/prod/files/2014/07/f17/commercial_appliance_research_opportunities.pdf

[30] Lawrence Berkeley National Lab, *Potential Impact of Alternative Efficiency Levels for Residential Cooking Products,* available at https://web.archive.org/web/20110811185456/http://www1.eere.energy.gov/buildings/appliance_standards/residential/pdfs/cookgtsd.pdf

[31] FSTC Baseline is the Food Storage and Technology Center's comparison of a baseline commercial range with typical cooking ranges of 65-85% for electric systems and 25-35% for gas. *See* https://www.energy.gov/sites/prod/files/2014/07/f17/commercial_appliance_research_opportunities.pdf

[32] Lawrence Berkeley National Lab, supra at ftn. 40.

[33] *See* AHRI Database, *supra.*

[34] SoCalGas Report, p. 9.

[35] SCG Report, p. 61 Table A-14 *Comparison of Residential Water Heater Cost Estimates.*

Example 1: The study assumes that the appliance cost for electrification "is largely determined by the residential water heater cost assumptions," which are grossly inflated. The SoCalGas Report assumes the installed cost of a HPWH is $4,313, compared to $1,448 for a gas storage water heater, and assumes a HPWH (EF 2.0) costs $1,600. HPWHs with far higher efficiency ratings sell for a lower retail price.

Figure 5. HPWH Prices

Manufacturer / Model	Efficiency Rating	Size (gallons)	Price of appliance
SoCalGas Report assumption	*2.0*	*Not stated*	*$1,600*
AO Smith Voltex Hybrid Electric Heat Pump 50-Gallon Water Heater	3.61[36]	50	$1,199[37]
Rheem / Prestige Hybrid	3.5	50	$1,389[38]
American Water Heater Tall	2.75	50	$1,429[39]
Reliance Hybrid Electric Heat Pump[40]	3.42	50	$1449[41]
Kenmore Elite 59250 Hybrid Electric Heat Pump Water Heater	3.24	50	$1559[42]

The SoCalGas Report then pads this high-priced HPWH with miscellaneous equipment and material costs and other fees, without explanation or citations, that add over $2,700

[36] A.O Smith Brochure, *supra* at ftn. 25.

[37] Discount Bandit, https://www.discountbandit.com/ao-smith-fptu-50-voltex-50-gallon-residential-hybrid-electric-heat-pump-wat.html?utm_source=GoogleShopping&utm_medium=cpc&utm_campaign=GoogleShopping&gclid=EAIaIQobChMIv6Or3syC3QIVAkOGCh20OQTVEAkYASABEgL_ovD_BwE

[38] G.P. Conservation https://www.gpconservation.com/rheem-prestige-series-hybrid-electric-water-heater.html?gclid=EAIaIQobChMIj_GdyIOG3QIVUVmGCh1YNQLCEAQYAiABEgLoQ_D_BwE

[39] Bonanza, https://www.bonanza.com/listings/American-Tall-High-Efficiency-Hybrid-Electric-Heat-Pump-50-Gallon-240-Volts-/440157376?goog_pla=1&gpid=173784728461&keyword=&goog_pla=1&pos=1o1&ad_type=pla&gclid=CjwKCAjwtvnbBRA5EiwAcRvnpoSrg4ca9ufv5KaqeiNZblOACro7OdSsEvA4qDjgtG6OA1j06zLDWRoCdWsQAvD_BwE

[40] Reliance Water Heaters, http://www.reliancewaterheaters.com/media/60879/REL_10YR_HP_SPEC_SHEETS.pdf

[41] Abt, https://www.abt.com/product/108969/Reliance-50-Gallon-Tall-Hybrid-Electric-Heat-Pump-Water-Heater-1050DHPHTNE.html

[42] Sears, https://www.sears.com/kenmore-elite-50-gallon-hybrid-electric-water-heater/p-04259250000P

to the installation cost.[43] (This cost does not include potential infrastructure upgrade fees, which we address below.) These inflated cost assumptions effectively double the cost of electrification compared with findings in other studies.

Example 2: The SoCalGas Report ignores the cost savings from heat pumps providing both heating and cooling in one appliance. When a gas furnace is replaced with an electric heat pump space heater, the resident effectively gets two high-efficiency appliances in one a space heater and an air conditioner (A/C). This means the resident no longer needs to purchase or service separate A/C equipment. The study offer no "A/C credit" in the cost analysis for building electrification. Given that Southern California has some of the highest rates of A/C ownership in the state,[44] this is a clear shortcoming in the analysis that once again dings electrification.

c. Installation and upgrade costs

Building electrification can can entail a one-time cost to upgrade the building – for example, to run electrical conduit to the electric appliance, install a condensate drain for a HPWH, and in some cases install a larger circuit. These upgrades improve the value of the home and their costs are variable and depend on the location, size, and condition of the home. The SoCalGas Report relies on a survey of upgrade costs in the City of Palo Alto as a proxy.[45] Palo Alto is one of the most expensive cities in California,[46] and by extension has services that are typically more costly than other areas of the state. Basing upgrade costs on one affluent city is not an appropriate proxy for Southern California or the state.

The SoCalGas Report also assumes that 50% of buildings will require a panel upgrade, but provides no basis for this estimate. A panel upgrade is not always required for electrification. In fact, the introduction of the 15 Amp Rheem HPWH last year means electrification is more likely to be possible without upgrading the panel. Moreover, homes with rooftop solar, electric vehicles, swimming pools, hot tubs, electric saunas, and wood shops will not need to upgrade their electrical panel in most cases. Given that a panel upgrade will also support residents to install rooftop solar and/or purchase an electric vehicle, it is problematic to have building electrification shoulder the full cost of the upgrade.

---

[43] SoCalGas Report, p. 61, Table A-14, Comparison of Residential Water Heater Cost Estimates.
[44] CEC, Residential Appliances and Saturation Study, http://www.energy.ca.gov/2010publications/CEC-200-2010-004/CEC-200-2010-004-ES.PDF, Table ES-1.
[45] SoCalGas Report, p. viii, citing TRC Solutions. 2016. "Palo Alto Electrification Final Report." City of Palo Alto. Available at: https://www.cityofpaloalto.org/civicax/filebank/documents/55069.
[46] https://sf.curbed.com/2017/11/30/16720190/atherton-forbes-expensive-zip-code

d. New construction

The SoCalGas Report does not include the costs of gas infrastructure in new construction.[47] Leaving out these significant costs leads to inaccurate findings that the biomethane strategy is more economical than electrification. It is well documented that all-electric buildings often cost less to build than mixed-fuel buildings. All-electric new construction avoids gas infrastructure costs, including distribution main lines under the street, gas meter and connection to the main, gas piping within the building, and exhaust venting. Stone Energy Associates and others have described the range of gas infrastructure costs in multiple letters to the California Energy Commission through the Title 24 public comment process. As a snapshot: KB Homes and City Ventures provided the Commission with a combined-cost figure of $4,500 net savings per single family home for going all-electric. Redwood Energy's experience with multifamily projects is that the net cost savings per unit for avoiding gas infrastructure ranges between $2000 and $3000 per dwelling unit.[48]

e. Electricity and gas rates

The SoCalGas Report assumes the worst case scenario for electricity rates relative to gas rates. The analysis ignores electricity tariffs like time-of-use (TOU) rates and rooftop solar, both of which will have downward pressure on costs for electrified homes.

> <u>Example 1:</u> The report models a "high rate" sensitivity for electricity, but not for gas. The report models average electricity rates with 3% inflation per year as a "high rate" sensitivity over the 1% per year increase that is consistent with the CEC's Integrated Energy Policy Report. The report does not, however, model a "high rate" sensitivity for gas, but rather assumes gas prices will increase only 1%/year. This is lower than and not consistent with the California Energy Commission *Natural Gas Market Trends and Outlook* report which projects price increases of about 3% per year from 2018-2030.[49]

> <u>Example 2</u>: The study does not include time-of-use rates, despite California's direction towards time variant electricity rates**.** As we have seen with electric vehicles, time-of-use rates can significantly lower the monthly costs of building electrification, as residents can load shift to use electric appliances like water heaters during off-peak, and use thermal storage to keep water hot for use during peak hours when electricity is more costly.[50]

---

[47] SoCalGas Report, p. 32

[48] CEC Docket No. 16-BSTD-06, Letter from Nehemiah Stone, Stone Energy Associates, to CEC Re: 2019 Building Energy Efficiency Standards Development (Apr. 4, 2017).

[49] California Energy Commission, Staff Final Report 2017 Natural Gas Market Trends and Outlook, Jan 2018, p. 3.

[50] HPWH Demand Flexibility Study, https://aceee.org/sites/default/files/pdf/conferences/hwf/2018/2a-delforge.pdf

Example 3: The study also leaves out how access to rooftop or community solar will lower utility bills for electrified homes. Rooftop solar is becoming increasingly common in Southern California: installations have increased in SCE territory by a factor of 6 in a little over a decade, from 360 MW in 2015 to over 2200 MW in mid-2018. We expect considerable growth in rooftop solar between now and 2030 as prices continue to drop and the new state-wide zero-net energy building code (Title 24) goes into effect in 2020. Homes with solar photovoltaics can use their lower-cost electricity supply to power electric heating and cooling, which can lead to reductions in heating bills by 50% or more.

6. The SoCalGas Report underestimates the growth in renewable energy.

The SoCalGas report assumes the minimum statutorily required amount of renewable energy, 50% renewables by 2030, is on the grid. This assumption overestimates the carbon intensity of the grid for the electrification scenarios, as it is commonly accepted that utilities will exceed SB 350 RPS requirements. The Public Utilities Commission expects utilities will hit the 50% target far sooner, as early as 2020.[51] And the electric utilities in SoCalGas territory have plans to exceed these goals as well: LADWP's Renewable Portfolio Standard requires renewables to make up 55% of electric supply by 2025, 60% by 2030, and 70% by 2035, and SCE has set a goal of 80% renewable electricity supply by 2030.

Given the rapid growth in both utility scale renewables and rooftop solar and the likelihood that California will soon require a more stringent renewable portfolio standard through legislation like S.B. 100, the SoCalGas Report misses the opportunity to include a more realistic renewable energy assumption or sensitivity, and uses the worst case assumption for the electrification analysis.

B. Conclusion

For the foregoing reasons, the SoCalGas report does not provide an accurate or unbiased comparison of the impacts and costs of biomethane as compared to building electrification. We appreciate the Commission's consideration of this critique, and look forward to engaging further in the process of preparing the 2018 IPER.

Sincerely,

Rachel Golden

---

[51] California Public Utilities Commission, *California Renewables Portfolio Standard,* http://www.cpuc.ca.gov/RPS_Homepage/

Senior Campaign Representative
Sierra Club
2101 Webster, Suite 1300
Oakland, CA 94612
Tel: 415-977-5647
Email: rachel.golden@sierraclub.org