December 2, 2019

Via Electronic Submittal at http://www.arb.ca.gov/lispub/comm/bclist.php

Re: Opposition to Proposed Fuel Cell Net Energy Metering Greenhouse Gas Emission Standard Regulation

Earthjustice, Sierra Club, the Natural Resources Defense Council, Vote Solar and the Union of Concerned Scientists write to express our strong opposition to the proposed Fuel Cell Net Energy Metering Greenhouse Gas Emission Standards Regulation ("Fuel Cell GHG Standard"). As the climate crisis deepens and the need for meaningful action grows more urgent, municipalities such as the City of Santa Clara have prohibited interconnection of gas-powered fuel cells because "fuel cells use natural gas, a non-renewable energy source that continuously emit GHG when they generate power. As a result, their increased usage would run contrary to the clean energy goals set by the City and State."[1] Yet ARB staff propose going in the opposite direction, using a flawed and incomplete methodology to calculate a Fuel Cell GHG Standard that enables the substantial public subsidy of inefficient and GHG-intensive fuel cell projects.[2] We urge its rejection by the Board.

The proposed Fuel Cell GHG Standard sets a 2017 GHG standard of 409 kg CO_2/MWh, which would decrease by 2.5 percent annually to 360 kg CO_2/MWh in 2022. To put ARB's proposed standard in context, 409 kg CO_2/MWh is over *four times* the grid average in PG&E's service territory.[3] The 409 kg CO_2/MWh GHG standard is also significantly greater than the analogous 332 kg CO_2/MWh 2017 GHG threshold adopted by the California Public Utilities Commission ("PUC") under the Self-Generation Incentive Program ("SGIP") and exceeds the

---

[1] City of Santa Clara, *Silicon Valley Power Advances Commitment to Renewables* (May 9, 2019), http://santaclaraca.gov/Home/Components/News/News/38964/ (emphasis added); City of Santa Clara Resolution No. 19-8701 at 2 (May 7, 2019) (limiting "the interconnection of Parallel Generation to facilities meeting the state criteria for renewable electrical generation facilities for the purpose of limiting greenhouse gas emissions in the City"), https://santaclara.legistar.com/LegislationDetail.aspx?ID=3936721&GUID=54E8FC8C-CE96-4231-A280-479191255D80. In response to the City's efforts to take this necessary action to meet its clean energy goals, Bloom Energy, a primary beneficiary of the $100 million in public subsidy under Fuel Cell NEM, filed a lawsuit. https://www.mercurynews.com/2019/06/13/bloom-energy-sues-santa-clara-for-undermining-its-technology/.

[2] Ratepayer subsidy under the Fuel Cell NEM program are estimated at $200k/MW. ARB, *Presentation on Fuel Cell Net Energy Metering GHG Emission Standards*, at Slide 3 ("Fuel Cell NEM Background") (Nov. 28, 2017), https://arb.ca.gov/energy/nem/fc_nem_presentation_11-28-17.pdf. With 500 MW of program capacity, the potential incentives under FC-NEM total approximately $100 million.

[3] PG&E, Fighting Climate Change (last accessed July 22, 2019) (converting 210 lbs CO_2/MWh to 95 kg CO_2/MWh), http://www.pgecorp.com/corp_responsibility/reports/2019/en02_climate_change.html.

emissions rate of many of California's gas plants.[4] Because the proposed Fuel Cell GHG Standard would subsidize fuel cells over 20 percent more polluting than the standard adopted by the PUC, it contravenes the legislative intent of AB 1637, which is clear that ARB's Fuel Cell GHG Standard should "be lower than the existing [SGIP] standard at the outset."[5] Indeed, assuming continuous 2.5 percent declines in the Fuel Cell GHG Standard, which is not assured under the proposed methodology, the Fuel Cell GHG Standard would not be lower than the PUC's 2017 GHG threshold until 2026. The discrepancy is more glaring given the PUC adopted its fuel cell GHG standard in 2015, before laws such as SB 100 and SB 32 accelerated California's renewable energy and greenhouse gas reduction requirements.

As detailed in the appendix, the Staff proposal contains omissions, overly conservative assumptions and methodological flaws that collectively function to inflate the proposed Fuel Cell GHG Standard significantly. These include: 1) failure to account for additional methane leakage resulting from fuel cells' location behind the meter; 2) reliance on a methodology that understates the hours when renewables are the marginal grid resource; 3) inadequate support for the elimination of the 1-RPS Factor to account for avoided renewable procurement from decreased retail sales that result from deployment of 500 MW of behind the meter gas generation contemplated under the Fuel Cell Net Energy Metering ("NEM") program; and 4) failure to account for the impact of these same resources on increasing renewable curtailment. Properly accounting for these concerns will result in a more accurate and appropriately stringent GHG Standard that, consistent with the legislative intent of AB 1637, is lower than the analogous PUC fuel cell GHG threshold adopted four years ago.

Respectfully,

Matthew Vespa
Staff Attorney
Earthjustice
50 California Street, Suite 500
San Francisco, CA 94111
Telephone: (415) 217-2123
Email: mvespa@earthjustice.org

Katherine Ramsey
Staff Attorney
Sierra Club
2101 Webster Street, Suite 1300
Oakland, CA 94612
Telephone: (415) 977-5737
Email: katherine.ramsey@sierraclub.org

Alex Jackson
Senior Attorney
Natural Resources Defense Council
111 Sutter Street, 21st Floor

Jason Barbose
Western States Senior Policy Manager
Union of Concerned Scientists
500 12th St., Suite 340

[4] Decision 15-11-027, *Decision Revising the Greenhouse Gas Emission Factor to Determine Eligibility to Participate in the Self-Generation Incentive Program Pursuant to Public Utilities Code Section 379.6(b)(2) as Amended by Senate Bill 861*, Rulemaking 12-11-005, at Appendix B (Nov. 19, 2015), http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M156/K044/156044151.PDF. For example, based on information provided in CEC permitting, the emissions rate of the Blythe Energy Project is 383 kg CO_2/MWh, 392 kg CO_2/MWh for La Paloma Energy Center and 378 CO_2/MWh for the Palomar Energy Center.

[5] Bill Analysis Before the Assembly Committee on Natural Resources at 2 (Aug. 30, 2016), https://leginfo.legislature.ca.gov/faces/billAnalysisClient.xhtml?bill_id=201520160AB1637.

San Francisco, CA 94104
Telephone: (415) 875-6100
Email: ajackson@nrdc.org

Oakland, CA 94607
Telephone: (510) 809-1577
Email: jbarbose@ucs.org

Ed Smeloff
Senior Director, Grid Integration
Vote Solar
360 22nd St., Suite 730
Oakland, CA 94612
Telephone: (707) 677 2107
Email: ed@votesolar.org

Appendix: Methodological Concerns with the Proposed Fuel Cell GHG Standard

1) The Proposed GHG Fuel Cell Standard Fails to Account for Additional Methane Leakage Resulting from Deployment.

Unlike centralized gas generation which is typically connected to the gas transmission system, fuel cells subsidized under the Fuel Cell NEM program are located behind a customer's meter and connected to the gas distribution system. This means that additional methane leakage will occur as methane moves through the gas distribution system, behind a customer's meter, and to the fuel cell. In comments on the Discussion Draft, we provided ARB Staff with a methodology using ARB's own leakage estimates to account for this additional GHG impact.[6] Yet the proposed Fuel Cell GHG Standard continues to ignore this concern.

A joint analysis by ARB and the PUC on natural gas leakage estimates the leakage rate of the distribution system at 0.14%.[7] Using a 20-year global warming potential ("GWP") for methane to properly reflect the urgency of the climate crisis, as ARB has used to justify past actions,[8] accounting for methane leakage reduces the GHG standard by approximately 18 kg CO_2e/MWh GHG per year.[9] Accordingly, the proposed GHG Fuel Cell GHG Standard should be

---

[6] Appendix B: Staff Report: Initial Statement of Reasons, Public Process for Development of the Proposed Regulation at 146, *https://ww3.arb.ca.gov/regact/2019/fcnem19/isorappb.pdf*.

[7] ARB & PUC, *Joint Staff Report-Analysis of the Utilities' June 15, 2018, Natural Gas Leak and Emission Reports* (Dec. 21, 2018), https://www.cpuc.ca.gov/uploadedFiles/CPUC_Website/Content/Safety/Risk_Assessment/Methane_Leaks/2017%20NGLA%20Joint%20Report%2012-21-18.pdf. According to Table 2: Total Emissions by System Category, 2015-2017, in 2017, the volume of methane emissions from Distribution Mains & Services was 1,420 MMscf, and the volume from Distribution Metering and Regulating ("M&R") Stations was 1,334 MMscf, equaling a total of 2,754 MMscf methane leaked from the distribution system. According to Table 5: System-wide Emissions – Throughput Categories, 2015-2017, total gas throughput in 2017 equaled 2,017,306 MMscf. Total distribution system leakage (2,754 MMscf) divided by total throughput (2,017,306 MMscf) equals the 2017 distribution system leakage rate: 0.00136, or 0.14%. This is a conservative estimate. Total distribution system leakage *and* Customer Meter leakage (1,656 MMscf in 2017, according to Table 2) equals to 4,410 MMscf. Divided by total throughput, the combined distribution and customer leakage rate is 0.00218 or 0.22%.

[8] *See, e.g.*, ARB, *Aliso Canyon Methane Leak Climate Impacts Mitigation Program* at 7 (Mar. 31, 2016) ("With this mitigation program, ARB uses the 20-year GWPs for SLCPs assigned by AR 5. These figures properly incorporate current scientific knowledge, underscore the influence of SLCPs as immediate climate-forcing agents, and emphasize the need for immediate action on climate change."), https://ww3.arb.ca.gov/research/aliso_canyon/arb_aliso_canyon_methane_leak_climate_impacts_mitigation_program.pdf?utm_medium=email&utm_source=govdelivery; https://www.arb.ca.gov/regact/2016/oilandgas2016/oilgasatt2.pdf at 8 (discussing cost per ton of CO2e reductions using 20-year methane GWP).

[9] The CO_2e associated with leakage is calculated by assuming 0.14% of leakage per therm. The amount that would leak per MWh is calculated using the average gas heat content and heat rate of a combined cycle unit (EIA, 2017). The heat rate for a combined cycle unit is used to present a conservative estimate based on the most efficient gas-fired power plant technology. The formula used to arrive at the 18 kg CO_2e/MWh of GHG pollution from methane leakage in the distribution system is: 0.230139 (kg CO_2e/therm) * 76.71 (therms of gas used by combined cycle therm/Mwh). The assumptions supporting this calculation are attached.

reduced by 18 kg CO_2e/MWh to properly account for methane leakage.

2) The Proposed GHG Fuel Cell Standard Locks In a Methodology That Substantially Understates Hours Where Renewables Are the Marginal Grid Resource.

The proposed GHG Fuel Cell Standard understates the hours that renewable resources operate as the marginal grid resource by assuming renewables are the marginal resource only when day-ahead electricity prices are at or below zero dollars. The basis for this assumption is that "[w]hen the electricity price is zero, renewable generation is likely on the margin because generators that require fuel (e.g. CCGT, SCGT) are not likely to bid into the market when electricity prices are at or below zero. This is because their operational costs are always greater than zero because of the greater fuel."[10] Operational costs of gas-fired generation are also greater when day ahead market prices are above zero dollars due to fuel costs. A more accurate way to determine hours when renewables are the marginal resource is to determine the Implied Market Heat Rate ("IMHR"). A methodology for doing so was provided by PG&E in the 2018 Rate Design and is excerpted below.[11]

PACIFIC GAS AND ELECTRIC COMPANY
ATTACHMENT 1
INVESTOR-OWNED UTILITY (IOU) DISCUSSION OF MARGINAL GREENHOUSE GAS (GHG) EMISSION CALCULATIONS

Both Energy and Environmental Economics, Inc.'s Avoided Cost Calculator (ACC) Model and Itron's 2016 Self-Generation Incentive Program (SGIP) methodology (used in the 2016 SGIP GHG Evaluation) calculate marginal GHGs as a function of Implied Market Heat Rates (IMHR) in the California Independent System Operator (CAISO). For ratesetting applications, the IOUs advocate for using Day-Ahead (DA) prices to calculate heat rates.

The IMHR is defined as: (Price – VOM[1])/(Gas price + transport cost + GHG price*0.0532)
Marginal GHG emissions in t/MWh[2] = IMHR * 0.0532 t/MMBtu

For both methodologies:

- IMHRs less than or equal to (≤) zero (i.e., prices ≤ the non-zero VOM) are set to zero;
- IMHRs greater than an assumed "low-efficiency" gas heat rate are set to the low-efficiency rate; and
- IMHRs between zero and a heat rate for an assumed "high efficiency" gas generator are set to the high-efficiency rate.

Thus, when the IMHR is below the high-efficiency threshold, efficient thermal generation is assumed to be on the margin; once the IMHR gets down to, or less than zero, renewables are assumed to be on the margin.

Assumptions regarding the hours when renewables are the marginal resource have a significant

---

[10] Staff Report: Initial Statement of Reasons at 9.
[11] A.17-12-011, PG&E 2018 Rate Design Window, Supplemental Testimony on Calculation of Cost Estimates and GHG Reductions (Sept. 26, 2018).

impact on the outcome of the GHG Standard. As the Statement of Reasons acknowledges, using all hours renewable resources are curtailed would reduce the GHG Standard from 409 to 308 kg CO_{2e}/MWh.[12] While this includes curtailment due to localized congestion, a converse methodology that only looks at hours where market prices are at or below zero dollar inflates the GHG standard by underestimating the number of hours where renewable are the marginal resource. To more accurately identify marginal grid resources, the IMHR methodology should be utilized.

Moreover, the proposed Fuel Cell GHG Standard locks-in this flawed methodology in perpetuity. Under the proposed regulations, ARB would apply the same formula every three years until 2047.[13] This precludes accounting for more accurate modeling on determining hours when renewables are the marginal resource. Because IMHR is a more accurate means of identifying the marginal resource at a given hour of the year, ARB at a minimum should ensure its regulations permit it to be incorporated in the next update.

3) The Proposed GHG Fuel Cell Standard Does Not Adequately Support the Elimination of the 1-RPS Factor to Account for Avoided Renewable Procurement that Results from the Fuel Cell NEM Program.

California's Renewable Portfolio Standard ("RPS") requirements are determined based on retail sales of electricity. Accordingly, the reduction in demand from the 500 MW of baseload behind-the-meter gas resources permitted under the FC-NEM program will reduce RPS procurement obligations on load serving entities. AB 1637 expressly requires ARB to account for the impact of reduced RPS procurement in determining the FC-NEM GHG standard.[14] In both the PUC's GHG threshold under SGIP and ARB's earlier proposed 324 kg CO_2/MWh GHG standard this was done using a 1-RPS Factor. The Initial Statement of Reasons excludes the 1-RPS Factor on the grounds that "IOUs are procuring more renewable generation than is required by the RPS" and cites to the exclusion of the 1-RPS Factor in the PUC's 2018 Avoided Cost Calculator ("ACC").[15] The reason the 2018 ACC did not include an RPS adder was because the passage of SB 350 made the need to achieve GHG reductions, rather than the need to meet RPS goals, the binding constraint on the electric sector. It is therefore not appropriate to look to ACC assumptions in determining a GHG Standard for fuel cells. In addition, the 2018 ACC was adopted prior to the passage of SB 100, which increased 2030 RPS requirements from 50 to 60 percent. ARB has made no demonstration that California is currently over-procured to meet a 60 percent RPS. Indeed, many newly formed Community Choice Aggregators are under-procured.[16] Therefore, additional BTM baseload generation will reduce future RPS procurement and ARB

---

[12] Initial Statement of Reasons at 29.

[13] Proposed Reg. § 95412.

[14] Pub. Util. Code, § 2827.10(b)(2) (FC GHG standard established by ARB "reduces greenhouse gas emissions compared to the electrical grid resources, including renewable resources, that the fuel cell electrical generation resource displaces, *accounting for both procurement* and operation of the electric grid") (emphasis added).

[15] Initial Statement of Reasons at 7-8.

[16] *See, e.g,* D.19-09-007, *Decision on New Community Choice Aggregators' 2018 Renewables Portfolio Standard Procurement Plans and Liberty Power Holdings' Request for Waiver* (Sept. 12, 2019), http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M313/K975/313975474.PDF.

must account for this impact in determining the Fuel Cell GHG Standard.

4) The Proposed GHG Fuel Cell Standard Fails to Account for the Impact of 500 MW of Baseload Fuel Cells on Renewable Curtailment and Forecloses Any Future Consideration of this Impact.

Fuel cells typically operate on a 24/7 baseload basis. This decreases grid flexibility and increases hours of renewable curtailment. Deployment of 500 MW of additional baseload resources envisioned under the Fuel Cell NEM program is not trivial. Yet the proposed Fuel Cell NEM Standard fails to account for this impact. This omission functions to further inflate the GHG standard. While it is currently difficult to determine how to measure the impact of additional baseload generation on renewable curtailment, methodologies to do so will likely develop in the future as our understanding of grid operations becomes more sophisticated. But because the proposed regulations lock-in the application of the same methodology through 2047, the proposed Fuel Cell GHG Standard makes it impossible to incorporate this important consideration in future updates.

5) Limited Biomethane Supplies Should Not Be Squandered on Stationary Fuel Cells.

The Initial Statement of Reasons' claim that the proposed Fuel Cell GHG Standard will facilitate the switch to biofuels is fundamentally misplaced.[17] Fuel cells operating off renewable fuel already qualify for the more generous incentives under the existing NEM program (as opposed to FC-NEM) and for incentives under SGIP. Accordingly, a declining GHG threshold under the FC-NEM program in no way functions to incentivize increased use of renewable gas.[18] Moreover, the *potential* supply of biomethane represents less than four percent of total gas demand in California.[19] Limited biogas supplies should be directed at existing difficult to electrify applications rather than to incentivize new, gas-dependent stationary power sources to meet building energy demands that could otherwise be served by an increasingly decarbonized grid.

---

[17] Initial Statement of Reasons at 14.

[18] Pub. Util. Code, § 2827(b)(11); Pub. Resources Code, § 25741.

[19] *Compare* Amy M. Jaffe *et al.*, *The Feasibility of Renewable Natural Gas as a Large-Scale, Low Carbon Substitute*, STEPS Program, Institute of Transportation Studies, UC Davis, at ix (2016), https://ww3.arb.ca.gov/research/apr/past/13-307.pdf (finding 82 bcf/y of biomethane sources "attractive for private investment," after accounting for substantial state and federal incentives) *with* U.S. Energy Information Administration, *Natural Gas Consumption by End Use* (Release Date: June 28, 2019), https://www.eia.gov/dnav/ng/ng_cons_sum_dcu_SCA_a.htm (California gas use in 2017 over 2,110 bcf/y).