July 22, 2019

Via Online Filing though Air Resource Board Website

Re: Comments on Preliminary Discussion Draft of Fuel Cell Net Metering Greenhouse Gas Emission Standards

The Natural Resources Defense Council, Sierra Club, and Earthjustice write to express our concerns with the most recent iteration of the Air Resources Board's ("ARB") proposed greenhouse gas ("GHG") emissions standard for Fuel Cell Net Energy Metering ("FC-NEM"). Assembly Bill ("AB") 1637 tasked ARB with establishing a GHG emissions standard that ensures only gas-powered fuel cells that reduce GHG pollution are eligible for the approximately $200k/MW of incentives under the FC-NEM program.[1] Instead, the GHG standard proposed in ARB's July 10, 2019 Preliminary Discussion Draft uses a flawed methodology that would allow inefficient and GHG intensive fuel cell projects to qualify. To put ARB's proposed standard in perspective, the California Public Utilities Commission ("PUC") adopted an analogous first-year 2017 GHG threshold of 332 kg CO_2/MWh for fuel cells under the Self-Generation Incentive Program ("SGIP").[2] In contrast, ARB has now proposed a 2017 FC-NEM GHG standard of 409 kg CO_2/MWh.[3] This result contravenes the legislative intent of AB 1637, which is clear that ARB's FC-NEM GHG standard should "be lower than the existing [SGIP] standard at the outset."[4]

The Preliminary Discussion Draft's proposed GHG standard not only violates the legislative intent of AB 1637, but its statutory requirements as well. AB 1637 specifically requires the GHG standard to account for the impact of additional behind-the-meter ("BTM") baseload gas-powered generation on renewable procurement under the Renewables Portfolio Standard ("RPS") from reduced retail energy sales. Yet the proposed standard fails to do so. The methodology also fails to account for increased methane leakage from the deployment of gas-

[1] AB 1637 (amending Pub. Util. Code, § 2827.10); 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.

[2] 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.

[3] ARB, Preliminary Discussion Draft at 2 (July 10, 2019), https://ww2.arb.ca.gov/sites/default/files/2019-07/fcnem_discussiondraft_20190710.pdf.

[4] 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.

powered fuel cells on the gas distribution system. ARB appears to suggest the lax GHG standard that resulted from these omissions is justified to further objectives that are both outside the scope of AB 1637 and not reasonably achieved through additional fuel cell deployment. For example, ARB states a key objective of its GHG standard development is to help "[t]ransition away from diesel as a distributed resource."[5] Yet because diesel generators only operate in an emergency back-up capacity, they are best displaced by solar and energy storage, not baseload gas resources like fuel cells that typically operate on a continuous 24/7 basis and would increase overall reliance on fossil fuels.

ARB should remedy the flaws in the Preliminary Discussion Draft or in the alternative, revisit the 324 kg CO_2/MWh standard it proposed in February 2018. That proposal, which both Pacific Gas and Electric Company ("PG&E") and environmental groups supported, adopts a lower threshold than the PUC adopted in SGIP and properly accounts for the impact of reduced renewable procurement from increased deployment of BTM gas-powered generation.[6] When also accounting for methane leakage, the 2017 GHG threshold would be 306 kg CO_2/MWh. By contrast, the Preliminary Discussion Draft's standard of 409 kg CO_2/MWh would enable ratepayer money to subsidize inefficient fossil-fueled projects that increase GHG pollution, violating both the legislative intent and letter of AB 1637.

1) The Preliminary Discussion Draft's Methodology for Determining the GHG Standard Violates the Requirements of AB 1637.

The Preliminary Discussion Draft's methodology contains several significant flaws and omissions. First, because California's RPS requirements are determined based on retail electricity sales, 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. While AB 1637 expressly requires ARB to account for the impact of reduced RPS procurement in determining the FC-NEM GHG standard, the Preliminary Discussion Draft's methodology fails to do so.[7] Instead, the methodology appears narrowly focused on determining the marginal emissions rate of the resource the fuel cell would displace. While the methodology does include an annual 2.5 percent reduction in the GHG threshold, this appears intended to account for reductions in the marginal operational emissions rate as the grid continues to decarbonize.[8]

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[5] ARB, *Presentation on Fuel Cell Net Metering GHG Emission Standard*, at Slide 5 (July 8, 2019), https://ww2.arb.ca.gov/sites/default/files/2019-07/fcnem_presentation_07082019.pdf.

[6] ARB, Draft Regulation Order (Feb. 12, 2018), https://ww3.arb.ca.gov/energy/nem/2-13-18/revised_draft_reg_order.pdf; PG&E Comments on ARB Draft Regulation Setting a GHG Standard for Fuel Cell NEM Program Eligibility (Feb. 28, 2018), https://www.arb.ca.gov/lists/com-attach/2-fuelcellnemwrkgrp-ws-WysFZANnUV1QMAZz.pdf; Sierra Club and Earthjustice Comments Re: Support of Revised Greenhouse Gas Emissions Standards for the Fuel Cell Net Energy Metering Program, https://www.arb.ca.gov/lists/com-attach/3-fuelcellnemwrkgrp-ws-VyRSPVUxUHEKfgBh.pdf.

[7] 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).

[8] ARB, Preliminary Discussion Draft at 4. To the extent this annual reduction purports to account for reduced RPS procurement, it is not supported.

Properly accounting for reduced RPS procurement as required under AB 1637 has a significant effect on the GHG standard. Both the PUC's GHG threshold under SGIP and ARB's earlier proposed 324 kg CO_2/MWh GHG standard, which relied on the PUC's 2017 Avoided Cost Calculator ("ACC"), account for reduced RPS procurement using a 1-RPS factor. ARB appears to suggest it no longer needs to factor in the impact of reduced RPS procurement from increased BTM deployment because the "2018 ACC did not include the RPS factor due to over-procurement of renewables."[9] 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 electricity sector. In addition, the 2018 ACC was adopted prior to the passage of SB 100, which increased 2030 RPS requirements from 50 to 60 percent. California is not over-procured to meet a 60 percent RPS. Therefore, additional BTM baseload generation will reduce future RPS procurement and ARB must account for this impact in determining the GHG threshold. ARB should either factor avoided RPS procurement into its current methodology or simply follow its previously proposed methodology that yielded a 2017 GHG threshold of 324 kg CO_2/MWh GHG.

The Preliminary Discussion Draft also fails to account for increased methane leakage that will occur from deployment of gas-powered generation on the distribution system.[10] A joint analysis by ARB and the PUC on natural gas leakage estimates the leakage rate of the distribution system at 0.14%.[11] 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,[12] accounting for

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[9] ARB, *supra* fn. 5, at Slide 8. ARB also does not explain the basis for E3's recommendation that CARB not "use the 2018 ACC to determine the emission reduction standard" and what if any, alternative approach E3 proposed. *Id.*

[10] The centralized gas generation the fuel cells would often displace are connected to the gas transmission system and therefore do not result in additional methane leakage that occurs from gas-powered resources like fuel cells that are located behind customer meters connected to the gas distribution system.

[11] 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%.

[12] *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;

methane leakage reduces the GHG standard by approximately 18 kg CO_2e/MWh GHG per year.[13] Accordingly, using ARB's earlier proposed standard of 324 kg CO_2/MWh, which properly accounts for reduced renewable procurement as required under AB 1637, and also accounting for methane leakage, which the earlier standard omitted, yields a GHG standard of 306 kg CO_2/MWh.

The Preliminary Discussion Draft also understates the hours that renewable resources operate as the marginal grid resource by only accounting for 110 hours of negative market pricing. Curtailment can and does occur when market prices are positive. California Independent System Operator ("CAISO") data indicates over 100,000 5-minute intervals, or approximately 1,750 hours of annual renewable curtailment.[14] Also unaccounted for is the additional impact on curtailment from the deployment of 500 MW of baseload behind-the-meter gas generation that typically operates on a continuous basis. These omissions further point to an inflated GHG standard that fails to capture the full extent of GHG pollution resulting from fuel cell deployment.

2) The Majority of the Listed Objectives for the GHG Threshold Are Not Reasonably Achieved Through Additional Fuel Cell Deployment.

ARB appears to attempt to justify adoption of a GHG standard far weaker than that developed by the PUC on the purported grounds that it will meet a series of "Key Objectives."[15] As an initial mater, the only relevant objective is the first: "Comply with AB 1637 legislative mandate." As set forth above, the proposed standard violates both the legislative intent and the letter of AB 1637. The remaining objectives are outside the scope of AB 1637 and, in any event, are not legitimately furthered by additional deployment of fuel cells. For example, one stated objective is to "[t]ransition away from diesel as a distributed generation resource."[16] Diesel generation operates only in the event of an outage. At all other times, energy demand is met by an increasingly decarbonized and renewable grid. Indeed, average grid GHG emissions in PG&E's service territory are 197 kg CO_2/MWh, less than half of the Preliminary Discussion Draft's proposed 2017 GHG standard for fuel cells.[17] Diesel back-up generation should not be replaced with a different fossil-fueled resource that typically operates on a continuous 24/7 basis, particularly where zero emission back-up solar and storage solutions are readily available and

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https://www.arb.ca.gov/regact/2016/oilandgas2016/oilgasatt2.pdf at 8 (discussing cost per ton of CO2e reductions using 20-year methane GWP).

[13] 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.

[14] CAISO Curtailment Data available at http://www.caiso.com/informed/Pages/ManagingOversupply.aspx.

[15] ARB, *supra* fn. 5, at Slide 5.

[16] *Id.*

[17] PG&E, Fighting Climate Change (last accessed July 22, 2019) (converting lbs to kg), https://www.pge.com/en_US/about-pge/environment/what-we-are-doing/fighting-climate-change/fighting-climate-change.page.

more cost-effective.

Another stated objective of the GHG standard is to "[p]romote replacement of fossil fuels with renewable gas over time."[18] 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.[19] Moreover, the *potential* supply of biomethane represents less than four percent of total gas demand in California.[20] 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.

Increased fuel cell deployment of gas-powered fuel cells also does not "[a]lign with other State policies to achieve legislatively-mandated climate goals and cleaner electricity grid."[21] Stationary fuel cells perpetuate reliance on fossil fuels and are therefore wholly inconsistent with California's decarbonization objectives. In recognition of this reality, the City of Santa Clara has now prohibited interconnection of BTM generation running off fossil fuels, specifically noting that "Bloom 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*."[22] Moreover, even when properly calculated, the proposed FC-NEM GHG standard is designed to enable subsidization of projects that are only an incremental improvement from business-as-usual.[23] As the climate crisis grows ever deeper and the need to achieve significant and rapid reductions in GHG pollution more urgent, a GHG threshold that allows public money to enable resources with emissions *over twice* PG&E's grid average is fundamentally at odds with California's aggressive climate goals.

3) The Proposed Self-Perpetuation of the Flawed Methodology in the Preliminary Discussion Draft Should be Stricken.

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[18] ARB, *supra* fn. 5, at Slide 5.

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

[20] *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).

[21] ARB, *supra* fn. 5, at Slide 5.

[22] 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.

[23] Setting the GHG standard at an improvement from average grid emission rather than the marginal grid resource would be a far better metric to ensure meaningful GHG reductions and ratepayer value from the FC-NEM program.

Unlike earlier iterations of ARB's GHG threshold, the Preliminary Discussion Draft now includes a provision that makes its methodology self-executing in future years. Proposed Section 95412 states:

> Beginning in 2022, and every three years thereafter, the Executive Officer shall calculate the annual greenhouse gas emission standards for the next three years and publish them on the CARB website using the following process. The calculation shall be performed the second Monday of November and published on the CARB website within five business days.[24]

This process improperly forecloses the consideration of new information that merits the revision of the ARB's methodology and its underlying assumptions. ARB should remove this provision from its Preliminary Discussion Draft.

Thank you for your consideration of our concerns. We urge ARB either correct the omissions in the GHG standard proposed in the Preliminary Discussion Draft or adopt a 2017 GHG standard of 306 kg CO_2/MWh, which properly accounts for both reduced RPS procurement as required by AB 1637 and methane leakage. At a minimum, ARB should adopt the 324 kg CO_2/MWh 2017 GHG standard ARB proposed in February 2018.

Respectfully,

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[24] ARB, Preliminary Discussion Draft, § 95412.

Attachment A: Inputs to Calcualte Upstream Emissions From Distribution System of Methane Leakage Only

Distribution Leakage Rate	0.14%

Total Upstream Emissions		
	0.0002	metric tons CO2e/therm
	0.0177	metric tons CO2e/Mwh
	17.65	kg CO2e/Mwh

Conversions

0.7	kg	=	1	m3
1	m3	=	35.3147	ft3
1	f3	=	0.001037	MMBtu
1	g CH4	=	86	g CO2e
1	therm	=	0.1	MMBtu
1	billion Btu	=	1,000	MMBtu
1	t CO2e	=	1,000,000	g CO2e
1	kg	=	1,000	g
1	t CO2e	=	1,000	kg CO2e

Leakage Emissions

0.14%	=	2.301390146	kg CO2e/MMBtu
		0.230139015	kg CO2e/Therm
		0.0002	metric tons CO2e/Therm

Conversions

10.37	Therms
1	Mcf

	2017 Average Gas Heat Rate (Btu/kWh)	2017 Average Gas Heat Content (Btu/cubic foot)	Gas Used (cubic feet/kwh)	Gas Used (cubic feet/mwh)	Gas Used (Mcf/mwh)	Gas Used (Therms/mwh)
Steam Generator	10,353	1,034	10.01	10,013	10.01	103.83
Gas Turbine	11,176	1,034	10.81	10,809	10.81	112.08
Internal Combustion	9,120	1,034	8.82	8,820	8.82	91.46
Combined Cycle	7,649	1,034	7.40	7,397	7.40	76.71

Source: https://www.eia.gov/electricity/anr https://www.eia.gov/electricity/annual/html/epa_07_03.html

Note: Using CC heat rate for our conversions, making the GHGs from leakage conservative.
GWP of Methane drived from most recent IPCC Report. http://www.climatechange2013.org/images/report/WG1AR5_Chapter08_FINAL.pdf (Table 8.7; with climate cc fb)