Date:
March 2, 2018

To:
California Air Resources Board

Prepared by:
WattTime

Subject:
Comment Docket for Fuel Cell-NEM Working Group Meeting

Background

The Fuel Cell Net Energy Metering (NEM) program allows fuel cells in California that use non-renewable fuels to participate in net metering programs. The stated goal of the program, per California Public Utilities Code § 2827.10 is to "encourage the development of eligible fuel cell electrical generating facilities" and "achieve reductions in emissions of greenhouse gases." To be eligible for the NEM program the fuel cells must meet emissions standards developed by the California Air Resources Board (CARB). WattTime, an environmental nonprofit specializing in applying electricity emissions factors to optimize emissions reductions, is concerned that the current proposed implementation plan may face an environmental integrity risk due to its reliance on nonstandard emissions measurement techniques, which are not in line with comparable California programs. In alignment with California's goals, WattTime believes the fuel cell NEM standard should be used to incentivize fuel cells when and if they are in fact reducing emissions of greenhouse gases. To achieve this, the standard should directly compare whether electricity from a fuel cell or the grid has lower emissions.

CARB, with input from stakeholders, has proposed using the California Public Utility Commission's (CPUC) Avoided Cost Calculator (ACC) as the basis of the emissions standard used to determine eligibility for the fuel cell NEM. The ACC forecasts hourly marginal emissions rates for every year through 2046 based on heat rate and predicted fuel costs. CARB is proposing using the annual average of the hourly marginal emissions rate (line 59 of the Emissions tab of the ACC) to determine eligibility for the fuel cell NEM program. This value will be updated on a regular schedule.

Separately, under the instruction of the CPUC, WattTime is working a large number of stakeholders, including utilities, on proposed accurate real-time marginal emissions rates for the SGIP energy storage program. Those stakeholders have reached consensus on the correct means to measure marginal emissions rates, based on Energy and Environmental Economics (E3)'s work in consultation with knowledgeable experts at WattTime, PG&E, Itron, and E3 itself. The State of California, through Public Utilities Code Section 769, encourages "coordinating existing commission-approved programs, incentives, and tariffs to maximize the locational benefits and minimize the incremental costs of distributed resources." It may be therefore appropriate to use the marginal emissions values developed for SGIP in the fuel cell NEM program as well, further aligning distributed resource incentive programs in California. Marginal emissions values for the SGIP program will be available on an hourly or even five-minute basis to ensure batteries are used to charge during times when the grid is cleanest and dispatch when the grid is dirtiest.

1. Emission Standard Calculation Methodology

The calculation of the annual aggregate marginal rate in the ACC used to determine eligibility for the fuel cell NEM program includes an important set of assumptions including heat rate, fuel costs, and details about the California Renewable Portfolio Standard (RPS).

WattTime agrees that the fundamental approach used to calculate the marginal emissions rates developed by E3 for the ACC is scientifically sound. However, based on conversations WattTime has had with E3, it is our understanding that these marginal emissions were calculated based on applying heat rates and fuel costs to day-ahead hourly electricity locational marginal prices, not the hourly average of five-minute real-time electricity locational marginal prices. Based on modeling WattTime has been performing for the SGIP energy storage program, WattTime has concluded that this creates a systematic bias that over-predicts marginal emissions rates. At a minimum, WattTime recommends updating the ACC, and to use the same methodology but applied using LMP data from the real-time market, a more accurate methodology for calculating marginal emissions.

2. Renewable Energy Portfolio Adjustment

The marginal emissions rate calculated in the ACC was reduced by a factor equal to the RPS standard during that year. WattTime believes this adjustment factor does not accurately reflect the actual operation of the grid and associated emissions at any point in time. The RPS adjustment is justified in the *Avoided Cost 2017 Interim Update* by stating

> "This RPS adjustment is necessary because California's RPS policy is based on retail sales of electricity. When a distributed resource saves a kWh of electricity, the utility consequently procures 0.5 kWh less renewable energy (under a 50% RPS). This RPS that the utility no longer procures would have offset GHG emissions itself, and so the resulting net GHG impact must be adjusted by (1 minus the RPS%)."

While this adjustment may make sense for the *cost* calculations the ACC is designed for, the percentage of renewable energy on the grid, as mandated by the RPS, has little bearing on the marginal *emissions* rate. The RPS is intended to ensure that a certain percentage of the total delivered energy, on an annual kWh basis, is renewable. While the RPS mandate could certainly influence the marginal emissions rate, it would do so by decreasing net load. There is no scientific basis for assuming this would reduce marginal emissions by a quantity equal to the RPS percentage. Artificially lowering the marginal emissions rate by the fixed RPS standard percentage risks causing the program to not accurately distinguish between fuel cells that would and would not decrease greenhouse gas emissions. WattTime opposes this not only because it would not meet the stated program goals, but because it would be reasonably likely to lead higher overall emissions in the state by incentivizing dirtier plants to operate.

Eliminating the RPS adjustment factor would also bring the marginal emissions rate calculation in line with the SGIP methodology, aligning incentives across different distributed resources. If this is not done, CARB should explain why the question of whether a fuel cell is reducing emissions should be calculated with different emissions rates than the exactly comparable question of whether a battery is reducing emissions. Scientifically speaking, there is no basis for these calculations to be different.

To achieve the program goals, it is important to correctly measure whether fuel cells are cleaner than the marginal power plants they displace. WattTime recommends eliminating the RPS adjustment to the marginal emissions rate in the ACC before it is used to determine eligibility for the fuel cell NEM program.

3. Hourly Marginal Emissions Rates

The most accurate means of ensuring that a fuel cell is cleaner than the grid would be to compare real-time fuel cell emissions with real-time marginal emissions rates of the grid. The ACC includes hourly marginal emissions, for both historical and future year. These values can and should be used to assess whether a fuel cell will be cleaner than the grid, based on predicted operational values on an hour by hour basis.

Summary of Recommendations

1. Include an updated methodology for more accurately calculating marginal emissions rates based on the hourly average of real-time prices instead of day-ahead values.
2. Remove the RPS multiplier from the marginal emissions rate as this does not accurately reflect the actual marginal emission rate of the grid and the displaced generator.
3. Consider using hourly marginal emissions rates to determine eligibility for the fuel cell NEM to ensure that fuel cell operation is cleaner than grid.

About WattTime

WattTime is a nonprofit subsidiary of the Rocky Mountain Institute founded in 2014 by UC Berkeley researchers to give energy customers the freedom to choose the power they consume. WattTime seek to give organizations the information they need to make smart energy decisions. WattTime's analytical approaches are built on research at Carnegie Mellon and UC Berkeley and make us uniquely qualified to conduct avoided emissions analyses and other environmental impact assessments with a high degree of accuracy.

Thank you for considering our comments. Please reach out to WattTime with any questions.

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