



June 18, 2015

California Energy Commission
Re: Docket No. 14-CHP-1
dockets@energy.ca.gov

California Energy Commission

DOCKETED

14-CHP-1

TN # 75998

JUN 22 2015

Re: Comments on the Staff Proposal: Proposed Near-Term Method for Estimating Generation Fuel Displaced by Avoided Use of Grid Electricity

Thank you for the opportunity to submit these comments regarding the *Staff Proposal: Proposed Near-Term Method for Estimating Generation Fuel Displaced by Avoided Use of Grid Electricity* ("Proposed Methodology"). Bloom Energy ("Bloom") finds the Proposed Methodology to be a detailed and thoughtful approach to greenhouse gas (GHG) accounting and supports the recommendation that this methodology should be used for any measure of GHG impact from Preferred Resources. As the Proposed Methodology notes, many if not all energy related programs now use GHG emissions as a factor in determining eligibility, and therefore it is necessary to develop universal measure.

Bloom supports the Commission's decision to limit the analysis to five years and finds the Commission's reasoning - that projecting emissions rates beyond five years is extremely challenging due to potential changes in the way resources operate on the grid - to be justifiable and appropriate. Although it might be compelling to attempt to quantify long term impacts of resource investments that are made today, it is inappropriate to do so since such analysis would need to be based on assumptions that are impossible to predict and also does not take into account the ability for technologies to improve over their operating life. In order to ensure that programs and policies are continually promoting GHG reducing technologies in the face of an ever cleaner California grid, programs and policies should rely on this methodology and update the emissions factor on a regular basis.

It is also important to highlight the Proposed Methodology's analysis of the impact of Preferred Resources on renewable resources. The Proposed Methodology states:

"Reductions in demand, specifically from energy efficiency and onsite generation, do not automatically correlate with reductions in the amount of electricity generated by renewable resources. First, the three content categories in the Renewables Portfolio Standard allow for the inclusion of renewable electricity that may not be delivered to California, thus not affect the operation of California's grid resources. Second, the translation from projected demand reductions to reduced capacity procurement to reduced electricity generation

from renewables is tenuous at best, given the frequently repeated viewpoint that the 33 percent Renewables Portfolio Standard goal is a floor to procurement rather than a ceiling. Third, since renewables are must-take resources, this energy is not currently curtailed during standard operation.”¹

Bloom highlights this issue as it has been a point of confusion and misunderstanding with policy makers and stakeholders alike. The Commission’s analysis and study of the impact on renewable resources from onsite generation is critical to understanding the nature and function of onsite generation.

As discussed in detail below, the methodology’s approach to accounting for the emissions reductions associated with avoided use of grid electricity is appropriate, although there is room for improvement. In particular, the Commission should consider weighting peaking resources more heavily, consistent with the percentage of time that they operate (e.g. capacity factor) rather than the share of energy produced. The Commission should also consider adding a separate heat rate category specific to electricity imports into California, as these power plants may tend to be less efficient than plants in California.

With these considerations in mind Bloom provides the following feedback to the questions posed in the Proposed Methodology.

Bloom Responses to Energy Commission Staff Proposed Methodology for Estimating Fuel Displacement Questions

1. Is a uniform statewide method appropriate for evaluating emissions displacement factors over a long-term (10-15 year) planning horizon? If not, please explain.

The Commission’s proposed approach to limit the methodology’s time horizon to five years is appropriate. As noted by the Commission, developing a long-term approach is not feasible because “operational characteristics, and evolutions of energy technology make the mid- to long-term operation of the grid unclear.”²

However, in general, a statewide method is appropriate to meet the goals and needs of the State, as natural gas-fired generation is the marginal generating resource across the state. Given that in all cases displaced resources would be scheduled into the CAISO market, it makes sense to view the market holistically. This simple approach will also enable easier implementation across programs.

¹ Neff, Bryan. 2015. *Proposed Near-Term Method for Estimating Generation Fuel Displaced by Avoided Use of Grid Electricity*. California Energy Commission. CEC-200-2015-002, page 42.

² Neff, Bryan. 2015. *Proposed Near-Term Method for Estimating Generation Fuel Displaced by Avoided Use of Grid Electricity*. California Energy Commission. CEC-200-2015-002, page 40.

2. Are the assumptions used to calculate the avoided generation for energy efficiency, demand response, and combined heat and power (and other distributed generation) correct? If not, what changes need to be made?

These assumptions are correct as inputs to illustrative calculations. However, these examples do not contemplate a distributed generation solution that operates at a very high capacity factor around the clock with few or zero exports. As noted in the conclusion of these comments, Bloom suggests adding additional examples to ensure a more robust picture of the range DER technologies.

3. Is the treatment of onsite generation and associated electric grid displacement appropriate? Please explain.

Bloom agrees with the treatment of grid displacement proposed in the Energy Commission's report. In particular, Bloom supports the Energy Commission's use of ARB's 7.8% line loss assumption,³ and notes that this is consistent with the approach taken in the Energy Commission's demand forecast⁴.

Bloom also agrees with the Commission's use of statewide average annual heat rate estimates for marginally dispatched resource classes. However, as discussed further in response to Question 6, these resource classes should be weighted based upon the number of hours they operate on the margin rather than the percentage of energy they provide. Along these lines, Bloom disagrees with the Energy Commission's statement that "[i]f this method was altered so that it would take into consideration a resource place in the load profiles, it would have to consider the total benefit and cost of the resource operational profile. For example, a resource operating as baseload would then avoid only baseload resources, while resources with operational profiles similar to peaker plants could avoid peaking resources."⁵ Instead, because a baseload distributed generation resource would shift the entire system demand curve downward in all hours of the year, it would displace the marginal resource at any given hour. As outlined in Chapter 2 of the Proposed Method, this would be peaking plants during some hours and load following resources in other hours.⁶

³ Neff, Bryan. 2015. *Proposed Near-Term Method for Estimating Generation Fuel Displaced by Avoided Use of Grid Electricity*. California Energy Commission. CEC-200-2015-002, page 26.

⁴ Kavalec, Chris, 2015. California Energy Demand Updated Forecast, 2015-2025. California Energy Commission, Electricity Supply Analysis Division. Publication Number: CEC-200- 2014-009-CMF, Demand Forecast Forms, Mid-Case Final Baseline Demand Forecast, Statewide Form 1.2.

⁵ Neff, Bryan. 2015. *Proposed Near-Term Method for Estimating Generation Fuel Displaced by Avoided Use of Grid Electricity*. California Energy Commission. CEC-200-2015-002, page 31.

⁶ Neff, Bryan. 2015. *Proposed Near-Term Method for Estimating Generation Fuel Displaced by Avoided Use of Grid Electricity*. California Energy Commission. CEC-200-2015-002, pages 17-18.

4. How might this method be applied in program planning and comparison or program impacts? In what circumstances do you see the state using a method like this?

The Proposed Methodology, with the suggested modifications proposed by Bloom, should be used with existing and future programs that identify GHG reduction as a goal of the program. For example, the methodology would be appropriate for evaluating the emissions reductions associated with individual projects under the SGIP program as well as from the program as a whole. The CEC's methodology should be used as it is comprehensive and accurately calculates displaced emissions. To date, other GHG accounting methodologies do not benefit from the same rigorous analysis and are therefore less precise in accurately accounting for GHG emission reductions.

5. What programs and/or situations would this method be inappropriate to apply? (For example, would it be inappropriate to use this method to estimate the emissions avoided by geothermal plants that operate as base load?)

This method is broadly applicable to distributed energy resource policies and programs. As explained in response to Question 3, baseload resources should be expected to shift California's load curve downward, thereby displacing the generating units that are on the margin during the course of the year.

Bloom agrees with the Energy Commission that this method would be inappropriate when evaluating large scale individual projects that could materially change the overall dispatch of California's energy system beyond simply reducing the total amount of generating output required. The Energy Commission has made clear that this method is neither appropriate for evaluating short-term grid variations nor for evaluating large-scale changes to the electric grid,⁷ both of which are relevant considerations for large individual projects.

6. Do you think the approach (as a whole or specific elements of the method) will result in accurate estimate, or will it overestimate/underestimate grid displacement? Please explain.

The approach described by the Energy Commission is reasonably accurate, but as Bloom outlined in its comments to the Draft Methodology, likely underestimates displaced emissions due to the weighting applied to peaker plants versus the more general load following plant category.

The Energy Commission explains that "[n]atural gas-fired plants with low capacity factors that run a minimal amount of time each year to meet peak electric demand are called *peaker plants*... they have the highest incremental cost due to needing more fuel to provide an equivalent amount of energy, and are, therefore have the highest operational cost." [sic] Peaker plants are, therefore, nearly certain to be on the margin during any hours in which they operate. Therefore, it would be more appropriate to

⁷ Neff, Bryan. 2015. *Proposed Near-Term Method for Estimating Generation Fuel Displaced by Avoided Use of Grid Electricity*. California Energy Commission. CEC-200-2015-002, page 7.

weight them according to the percentage of hours in which they operate rather than the percentage of total natural gas fired generation they produce. The Commission notes that this would “require additional analysis of hourly dispatch data⁸.” Bloom suggest that the 5% capacity factor provided in the CEC Thermal Efficiency paper would be appropriate. If the Commission feels this is not sufficient, then Bloom suggests conducting the necessary analysis to arrive at an accurate number. This is particular crucial since, as noted by SoCal Gas and EtaGen⁹, the integration of California’s growing renewable resource portfolio will likely result in peaker plants operating more frequently in the future.

The Energy Commission Staff elected to omit “[n]onrepowered or retrofitted once-through cooling plants and none of the aging plants” in either heat rate category it evaluated in its fuel displacement analysis.¹⁰ The Staff’s rationale for doing so is that these plants are necessary to provide system stability and therefore must operate. This approach is reasonable only if each of the omitted plants operates strictly as a must-run baseload resource, providing steady output without ramping up and down in response to market signals.

As stated in response to Question 1, the Energy Commission has made clear that many unpredictable changes in a variety of aspects of California’s power grid will occur over 10-15 years. Bloom agrees that it is appropriate to incorporate a heat rate floor based on the range of current technologies, based on the Energy Commission’s work in support of its Cost of Generation model.¹¹

Finally, Bloom reiterates its recommendation that the Energy Commission better account for electricity imports with higher emission rates than California. The Energy Commission’s method does not appear to incorporate imported electricity, which often comes from sources with higher heat rates than those within California. The approach should include imported electricity as a third heat rate in addition to the load following and peaking heat rates already included. Specifically, unspecified sources, including coal and other resources without long-term contracts, may in some cases operate as marginal resources. The heat rate for imported power should be based upon the default emissions factor for unspecified imports previously determined by CARB, CPUC, CEC, and other WCI jurisdictions to be 961 lbs/MWh (before T&D losses), equal to a heat rate of 8,221.¹² Additional analysis would be required to determine the appropriate weight to assign to the imported electricity heat rate, although the CEC estimates that unspecified sources of power contributed 12.48% of the overall CA power mix in 2013.¹³

⁸ Neff, Bryan. 2015. *Proposed Near-Term Method for Estimating Generation Fuel Displaced by Avoided Use of Grid Electricity*. California Energy Commission. CEC-200-2015-002, page 39.

⁹ Neff, Bryan. 2015. *Proposed Near-Term Method for Estimating Generation Fuel Displaced by Avoided Use of Grid Electricity*. California Energy Commission. CEC-200-2015-002, page 39.

¹⁰ Neff, Bryan. 2015. *Proposed Near-Term Method for Estimating Generation Fuel Displaced by Avoided Use of Grid Electricity*. California Energy Commission. CEC-200-2015-002, pages 22-23.

¹¹ Neff, Bryan. 2015. *Proposed Near-Term Method for Estimating Generation Fuel Displaced by Avoided Use of Grid Electricity*. California Energy Commission. CEC-200-2015-002, page 28.

¹² http://ei.haas.berkeley.edu/pdf/working_papers/WP236.pdf

¹³ http://energyalmanac.ca.gov/electricity/total_system_power.html

7. What do you think are the appropriate levels of granularity, such as geographic or temporal, are necessary to provide a reasonable estimate of electric grid fuel displacement? Please use the discussion of method parameters section in Chapter 5 as a starting place for discussion.

As discussed in response to Question 1, Bloom does not believe that granularity beyond what the Energy Commission envisions in its report is appropriate for the purpose of policy evaluation. Such granularity would add considerable complexity without significantly improving results on a program-wide basis.

There is no need to tailor fuel displacement methodologies to specific policies and programs, because although the goals of those programs may vary, the resources that will be displaced will not change. That is precisely the reason why a uniform statewide standard is appropriate. Bloom supports the Energy Commission's position that "a standardized displacement method has significant benefits for policy planners, energy solution providers, and end users."¹⁴

Bloom also agrees with the Energy Commission that consideration of overgeneration and renewable curtailment in this method would increase complexity considerably without actually improving the accuracy of results. The Energy Commission staff's position explains the situation very clearly in explaining that "no single generator or resource type is solely responsible for overgeneration. Rather, it is a system issue. There is no clear answer for how the hours in which overgeneration occurs should be treated in a displacement analysis."¹⁵

Conclusion

Bloom largely supports the Proposed Methodology, with the caveats noted above. Given the technicalities of GHG accounting, Bloom offers an illustrative example for onsite generation using the methodology to summarize the methodologies approach and results:

Onsite Firm Baseload Generation Example

Generator Size (kW)	1,000
Off-Peak Capacity Factor (%)	95%
Off-Peak Export (%)	0%
On-Peak Capacity Factor (%)	95%
On-Peak Export (%)	0%
Total Capacity Factor	95%
Total kWh Savings	41,610,000
Avoided Emissions Displacement Factor (kg CO2/MWH)	420

¹⁴ Neff, Bryan. 2015. *Proposed Near-Term Method for Estimating Generation Fuel Displaced by Avoided Use of Grid Electricity*. California Energy Commission. CEC-200-2015-002, page 37.

¹⁵ Neff, Bryan. 2015. *Proposed Near-Term Method for Estimating Generation Fuel Displaced by Avoided Use of Grid Electricity*. California Energy Commission. CEC-200-2015-002, page 41.

Bloom looks forward to further participation in this proceeding and continued dialogue with the Commission to ensure the process adequately captures the opportunity, availability and performance attributes of advanced energy technologies, like fuel cells, to meet the state's energy objectives.

Thank you for your consideration,

A handwritten signature in black ink, appearing to read 'Erin Grizard', with a stylized flourish at the end.

Erin Grizard
Director, Regulatory and Government Affairs