BEFORE THE CALIFORNIA ENERGY COMMISSION
OF THE STATE OF CALIFORNIA

In the Matter of:	)	
	)	
2014 Combined Heat and Power Staff Workshop	)	Docket No. 14-CHP-1
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Comments of the California Cogeneration Council on Energy Commission Staff Proposed Methodology for Estimating Fuel Displacement

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On behalf of the
CALIFORNIA COGENERATION COUNCIL

June 19, 2015

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On June 8, 2015, the California Energy Commission (CEC) issued a staff report entitled, "*Proposed Near-Term Method for Estimating Generation Fuel Displaced by Avoided Use of Grid Electricity*" and included a number of questions for stakeholders to address in their comments. This report is a follow-up to the staff presentation conducted at a workshop on July 14, 2014, to discuss the benefits, challenges, and practical solutions to encouraging the development of clean and efficient combined heat and power (CHP) resources in California. The California Cogeneration Council (CCC)1 participated in the workshop, and provided written comments on August 18, 2014.

The CCC appreciates the opportunity to submit these comments on the staff proposed methodology and has responded below to the questions posed in the report.

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.**

[1] The CCC is an *ad hoc* association of natural gas-fired combined heat and power facilities located throughout California, in the service territories of all three of California's major investor-owned electric utilities (IOUs) – Pacific Gas & Electric Company (PG&E), Southern California Edison Company (Edison), and San Diego Gas & Electric Company (SDG&E). In aggregate, CCC members' 30 different CHP projects generate approximately 1,100 megawatts (MW) of power, most of which is sold to the IOUs. The CCC represents a significant share of the distributed CHP projects now operating in California.

The CCC believes that the CEC's fuel displacement methodology is a reasonable "ballpark" calculation of the minimum amount of fuel displaced by CHP resources. The CEC's statewide approach may not be as accurate as a regional calculation, which the CEC could do by sorting its Quarterly Fuels and Energy Report (QFER) data by region. However, for the purpose of establishing a general number for electric generation emissions displaced by CHP, a statewide approach is reasonable.

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?**

Changes that the CEC should consider include the following items. First, the CCC has concerns about the CEC's use of a regression analysis to identify a downward trend in 2002-2014 heat rates. Heat rates can vary from year to year due to factors such as weather and hydro conditions, since gas-fired generation generally fills in for variations in hydro output and is the marginal source of electricity as load varies due to weather conditions. Without including variables to determine the impact of weather and hydro conditions, for example, the report cannot conclude that trends are due to the one explanatory variable it did consider (i.e. the year). Thus, without doing a more comprehensive analysis to determine why market heat rates decreased slightly during the historical period, there is no assurance that a long-term trend has been identified. We would suggest simply using an average of the QFER data rather than applying a regression.

Second, the QFER data represents a sample of generators, but it is the least efficient generator that is displaced at the margin by CHP generation.[2] Thus, it may make sense to look at the range of heat rates indicated by the QFER data, and use a heat rate that is closer to the top end of that range, in order to capture marginal rather than average gas-fired heat rates. The CCC does agree with the study that it is appropriate to consider only gas-fired generation as the displaced generation resource, as gas-fired plants are typically the last dispatched. It would not be appropriate to consider displacement by renewable resources, as those resources are not

[2] The comments of CAC / EPUC make the same point, and provide a table to quantify marginal vs. average heat rates, which the CCC supports.

marginal. The report correctly notes that, subsequent to recent changes in the RPS statute in AB 327, RPS percentages are a floor to procurement rather than a ceiling.

Third, if the CEC's fuel displacement analysis is used to determine fuel savings from the entire population of CHP, rather than from a single CHP project, there is a need to consider incremental rather than marginal savings, where the increment is the size of the entire CHP population. Such analysis may be more appropriately conducted based on production cost models, e.g. where all CHP can be included in or taken out of the model to determine an incremental system heat rate. At a minimum, the final report should caution against applying the 405 kg/MWh amount to more than small amounts of CHP capacity.

Fourth, we recognize that, as stated on page 25, that the calculation presented in Table 18 does not take into account avoided boiler fuel. We would recommend footnoting that point on Table 18 so that this point is not missed: "405 kg/MWh excludes boiler fuel emissions displaced by CHP."

Fifth, the assumption of a 2.5% / 97.5% split between peaking and load-following generation is based on the amount of energy each of these resources produce. The CCC recommends that the weights for these types of gas-fired generation should be based instead on the number of hours that load following and peaking resources are on the margin. The reason is that peaking generation may be just a small percentage of total generation in terms of energy produced, even if it runs for a substantial number of hours each day. For example, even if peaking generation is a small fraction of total generation in a given hour, it is the marginal generation source that is displaced in that hour. Thus, it would make more sense to calculate an hour-weighted, not generation-weighted, heat rate. Looking at CAISO SP-15 market heat rates in 2014 as an example, market heat rates were above 11,890 Btu/kWh (the high-end CT heat rate indicated in Table 8) in about 11% of all hours in 2014. The actual value is not the key point here – and there may be a number of ways to estimate the percent of time that peakers operate – rather it is the conceptual point that the resource which is avoided in each hour is not necessarily indicated by the relative generation of each type of gas-fired resource.

As an example of an alternative source for determining how many hours peakers operate, the CAISO's 2014 *Annual Report on Market Issues and Performance* shows a capacity factor for

a new CT in 2014 equal to 10%.[3] This says that CTs operate for at least 10% of the hours in the year.

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

CCC agrees that it is appropriate to use loss-adjusted heat rates to determine grid displacement for onsite generation. CCC notes that, to the extent CHP is in a load center, it may be appropriate to use a loss adjusted heat rate for exports as well. The key consideration is where the CHP unit is located in relation to the units that were analyzed as part of the QFER data.

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

and

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?)**

CCC believes that this method could be applied for general analysis of the statewide fuel displacement of various types of electric resources. However, such a method should not supplant more detailed analysis that may be needed for more accurate results in specific situations. In particular, the method should be considered a lower bound to the extent that it does not consider location, is based on a trend in average heat rate data rather than based on marginal system heat rates, does not look at the effect of displacing larger increments of capacity, and excludes fuel displacement associated with thermal output. Beyond these limitations, the methodology may be useful for making general conclusions about the electric sector grid emissions that would occur but for CHP electric output.

[3] See Table 1.9 of the report, at http://www.caiso.com/Documents/2014AnnualReport_MarketIssues_Performance.pdf

In general, if a QFER database approach is used, the database should be updated over time, and comparisons to market heat rates should be made to ensure that the conclusions drawn from the QFER data are not too different than what is indicated by natural gas and electricity market prices. In addition, production cost modeling could be used to determine whether the methodology is reasonable over time, and to assess fuel displacement from larger sets of resources.

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.**

While the approach as a whole appears to be fair, it should be considered to be a calculation of the minimum electric grid fuel displacement, for the reasons stated above. Specifics of the question that is being answered should play a role in determining whether the estimate is accurate enough for the particular analysis in question.

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.**

Geographic and temporal detail would certainly improve the analysis, but would introduce additional complexity, and may be difficult if the data used in the analysis does not support that level of detail. For example, annual heat rates may be appropriate for baseload resources, but may not be appropriate for load-following or peaking resources that produce substantially more energy on-peak than off-peak, when less efficient units are on the system margin. Similarly, a statewide approach may not be accurate if an analysis is to apply to resources that are located within a congested region of the CAISO system, in a location where marginal unit heat rates are significantly above what is reflected in the historical QFER data. Finally, the analysis may not be appropriate for looking at large blocks of generation (e.g. all CHP).

The CCC appreciates the opportunity to provide these comments, and appreciates the work of the CEC staff to provide such useful tools for the analysis of fuel and emissions displacement.

Respectfully submitted,

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