

2008 Rulemaking on Implementation of the)
Waste Heat and Carbon Emissions Reduction Act)

Docket No. 08-WHCE-1

**Comments of Dr. Barbara R. Barkovich on Behalf of Cement Manufacturers
on the Proposed Guidelines for Certification of Combined Heat and Power
Systems Under the Waste Heat and Carbon Emissions Reduction Act**

I. Introduction and General Comments

On behalf of several cement manufacturers in California, I am submitting comments on the Proposed Guidelines for Certification of Combined Heat and Power (CHP) Systems under the Waste Heat and Carbon Emissions Reduction Act (AB 1613) dated October 2009. Several cement manufacturers are considering the addition of bottoming cycle CHP facilities at their cement plants. While the output of these facilities would be intended for on-site electricity consumption, there would be times when there would be power to sell to a utility. For this reason, the cement industry has an interest in the Proposed Guidelines. We discuss specific points raised in the guidelines below. However, as a general comment, we believe that the Proposed Guidelines require a level of detailed reporting that will be very burdensome for end-use electricity consumers interested in efficient generation of power on-site. Customers like our members will already be required to meet reporting requirements established by the California Air Resources Board (CARB) for the output of our industrial processes and our CHP. It would be least burdensome and most efficient for the data requirements to be consistent among the CEC, CARB, and the Federal Energy Regulatory Commission (FERC), which has already developed standards under PURPA (16 USC § 2601 et seq.). We also believe that the main information that should be required of customers with on-site CHP should be how much fuel is used each year and how much electricity is produced during that year. For bottoming cycle CHP, this would involve tracking the amount of fuel used for supplemental firing, if any, and the cumulative electricity produced. This information should allow a customer to demonstrate that it meets the required efficiency standards. We recommend the CEC adopt the FERC standards for this purpose that are contained in FERC form 556.

II. Specific Comments on Standards

While the cement industry accepts the statutory requirement of at least 60% conversion of fuel energy to useful energy output, it is apparent in the references in the statute to sizing CHP to thermal load and meeting thermal load requirements that bottoming cycle CHP was not explicitly considered in the development of the

statutory language. Bottoming cycle CHP, which uses waste heat from an industrial process to generate electricity, with or without supplemental firing, is not sized to thermal load and is not designed to meeting thermal load requirements. Rather, it is a means of making use of waste heat from an industrial process to do useful work, in this case to produce electricity. We note that this waste heat is previously used in the cement industry for the thermal conversion of raw materials into cement clinker, an inherently high-temperature process. Clinker production requires an optimum energy input rate (energy per unit mass of raw material) (i.e., operating at an energy input rate higher than the optimum results in poorer clinker production), so the interests of energy efficiency are met prior to electricity production. Still, there exists some energy value in the waste heat that remains that can be used to produce electricity. Without supplemental firing, the efficiency would be infinite, in that it would have a denominator of zero.

Thus, the Energy Conversion Efficiency of the bottoming cycle CHP process is determined by the total kWh produced divided by the supplemental fuel used. (We anticipate no mechanical energy output.) The Proposed Guidelines recognized this fact by stating that:

“A Bottoming Cycle CHP System that uses supplementary firing shall achieve an Energy Conversion Efficiency *of no less than 60 percent both as designed and on an annual operating basis*. The Energy Conversion Efficiency shall be calculated as (the sum of the useful electrical energy output plus useful mechanical energy output) divided by the fuel energy input, on a HHV basis, for supplementary firing.

“A Bottoming Cycle CHP System that does not use supplementary firing is exempt from the Energy Conversion Efficiency Standard.” (emphasis added)

We note, however, what we believe is an error in the Proposed Guidelines with respect to the italicized language above as it relates to the 60% efficiency requirement. The statute specified that the CHP should have 60% efficiency at 100% load.

Section 2843(e) of the Public Utilities Code states:

“(e) (1) An eligible customer-generator's combined heat and power system shall meet an oxides of nitrogen (NOx) emissions rate standard of 0.07 pounds per megawatt-hour and a minimum efficiency of 60 percent. A minimum efficiency of 60 percent shall be measured as useful energy output divided by fuel input. *The efficiency determination shall be based on 100-percent load.*” (emphasis added)

At less than 100% load, the efficiency would be less than 60%. Thus, the Guidelines should be changed to require 60% efficiency at full load and not during actual operation. Even utility generating plants are less efficient if they are not operated at

full load. Heat rates are higher if these plants are cycled. This is simply physical reality.

The Fuel Savings Standard in the Proposed Guidelines properly notes that it has no applicability to bottoming cycle CHP.

“A Bottoming Cycle CHP System is exempt from the Fuel Savings Standard.”

This is consistent with the fact that double benchmarking does not apply to bottoming cycle CHP. Any Guidelines should make this fact clear.

As for an Emissions Standard, the current CPUC Emissions Performance Standard (EPS) is appropriate. In the case of bottoming cycle CHP, the only GHG emissions would come from supplemental firing. The emissions would be divided by the total output of the bottoming cycle CHP facility.

III. The heat rate for double benchmarking

Although the Guidelines propose electrical generation with a 7750 Btu/kWh heat rate, PG&E (as well as other utilities) has proposed using a generator with a 7000 Btu/kWh heat rate. The cement industry believes that the heat rate in the Guidelines is far more appropriate and believes that the PG&E proposal is unrealistic and inappropriate. Even new combined cycle plants do not operate at capacity factors that achieve design heat rates. In addition, not all new utility generation is combined cycle. Indeed, many recent plants have been combustion turbines. Furthermore, the average heat rates for the portfolio of utility fossil-fired generation are significantly higher than the heat rate of a new facility. While double benchmarking does not apply to bottoming cycle CHP, the CEC should not adopt the utility proposal for a 7000 Btu/kWh heat rate.