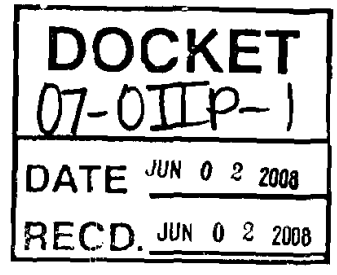
BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking to Implement the Commission's Procurement Incentive Framework and to Examine the Integration of Greenhouse Gas Emission Standards into Procurement Policies.	R.06-04-009 (Filed April 13, 2006)

ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION OF THE STATE OF CALIFORNIA

Order Instituting Informational Proceeding AB-32 Implementation: Greenhouse Gases	Docket 07-OIIP-01

OPENING COMMENTS OF INDICATED CEMENT COMPANIES



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Dated: June 2, 2008

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OPENING COMMENTS OF INDICATED CEMENT COMPANIES

Pursuant to the May 13, 2008 ruling of California Public Utilities Commission Administrative Law Judges Charlotte TerKeurst and Jonathan Lakritz, as revised by subsequent ruling of May 20, 2008, CEMEX-Pacific Region (CEMEX), Lehigh/Hanson Cement, Inc. (L/H), Mitsubishi Cement Corporation (MCC), National Cement Company (NCC), and TXI-Riverside Cement Company (TXI) (collectively the Indicated Cement Companies, ICC) respectfully submits these comments on the role of Combined Heat and Power (CHP) (also known as cogeneration) as a greenhouse gas (GHG) mitigation strategy.

I. SUMMARY

We summarize our comments here. Considerably greater detail is provided in Section V.

The GHG mitigation benefits of CHP are related to the efficiency gains that result from the recovery of heat energy that would otherwise have been wasted if not for a second purpose of either process use (topping cycle) or electricity generation. The end result is that electricity is produced more efficiently and with less GHG than it would have been if the input fuel had been used for the industrial process and for the production of electricity separately (as long as the CHP process meets appropriate efficiency standards). In addition, where the electricity is used on-site, there are also benefits in the form of reduced generation and transmission losses.

In Section V. we present our position on CHP, which can be summarized as follows:

- The thermal portion of emissions associated with bottoming-cycle CHP, which is directly associated with the manufacturing process, should be regulated as part of the industrial sector by the ARB.
- There should be a separate CHP sector because CHP does not fit into either the industrial sector or the utility sector for the reasons outlined below.
- Although the CHP sector should not be part of the utility sector, it should be regulated by the CPUC (as a separate sector), and should be subject to efficiency standards that allow these projects to qualify as GHG mitigation projects and accrue any associated benefits. The efficiency standard should result in a net reduction in overall GHG emissions when emissions are considered from the combined industrial activity and electricity production using CHP compared to the separate pursuit of these activities.
- Currently there are disincentives to the pursuit of CHP within the purview of the CPUC which provide significant impediments to the implementation of more efficient CHP.
- As required under AB32, the CPUC should ensure that regulations for CHP do not create inequitable burdens on certain operations or sectors.
- It is essential that the California regulations allow for a smooth transition to future regional and federal programs, based on providing the maximum flexibility for this transition, given that the future regional and federal programs have not been defined.

III. ALLOWANCE ALLOCATION

<u>Question 12</u>. If auction revenues are used to maintain affordable rates, should the revenues be used to lower retail providers' overall revenue requirements, returned to electricity consumers directly through a refund, used to provide targeted rate relief to low-income consumers, or used in some other manner? Describe your preferred option in detail. In addition to your recommendation, comment on the pros and cons of each method identified for maintaining reasonable rates.

Under CPUC regulation, we anticipate that auction costs will be passed through to consumers through the utility revenue requirement. The consequence will be an increase to already high California electric rates. These rates are already a major competitive problem for California industry. For the cement industry, which is electricity intensive, this is particularly the case. If auction revenues are used to reduce the revenue requirement, which we recommend, it is essential that the revenue reduction should be used to lower retail rates consistent with the manner in which the rates were increased due to the auction costs. There should be no reallocation of costs causing cost shifting among customer classes.

V. TREATMENT OF CHP

A. DETAILED PROPOSAL

<u>Question 1</u>: Taking into account and synthesizing your answers to other questions in this paper, explain in detail your proposal for how GHG emissions from CHP facilities should be regulated under AB 32.

The GHG mitigation benefits of CHP are related to the efficiency gains that result from the recovery of heat energy that would otherwise have been wasted if not for a second purpose of either process use (topping cycle) or electricity generation. The end result is that electricity is produced more efficiently and with less GHG than it would have been if the input fuel had produced electricity alone (as long as the CHP process meets appropriate efficiency standards). In addition, where the electricity is used on-site, there are also benefits in the form of reduced generation and transmission losses.

For a bottoming-cycle facility, the electricity is produced using waste heat from the industrial process and may include supplementary firing. For bottoming-cycle facilities meeting efficiency standards as outlined below, the GHG emissions per MWh of power produced are lower than those from natural gas-fired power generation alone. They would be even lower than for coal-fired power generation.

In the following sections, we will be presenting our position on CHP, which can be summarized as follows:

- The thermal portion of emissions associated with bottoming-cycle CHP, which is directly associated with the manufacturing process,[1] would be regulated as part of the industrial sector by the ARB.
- There should be a separate CHP sector because CHP does not fit into either the industrial sector or the utility sector for the reasons outlined below. In addition, a CHP sector will allow proper treatment of the evaluation criteria listed above and will focus attention on avoidance of disincentives and removal of barriers particular to CHP.
- Although the CHP sector will not be part of the utility sector, it should be regulated by the CPUC (as a separate sector), and should be subject to efficiency standards that allow these projects to qualify as GHG mitigation projects and accrue any associated benefits.

In the following discussion, we will be applying these principles to bottoming-cycle CHP, because this is the type of CHP most likely to occur in the cement industry. However, we believe that all of these arguments also apply to topping-cycle CHP.

While our comments present our recommendations, in some cases, we will present a "fallback" position, in case our preferred position is not accepted.

Under our proposal for regulation of GHG emissions from CHP facilities under AB 32, the thermal portion of emissions associated with bottoming-cycle CHP, which is directly associated with the manufacturing process,[2] would be regulated as part of the industrial sector by the ARB. Only emissions associated with any supplemental firing used to

[1] This is shown diagrammatically below.
[2] This is shown diagrammatically below.

augment electricity production would be regulated by the CPUC. We recommend that this regulation take effect as part of a separate CHP sector.

If the CHP sector is not regulated by the PUC as a separate CHP sector, then only units that sell more than 64,000 MWh/year to the grid should be regulated by the PUC, and only that portion of power sold to the grid should be regulated. This threshold corresponds to the level of 25,000 MT CO2/year (based on natural gas firing at an efficiency of 45%), which is the current ARB threshold for mandatory reporting and represents a threshold at which individual facility emissions are considered to be significant.

The emissions associated with thermal uses should be regulated as part of the industrial sector and the emissions associated with electricity production, if any, should be regulated by the CPUC as part of a separate CHP sector because:

> The thermal portion of emissions for bottoming cycle CHP represents an intrinsic output of the manufacturing process. Indeed, if there is no supplemental firing, there are no emissions associated with the electricity production, since all the fuel input goes into the manufacturing process, and only the waste heat is used to make electricity.
>
> Placing electricity production by CHP facilities in the electricity sector will not allow for recognition that this electricity production is a byproduct of an industrial process and not an end in itself (at least for bottoming cycle); indeed, the efficiencies standards are designed to ensure this result.
>
> Electricity production by CHP facilities does not fit well in the industrial sector, because there are likely to be special efficiency standards that would not apply to non-CHP facilities in the same sector.
>
> Placing the emissions associated with electricity production under CPUC regulation will make it possible for CHP to be treated as a means of reducing GHG emissions from utility fossil-fired generation.
>
> The CHP sector should not be part of the utility sector to avoid the need to purchase auctioned credits, which represents an inequitable burden due to the small size of these projects and inability to pass through costs.

We note that there is a problem with the current ARB reporting requirement for bottoming cycle CHP, in that it allocates some GHG emissions to electricity output and some to the manufacturing process in a manner that is not consistent with the actual thermodynamics of the situation. This matter is discussed in greater detail below. However, briefly, in a bottoming cycle application, the waste heat from the manufacturing process is used to generate electricity. If there is no supplemental firing, there is no additional fuel that goes into the electricity production process, and thus all of the fuel use, and related GHG emissions, are associated with the manufacturing process and not electricity production.[3] If there is supplemental firing, only the GHG emissions

[3] We provide below a reference to a United Nations document that shows this result.

associated with that supplemental firing are associated with electricity production. Unfortunately, the ARB reporting requirements assign what is essentially an arbitrary amount of the GHG associated with the fuel input to the manufacturing process to the electricity production, aside from any supplemental firing. In order to correctly calculate the GHG mitigation associated with bottoming cycle CHP, it will be necessary to correct the ARB's reporting requirements.

B. REGULATION OF CHP GHG EMISSIONS

Question 2: Should GHG emissions from CHP systems be regulated in one sector? If so, which one? How?

The emissions associated with thermal uses should be regulated as part of the industrial sector and the emissions associated with electricity production, if any, should be regulated by the CPUC as part of a separate CHP sector. See answer to Question 1 above.

Question 3: For in-state CHP systems, should all of the GHG emissions (i.e., all of the emissions attributed to the electricity generation and to the thermal uses) be regulated as part of the electricity sector? If so, for the electricity that is delivered to the California grid, should the deliverer as defined in D.08-03-018 be the point of regulation? And, what entity(ies) should be the point(s) of regulation for thermal usage and electricity that is not delivered to the California grid if those uses are included in the electricity sector for GHG regulation purposes?

As noted above, the manufacturing (or other) facility that contains the CHP equipment would be the point of regulation for thermal usage. The emission associated with the manufacturing process should be included in the industrial sector. Certainly, in the case of bottoming cycle CHP, these emissions are intrinsically related to the industrial process. The electrical production should be included in a separate CHP sector and should not be included in the electricity sector for reasons provided above.

Question 4: For out-of-state CHP systems, how should GHG emissions attributed to the electricity delivered to the California grid be regulated? If part of the electricity sector, should the deliverer of the CHP-generated electricity delivered to the California grid be the point regulation? (These questions are based on our view that, for out-of-state CHP systems, only emissions attributed to electricity delivered to California, and not attributed to other electricity or the thermal output, are subject to AB 32.)

n/a to cement industry

Question 5: Should CHP units be placed in different sectors based on CHP unit capacity size?

We recommend that all CHP units be placed in the CHP sector for emissions associated with their electricity production only. This should apply to large CHP and seems logical to apply to small CHP.

If the CHP sector is not regulated by the CPUC as a separate CHP sector, then only units that sell more than 64,000 MWh/year to the grid should be regulated by the CPUC, and only that portion of power sold to the grid should be regulated.

Question 6: Should any of the options for assigning the emissions of a CHP unit to one or more sectors be rejected because it might violate the dormant Commerce Clause?

No response.

Question 7: Should the type of GHG regulation (i.e., cap and trade or direct regulation) be different for a topping-cycle CHP unit versus a bottoming-cycle unit?

Our comments address only bottoming cycle CHP. As stated above, bottoming cycle CHP is intrinsically related to the industrial process, because its source of heat is entirely or largely (in the case of supplemental firing) an output of the industrial process. (See below a generic diagram of bottoming cycle CHP, as well as a UN diagram which shows the bottoming cycle application for the cement industry.) For this reason, inclusion in cap and trade as part of the electric power sector is inappropriate, because provision of electricity is not the primary purpose of the entire endeavor. Rather, the purpose of bottoming cycle CHP is to make use of waste heat that would otherwise be useless for any other purpose. All of the electricity produced from the waste heat is "additional" to electricity that is produced using fuel inputs. Bottoming cycle CHP thus increases the beneficial usage of the fuel input to the manufacturing process and reduces the effective GHG emissions when the combined output of the industrial process and electricity is considered.

If there is no supplemental firing, bottoming cycle CHP is essentially carbon-free. This position is supported by the baseline methodology discussed in the UN document providing the diagram used below, which defines project emissions for waste hear recovery and utilization from cement plants as "the difference in CO2 emission from use of fossil fuel in the clinker making process in cement manufacturing unit, where the project is being implemented, before and after the project implementation."[4] (Op. cit, p. 6) The project here is the waste heat recovery and use through conversion of the waste heat to electricity. Thus, in the absence of supplemental firing at the CHP unit, the emissions from the project are found to be zero.

To better inform the Commission of the distinction between topping and bottoming cycle CHP, we quote here from a published paper below that explains the difference. The CHP option of interest to the cement industry is bottoming cycle CHP, which uses the waste heat from the cement manufacturing process to generation electricity.

> "CHP plants are often referred to as "topping cycles" or "bottoming cycles." A topping cycle plant is a plant where electric generation is at the top or beginning of the cycle and steam or other resulting thermal energy streams are sent to other process uses after the production of electric. An example of a topping cycle is a steam boiler that sends steam to a steam turbine electric generator with exhaust

[4] Found at: http://cdm.unfccc.int/EB/021/eb21repan14.pdf

steam or extraction steam from the turbine being sent to a process use. Another example is the use of a gas turbine generator used to produce electricity with the use of a heat recovery steam generator (HRSG) to recover heat from the gas turbine exhaust for the production of process steam. A topping cycle is illustrated in Figure 1.

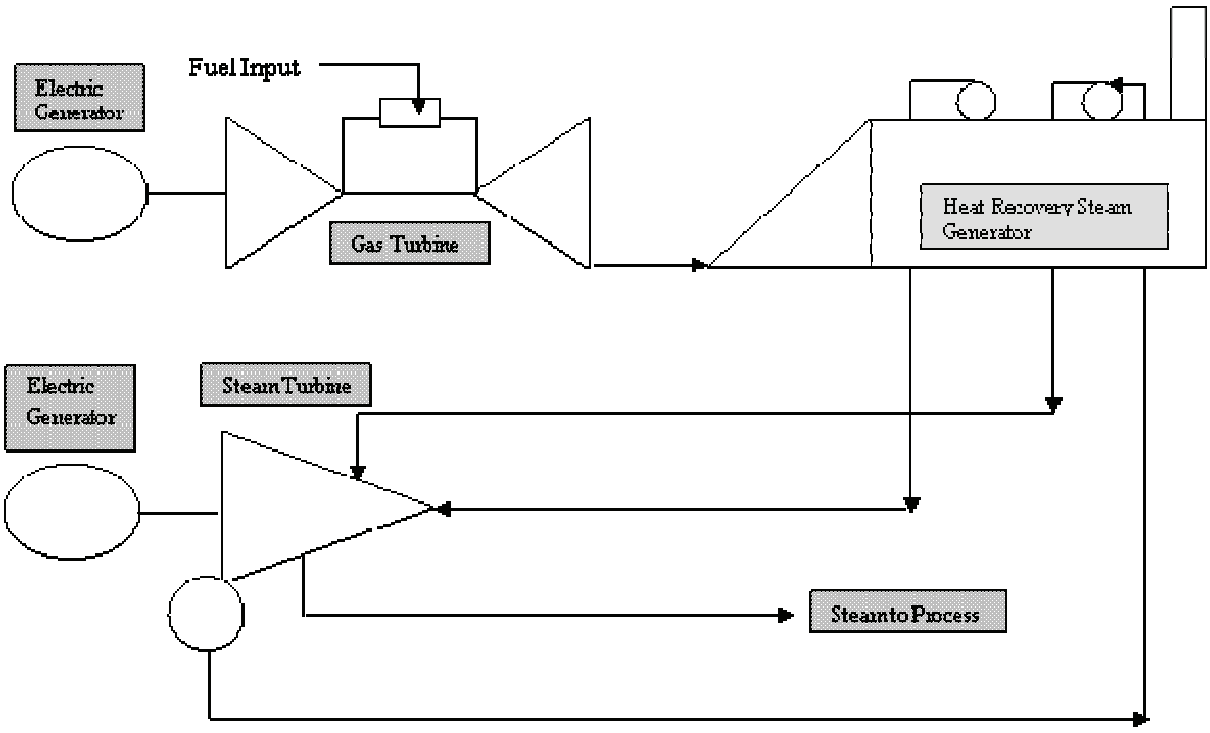

Figure 1. CHP topping cycle example

A bottoming cycle plant is a plant that recovers steam or heat from a process stream to produce electricity. An example of a bottoming cycle (shown in Figure 2) would be a case where steam is produced for process use and exhausted from the process at a quality high enough to supply a steam turbine generator for the production of electricity. Another example is heat recovered from the discharge of a cement kiln or other process to make steam for electricity.

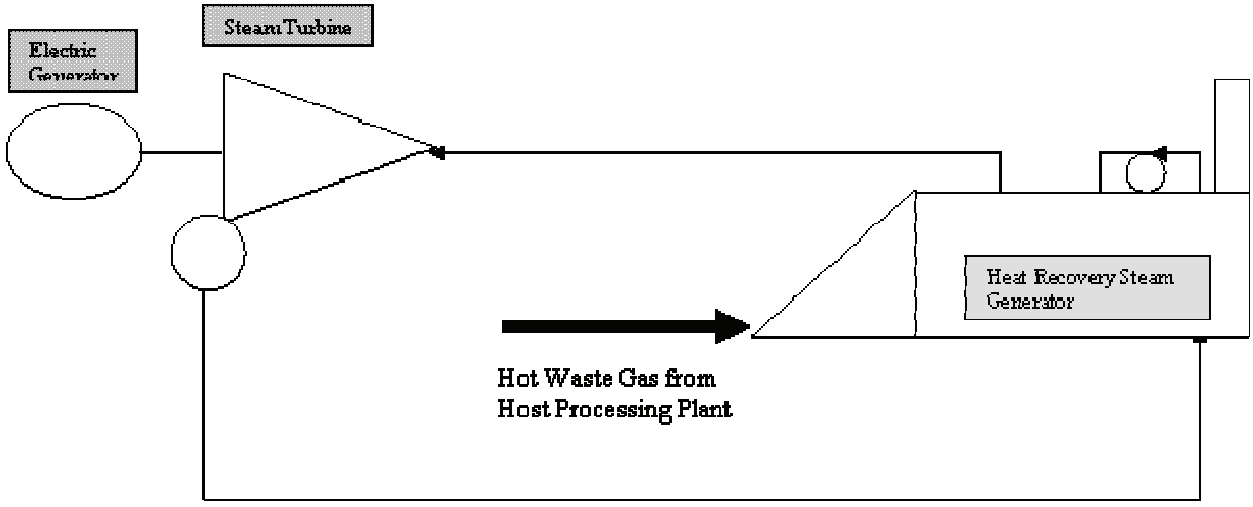

Figure 2. CHP Bottoming Cycle Example

In both cases the efficiency gains are reached by recovering heat that would have normally been discarded or vented if it was not used for a second purpose of either process use (topping cycle) or electricity generation (bottoming cycle)." [5]

Bottoming cycle CHP is intrinsically related to the industrial process, because its source of heat is entirely or largely (in the case of supplemental firing) an output of the industrial process. (See diagram below, which shows the bottoming cycle application for the cement industry.) The purpose of bottoming cycle CHP is to make use of waste heat that would otherwise be useless for any other purpose. In so doing, it increases the beneficial usage of the fuel input to the manufacturing process and reduces the effective GHG emissions when the combined output of the industrial process and electricity is considered.

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[5] "Combined Heat and Power Plants**:** Considerations and Applications for Cogeneration" Authored by:Tom McNay, Director, Development Engineering, Cinergy Solutions, (513) 419-5971, tmcnay@cinergy.com and Tillman Burnett, Development Engineer, Cinergy Solutions, (513) 419-5955, tillman.burnett@cinergy.com

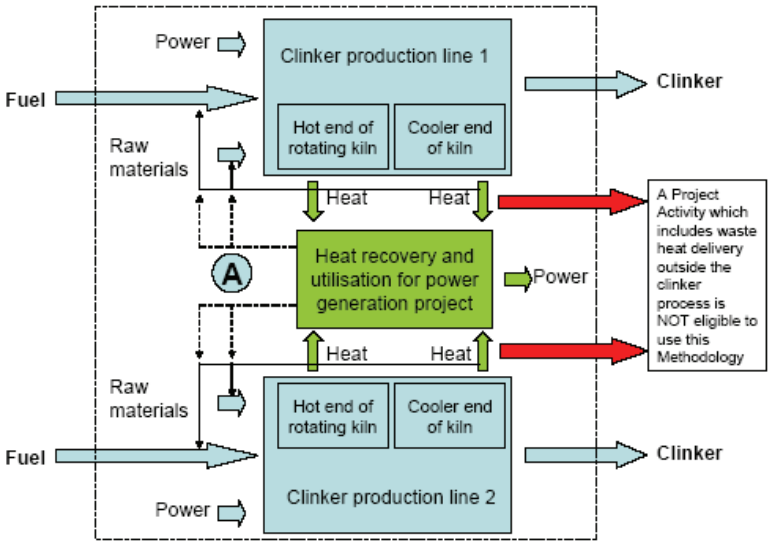

Figure 1. Schematic of sample Project Activity

Source: **UNFCCC/CCNUCC**
CDM – Executive Board AM0024 / Version 01
Sectoral Scopes: 1 and 4, 30 September 2005 **Approved baseline methodology AM0024**
"Baseline methodology for greenhouse gas reductions through waste heat recovery and utilization for power generation at cement plants", p. 2[6]

<u>Question 8</u>: Should the sectors used for GHG regulation be different for topping cycle and bottoming cycle CHP units?

The thermal portion of emissions associated with bottoming-cycle CHP are directly associated with the manufacturing process, as can be seen in the diagram above, and should thus be regulated as part of the industrial sector by the ARB. Only emissions associated with any supplemental firing used to augment electricity production should be regulated by the CPUC. We recommend that this regulation take effect as part of a separate CHP sector. We believe that this may be an appropriate sector for regulation of the electricity production from topping cycle facilities as well.

If the topping-cycle CHP sector is not regulated by the CPUC as a separate CHP sector, then, at a minimum, the bottoming-cycle CHP sector should be regulated by the CPUC as a separate CHP sector, because of the relatively small size of these units.

[6] We note that any bottoming cycle CHP being considered by the cement industry does not contemplate delivering waste heat outside the clinker process.

Question 9: Should electricity delivered to the California grid by a CHP unit be regulated under the deliverer point of regulation established in D.08-03-018? Why or why not?

If the power is included in a separate CHP sector, this issue is moot.

Question 10: Should electricity generated by in-state CHP systems for on-site use be subject to the same regulatory treatment as CHP electricity delivered to the California grid? Why or not?

We note that if a CHP plant produces electricity that is used exclusively on site, the result will be a reduction in electricity provided by a utility or other Load Serving Entity (LSE), with a concomitant reduction in GHG emissions from the facilities producing the electricity for the LSE. In addition, the losses associated with the delivery of the electricity to the industrial facility containing the CHP unit are also avoided. The decision as to whether to sell electricity from a CHP facility or use it on-site is an economic one. We suggest that in either case the electricity be included in the CHP sector, assuming that it meets appropriate efficiency requirements.

If the CHP sector is not regulated by the CPUC as a separate CHP sector, then only units that sell more than 64,000 MWhrs/year to the grid should be regulated by the PUC, and only that portion of power sold to the grid should be regulated.

Question 11: If CHP is regulated in the electricity sector (either as one combined unit or based only on the total electricity output or based only on the electricity delivered to the California grid), do any of the proposed staff allocation options for electricity need to be modified? How?

We recommend against including CHP in the electricity sector; the reasons for not including bottoming cycle CHP are presented above. In addition, CHP represents a net demand reduction for the electricity sector, which distinguishes it from other supply-type resources. Indeed, bottoming cycle CHP is equivalent to energy efficiency, since it makes use of waste heat. Assuming that the CHP meets appropriate efficiency standards, we do not believe that it should be included in the proposed electric sector auction proposals. Given the nature of bottoming-cycle CHP, and its intrinsic link to the manufacturing technology, requiring bottoming-cycle CHP to buy auctioned credits would create significant disincentives for pursuing this technology.

Question 12: If CHP is treated separately from the electricity sector, but is still included as part of a cap-and-trade program, how should allowance allocation to CHP units be handled?

For the reasons presented above, we do not believe that CHP that meets appropriate efficiency standards should be included as part of cap and trade. However, if CHP were to be included in cap-and-trade, it should be allocated free allowances, since it represents an increase in efficiency.

Question 13: If allowances are allocated administratively to CHP units, should the allocations take into account increased efficiency of CHP? If so, how?

Because there is a minimum efficiency for CHP units, if CHP ends up being regulated under the utility sector, then CHP units meeting or exceeding the efficiency standard

should receive a free allocation, and those exceeding the efficiency standard should be eligible to sell offset credits or receive additional incentives under whatever incentives program is established.

Question 14: Are there advantages to having all emissions from in-state CHP regulated as part of the electricity sector under cap and trade (and therefore with the need for only a single set of allowances?) How should this be accomplished?

We see no advantages to having all emissions from in-state CHP regulated as part of the electricity sector under cap and trade. The GHG emissions associated with the thermal use should be included in the industrial sector. The GHG emissions associated with the electricity production, if any, should not be included in cap and trade.

Question 17: What is the best approach to regulation of CHP emissions to minimize the potential for disincentivizing new installations of CHP and why is that the best approach?

Do not include CHP in cap and trade. Include GHG emissions associated with thermal use in the industrial sector. If GHG emissions associated with bottoming cycle CHP are also included in the industrial sector where it is generated, it will be necessary to recognize net GHG reductions associated with avoided or deferred fossil-fired electric generation in the electric sector. If GHG emissions associated with bottoming cycle CHP are included in a CHP sector, such net GHG reductions should also be recognized.

From the perspective of other aspects of CPUC regulation, the Commission should also eliminate departing load charges, including CTC, CRS, and Procurement and CAM non-bypassable charges, which represent major disincentives to CHP. This is discussed in greater detail below.

C: TREATMENT OF CHP AS GHG REDUCTION MEASURE

Question 16: Should CHP be considered an emission reduction measure under AB 32? Why or why not?

Yes. CHP should be considered an emission reduction measure under AB 32, because it will result in a net decrease in GHG emissions and will reduce the need for new fossil-fired electricity generation. The E3 modeling indicates that CHP is one of the more cost-effective GHG reduction options. It has higher efficiency that the fossil-fired generation it avoids. In addition, electric ratepayers do not have to fund the investment in the avoided generation. In both cases efficiency is increased and the impact on rates is reduced. For the purpose of determining the impact of CHP on the GHG inventory, any GHG emissions from CHP that results in replacement or deferral of new fossil-fired electric generation should be netted against the reduced GHG emissions from the utility part of the electricity sector. This net reduction will occur even if the GHG emissions from the CHP host itself increase somewhat. A suitable efficiency standard will assure that there is a net reduction.

Consideration of CHP as a GHG mitigation measure is extremely important for the cement industry. The cement industry has particular concerns about leakage. If cement is imported rather than made in California, the state will have no opportunity to mitigate the

GHG emissions from out-of-California cement facilities, most of which require ocean shipping with its additional GHG emissions. The cement industry already has substantial competitive concerns due to currently high electricity prices that will only go higher with GHG regulation. State policies that facilitate (and ideally provide incentives for, or at a minimum, reduce the current disincentives for) the use of CHP by the cement industry will provide some assistance in mitigating these high electricity prices and the competitive disadvantages they will confer.

In addition, as noted earlier in these comments, in order for CHP to be seen in its appropriate context as a GHG mitigation measure, there is a need to correct the ARB reporting requirements for bottoming cycle CHP. These changes are needed in order to be able to accurately calculate the net decrease in GHG emissions associated with CHP.

As shown above, in a bottoming cycle application, the waste heat from the manufacturing process is used to generate electricity. If there is no supplemental firing, there is no additional fuel that goes into the electricity production process, and thus all of the fuel use, and related GHG emissions, are associated with the manufacturing process and not electricity production. If there is supplemental firing, only the GHG emissions associated with that supplemental firing are associated with electricity production. Unfortunately, the ARB reporting requirements assign what is essentially an arbitrary amount of the GHG associated with the fuel input to the manufacturing process to the electricity production, aside from any supplemental firing. This allocation of GHG emissions will overstate the GHG emissions associated with the electricity production using the bottoming cycle and undermine the calculation of the net GHG reduction. We urge the Commission to work with the ARB to modify its reporting requirements.

<u>Question 18</u>: Should ARB and/or the Commissions consider policies or programs to encourage installation of CHP for GHG reduction purposes? Why or why not?

Yes. The Commissions should pursue the following policy changes: Eliminate departing load charges, including CTC, CRS, and Procurement and CAM non-bypassable charges. Include diversity adjustments in standby rates (discussed in greater detail below). For **new** CHP, require utilities to provide emission reduction credits (ERCs) under New Source Review for GHG facilities when these ERCs are needed for installation of new CHP at industrial or commercial sector sites and where there is a net GHG reduction from the ability to avoid or defer utility fossil-fired generation.

Such policies to encourage installation of CHP for GHG reduction and efficiency purposes are entirely consistent with both the second Energy Action Plan (EAPII) and the CEC's Final 2007 IEPR Report.

EAP II sets as a goal the removal of "barriers to encourage the development of environmentally sound combined heat and power resources and distributed generation projects." (EAP II, at 8.)

In its 2007 Integrated Energy Policy Report (IEPR), the Energy Commission recommended the following:

 The CPUC's self-generation program incentives should be based upon overall efficiency and performance of systems, regardless of fuel type.

 The CPUC should complete a tariff structure to make distributed generation and combined heat and power projects "cost and revenue neutral," while granting owners' credit for system benefits such as reduced congestion.
 The CPUC and the Energy Commission should work cooperatively to eliminate all non-bypassable charges for distributed generation and combined heat and power, regardless of size or interconnection voltage and standby reservation charges for distributed generation.
 The CPUC should continue the work of the "Rule 21" industry/utility collaborative working group to refine interconnection standards, provide third party resolution of interconnection issues, and streamline permitting.
 The CPUC should develop a distributed generation portfolio standard, including combined heat and power regardless of size or interconnection voltage, for electric utility procurement plans. Alternatively, the utilities could be required to treat distributed generation and combined heat and power, regardless of size or interconnection voltage, like efficiency programs. (CEC 2007 IEPR, p. 179)

and

"The state should adopt greenhouse gas measures and regulations that fully reflect the benefits of combined heat and power with separate production of thermal and electric energy." (Ibid., p. 180)

ISSUE 8: EFFICIENCY CALCULATIONS

Question 19: Should CHP have an efficiency threshold in order to qualify as an emission reduction measure? If so, why?

Yes, efficiency standards should be applied to all types and sizes of CHP systems. However, different efficiency standards should be applied to topping-cycle and bottoming-cycle systems. Bottoming cycle CHP units without supplementary firing should be assumed to have zero emissions, since the fuel input to the manufacturing process is the same regardless of the production of electricity from the waste heat. Only the supplementary firing portion of the emissions should be subject to efficiency standards. When the total fuel input is considered, the effect of the use of the waste heat will be to produce electricity with less fuel (the only incremental fuel being from the supplemental firing) than would be the case for a power plant that only produces electricity. An appropriate efficiency standard would assure that this is the case.

Another important aspect of CHP efficiency is the fact that the power production for on-site usage avoids the losses inherent in transporting power from central generation facilities to the point of end use and transformer losses for changes in voltage.

We note that the Commissions should consider the possibility of different efficiency standards applied to different equipment sizes because there are technology differences based on size. For example, smaller applications may involve reciprocating engines or fuel cells, whereas larger applications can use combustion and steam turbines.

We do not recommend a size limitation for bottoming cycle CHP, since it is a function of waste heat recovery, which is specific to the manufacturing facility. What is important for all CHP is that the CHP facilities be sized to the host thermal source (of bottoming cycle) or thermal need (in the case of topping cycle). Furthermore, small CHP units in general have higher capital costs per MW of capacity, and so already are disadvantaged.

<u>Question 20</u>: Which of the proposed methods best achieves the objectives of an efficiency threshold and why is it the best? Is there a superior method not proposed by staff and why is it superior?

The proposed methods, and our responses, follow:

<u>Method 1</u>: One method of creating an efficiency threshold is via a double benchmarking strategy. This is when a CHP system is compared to the next best alternative, such as a separate boiler and a combined-cycle gas turbine (CCGT) system. It is possible to calculate the difference in emissions between the amount of GHG emissions that would be emitted with the two facility, non-CHP system and the amount that would emitted with a CHP unit. The difference between the two becomes the double benchmark. If the CHP facility reduces emissions relative to the separate facilities, the CHP facility could be considered a GHG reduction measure.

This methodology would work well for topping cycle CHP. For bottoming cycle CHP, it should be modified. If a bottoming-cycle CHP unit uses natural gas for supplementary firing and it achieves a FERC efficiency greater than the efficiency of the reference fossil fuel generation, it should be deemed to be reducing greenhouse gas emissions. The efficiency standard would be set at a level that would assure that qualifying bottoming cycle CHP would use fuel more efficiently to generate electricity than a reference value.

We are proposing to use the Federal Energy Regulatory Commission's (FERC) formula for calculating the efficiency of bottoming-cycle cogeneration units. This formula, from page 8 of FERC form 556, is:

$$\text{Efficiency} = \frac{(\text{Pe} + \text{Pm})}{\text{Ps}}$$

where :

Pe = Average annual hourly electrical output (MMBTU [= 3.413 $\times$ MW $\cdot$ hr])

Pm = Average annual hourly mechanical output (MMBTU [= 0.002546 $\times$ Hp $\cdot$ hr])

Ps = Average annual hourly energy input for supplementary firing (MMBTU)

The formula only counts the thermal energy used for supplementary firing, implying that the thermal energy recovered from the high-temperature manufacturing process (e.g., the thermal energy recoverable from the hot exhaust leaving a cement kiln) is *free* energy.

The efficiency calculated by this formula would be compared to the efficiency of a reference fossil-fueled power plant. The efficiency of the reference power plant would serve as a benchmark. If the bottoming-cycle cogeneration unit, burning natural gas for supplementary firing, achieves a higher efficiency than the reference plant, it would be deemed to be contributing to the reduction of greenhouse gas emissions from electricity production. The reference power plant efficiency value used in the GHG reduction calculations is 33.7%, based on the California Energy Commission "Assessment of

California Combined Heat and Power Market and Policy Options for Increased Penetration", November 2005 (CEC-500-2005-173), page 2-20.

The **attached table** presents the GHG emission reduction calculations for example systems at a 10MW and 20 MW size, for two efficiency cases. The first case is an efficiency of 45%, which just meets the FERC efficiency standard, which is the limit that we are proposing. The second case has an efficiency above the minimum, and hence could potentially be eligible for offsets or some other financial incentive to help pay for the higher capital cost incurred to reach the higher efficiency.

The GHG reductions are calculated using the following formula:

GHG reduction = (fuel fired by CHP unit)*(EF for CHP unit) –
(fuel fired by reference power generation)*(EF for reference)
Where EF = GHG emission factor for fuel used

In the example, both the CHP unit and the reference are fired with natural gas, at an emission factor of 53.05 kg CO_2 per MMBTU fired. If other fuels, such as biogas, are used in the CHP unit, then the biogas emission factor would be used for the CHP unit. The GHG reductions achieved for the four examples shown (2 efficiency case and 2 sizes at each efficiency case) vary from 10,000 to 29,000 metric tonnes CO_2 per year.

This method directly accomplishes the goal of allowing CHP to be used for GHG mitigation when it avoids or defers fossil-fired generation of lesser efficiency.

Method 2: The waste-heat recovery operations in CHP systems are a second possible efficiency metric. Measuring waste-heat capture would be another way of seeing if the state is receiving GHG reductions. Since much of the fuel efficiency benefits from a CHP unit come from efficient waste-heat recovery, this would encourage systems to take GHG reductions into consideration.

There are several unanswered questions about how this method would work. We are not sure how it would be applied for bottoming cycle CHP. How would the BTUs for supplemental firing be factored in? For topping cycles, there is flexibility in determining the mix of electricity and process energy. How would this proposal address that mix? Method 1 appears more straightforward and would achieve the goal of allowing CHP to be used for GHG mitigation when it results in GHG reductions compared to the GHG that would otherwise be created if the facility with the CHP purchased fossil-generated power from an LSE.

Method 3 would involve measuring emissions reductions due to fuel-switching from a more GHG-intensive fuel to a less GHG-intensive fuel, such as biogas. This is an option only if the new fuel is less carbon intensive than the previous fuel used at the facility.

We prefer Method 1, which should capture this effect. If a CHP facility switched to biogas in lieu of natural gas, its relative GHG emissions should be even lower when compared to fossil-fired generation from an LSE.

Question 21: What should the minimum efficiency threshold be (in terms of % savings) to qualify as an emissions reduction measure and why is that the appropriate minimum efficiency threshold?

Please see answer to Question 20.

Question 22: Are there other legal and regulatory barriers to CHP implementation in California that should be considered with respect to GHG regulation? If so, please explain in full with citations to specific relevant legal authorities. Also explain if and, if so, how the barriers could be avoided.

The CEC drew attention in its 2007 IEPR to the discouraging effect of non-bypassable charges such as departing load charges on the development of CHP.

As stated by the CEC in its Final 2007 IEPR Report:

> "This use of non-bypassable charges chills the market for distributed generation and combined heat and power projects, undermining the potential benefits these projects offer both to the environment and California's electricity system." (CEC 2007 IEPR, p. 179)

These non-bypassable charges include the Competition Transition Charge (CTC), the Cost Responsibility Surcharge (CRS) for customers transitioning from Direct Access service to Customer Departing Load (CDL),and the newly adopted Procurement and Cost Allocation Mechanism departing load charges, on whose applicability to CDL the Commission has yet to rule. All of these charges effectively require a customer with its own generation produced through CHP to also pay for the utility's generation capital investment and procurement costs. Such charges are additive to standby charges, potentially leading to double payment, and have been a major deterrent to CHP investment in the cement industry in particular and the industrial sector in general. These charges are in addition to other non-bypassable charges for public purpose programs, nuclear decommissioning, and DWR Bonds.

Another deterrent has been the lack of diversity adjustments in some utilities' standby charges. In this context, Southern California Edison has made the greatest advances in recognizing diversity in rate design.

One legal barrier is the restriction, under AB 1613, of a standard tariff for sales of excess electricity from CHP projects to those less than 20 MW. This limitation excludes CHP at larger industrial facilities, where it can be a very efficient means of reducing waste heat, producing electricity with a high level of efficiency, and mitigating GHG emissions associated with the production of electricity.

Another legal barrier is the limitation of sales or transport of power produced through CHP to companies affiliated with the CHP host. Currently the only option is sale of surplus power to an LSE. Being able to transport or sell to an affiliate could allow for development of more efficient CHP resources in some applications.

Lastly, as noted above, the CPUC and CEC should work with the ARB to correct the reporting requirements associated with bottoming cycle CHP in order to correctly determine the amount of GHG emissions associated with the electricity production part of the process.

Question 23: Should the Commissions pursue policy or programmatic measures to overcome some of the barriers to CHP deployment?

The Commissions should reconsider the elimination of CDL charges, including the CRS, for electricity consumers who engage in CHP for GHG mitigation. These charges have a major deterrent effect on pursuit of CHP by rendering many such investments by industrial customers non-cost-effective. We note again that the E3 modeling shows that CHP is one of the more cost-effective mitigation strategies for the electric sector.

As noted above, the CPUC is also in the position to direct the utilities to provide emission reduction credits for CHP projects sponsored by industrial or commercial entities where there is a net GHG benefit compared to utility fossil-fired generation.

Unlike GHG emission reductions, regulation of criteria pollutants is specific to local air district. New bottoming cycle CHP facilities with supplemental firing will need streamlined air quality permitting, including criteria pollution emission reduction credits (ERCs). State policy should facilitate both streamlining and the availability of ERCs. The latter could come from the utilities if CHP is a cheaper GHG mitigation option for electricity production than new utility fossil generation.

Question 24: Would including all of CHP in cap and trade create a disincentive if natural gas is not regulated under cap and trade? p. 12

No response.

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Conclusion

The ICC appreciates this opportunity to provide responses to the questions posed by the CPUC and the CEC regarding GHG mitigation related to electricity production. The efforts of parties in responding to the joint commissions' questions have been very challenging. The development of reply comments will be equally challenging. The commissions have confronted a massive undertaking in their efforts to provide recommendations to the Air Resources Board toward its implementation of AB 32 and that the review of the record in this proceeding and the development of the ultimate recommendations under very tight legislative deadlines. We hope that these comments will provide concrete assistance in this endeavor.

Respectfully submitted,

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Dated: June 2, 2008

CERTIFICATE OF SERVICE

I, Judy Pau, certify:

I am employed in the City and County of San Francisco, California, am over eighteen years of age and am not a party to the within entitled cause. My business address is 505 Montgomery Street, Suite 800, San Francisco, California 94111.

On June 2, 2008, I caused the following to be served:

OPENING COMMENTS OF INDICATED CEMENT COMPANIES

via electronic mail to all parties on the service list R06-04-009 who have provided the Commission with an electronic mail address and by First class mail on the parties listed as "Parties" and "State Service" on the attached CPUC service list who have not provided an electronic mail address.

I also caused this filing to be served on the California Energy Commission, as directed in the CPUC's May 20, 2008 Ruling, by e-mail to docket@energy.state.ca.us and kgriffin@energy.state.ca.us; and by mailing a copy to: California Energy Commission, Docket Office, MS-4, Re: Docket No. 07-OIIP-01, 1516 Ninth Street, Sacramento, CA 95814-5512.

_ _/s/ Judy Pau_____

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CALIFORNIA PUBLIC UTILITIES COMMISSION
Service Lists

PROCEEDING: R0604009 - CPUC - PG&E, SDG&E,
FILER: CPUC - PG&E, SDG&E, SOCALGAS, EDISON
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