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Joint California Public Utilities Commission and California Energy Commission Staff Paper on GHG Regulation for Combined Heat and Power

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Joint California Public Utilities Commission and California Energy Commission Staff Paper on GHG Regulation for Combined Heat and Power

I. Introduction

The purpose of this staff issue paper is to discuss questions that arise about the treatment of greenhouse gases (GHG) from a Combined Heat and Power (CHP) unit in the context of Assembly Bill (AB) 32. In the joint decision of the Public Utilities Commission and Energy Commission of March 2008, the Commissions stated: "[W]e plan to consider further the treatment of CHP facilities under this policy framework. We want to avoid unintended negative consequences for CHP, which may be a valuable source of additional GHG emissions reductions in California. Therefore, we intend to consider further the treatment of emissions from CHP facilities in the next portion of this proceeding, and plan to include recommendations on this issue to ARB in our next decision."[1]

There are two underlying goals of this staff issue paper. The first is to discuss how CHP should be treated under the AB 32 framework, since CHP units emit GHG, but typically less than conventionally generated electricity. Options include regulating CHP as a separate sector or inclusion in another sector such as electricity, natural gas or industrial. Included here is the question of whether CHP should come under a cap-and-trade framework, if one is adopted by the Air Resources Board (ARB) as part of its AB 32 regulations. Implicit in these questions is the issue of ensuring a level playing field between CHP and other providers of electricity. The second goal of this paper is to discuss whether CHP should be considered a potential emission reduction measure for the purposes of AB 32. If so, then the Commissions may want to consider additional regulatory and policy steps that can be taken to encourage installation of new CHP. The question of whether this is appropriate is discussed in this paper. However, how such encouragement could happen might be implemented through additional policy or other means beyond the resulting recommendations of this staff paper.

This paper first provides some background information necessary to understanding CHP issues in the context of the California grid. It then goes into a discussion of the treatment of CHP emissions under AB 32. Next, there is a discussion of the differences in topping-cycle versus bottoming-cycle units, and the implications for GHG regulation strategies. There is then a discussion about the type of CHP regulations available, along with a discussion of on-site output and its interactions with delivered outputs. There is then a discussion about the allocations methodology for CHP under various different scenarios. Next there is a discussion of CHP as a potential emissions reduction strategy, including some implications about efficiency and various legal and regulatory barriers to CHP.

At the end of each section, staff presents at least one question as a starting point for a discussion in the comment process. These questions are re-stated and numbered at the

[1] See Decision (D.) 08-03-018, pp. 9-10.

end of the document to help facilitate response during the comments process. The comments in response to this staff issue paper will be used to inform the Commissions' joint decision with final recommendations to ARB regarding inclusion of the electricity and natural gas sectors and CHP in ARB's scoping plan.

II. Background

A CHP unit generates both electricity and thermal heat from a single fuel source. Because of this co-generation, the potential exists for energy efficiency gains relative to processes that provide power and heat separately. This efficiency potential can lead to a decrease in total fuel use and therefore a subsequent decrease in GHG emissions.

According to the ARB November 2007 Inventory, electricity produced at existing CHP facilities produced 15 to 24 million metric tons of carbon dioxide equivalent (CO2e) emissions annually over the 1990 to 2004 period and useful thermal output from them produced an additional 7 to 13 million metric tons of CO2e annually. Total CHP facility emissions ranged from 25 to 33 million metric tons of CO2e, approximately 6-7% of California's total GHG emissions over the 1990 to 2004 period.[2]

Currently in California, there are approximately 940 CHP units in operation.[3] These units have a capacity of over 9,000 MW. Of these units, approximately 77% are less than 5 MW in size, while the remaining 23% are larger than 5 MW. It should be noted, however, that 96% of the current electrical capacity comes from the units sized 5 MW or greater. These numbers are summarized below in Table 1. Presently, the staff does not suggest modifying the reporting requirements as established by ARB. As of December 2007, the current threshold for reporting under ARB is 1 MW of capacity and 2,500 tons of CO2e emitted.[4]

Table 1: Summary Statistics of CHP Plants in California.

Size Threshold	MW Capacity	% of Total MW	Number of Plants	% of Total Plants
< 5 MW	380	4%	727	77%
≥ 5 MW	8,848	96%	213	23%
Total	*9,228*	-	*940*	-

While often characterized under the single heading of CHP, there are multiple types of technologies and fuel sources that are considered to be part of this broad category. As a general matter, some technologies are optimized to produce heat, with electricity as a byproduct. In other cases, electricity is the primary product, with heat as the byproduct. We expect that parties may want to comment on the types of technologies that should be

[2] The totals are not additive due to year-by-year variations.
[3] Source: Energy and Environmental Analysis database, based on 2006 data. Located online at http://www.eea-inc.com/chpdata/States/CA.html.
[4] Current reporting rules are located at http://www.arb.ca.gov/cc/ccei/reporting/GHGReportRegUpdate12_05_07.pdf

appropriately included in the CHP definition for purposes of GHG regulation and the use of CHP as an emission reduction measure under AB 32.

A 2005 study from the California Energy Commission's Public Interest Energy Research (PIER) program states that there is a total remaining technical market potential from all types of CHP that approaches 30,000 MW in California.[5] The study splits this figure into generation from both new and existing facilities. These estimates are subject to a number of market conditions, including the cost of natural gas (the primary fuel source for the majority of existing and potential CHP plants), energy prices and GHG considerations. The study also outlines market barriers and other opportunities for CHP, which are discussed in other portions of the paper. The PIER study has a direct impact on the 2007 Integrated Energy Policy Report (IEPR), which refers to CHP as being a potential reduction source of GHG. "Combined heat and power, in particular, offers low levels of greenhouse gas emissions for electricity generation, taking advantage of fuel that is already being used for other purposes."[6]

CHP units are diverse and may fall into a number of different categories:

1) Units may be existing or new.
2) For new installations, units may be at an existing location or may be integrated into the design of an entirely-new facility.
3) Units may serve on-site load only or may provide power to the California grid.
4) Units may be located in-state or out-of-state (with delivery of electricity to the California grid).

Because of this diversity of CHP technology and applications, this paper attempts to treat as broadly as possible all of the possible policy implications that relate to CHP units.

III. Treatment of CHP Emissions Under AB 32

A CHP unit produces both electricity and thermal heat from a single fuel source. A generic representation of this is illustrated below in Figure 1. In this very basic illustration, a CHP unit has a certain amount of fuel input into the system yielding a corresponding amount of thermal heat and electricity. The horizontal dotted line represents the thermal/electric split. This split is not a fixed proportion, and can be adjusted depending on the facilities' specific needs. Furthermore, the electricity can also be divided between power consumed at the site's location and power delivered onto the grid. This split is represented by the vertical dotted line – again, there is not a fixed proportion for this either. Thus, regardless of the technological process, most CHP units result in three consumed outputs: on-site thermal, on-site electricity and electricity delivered to the grid.

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[5] *Assessment of California CHP Market and Policy Options for Increased Penetration,* EPRI, Palo Alto, CA, California Energy Commission, Sacramento, CA: 2005.

[6] California Energy Commission 2007, *2007 Integrated Energy Policy Report*, CEC-100-2007-008-CMF. p. 7.

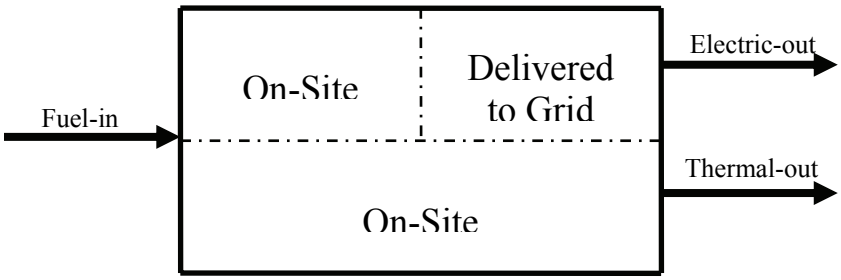

Figure 1: Generic Representation of a CHP Unit.

Since the CHP results in both thermal and electric output, there are options on how these units should be regulated. One possibility for regulation of the GHG emissions from the component parts of the CHP unit would be to regulate emissions from electricity delivered to the grid as part of the electricity sector, and to regulate emissions from electricity consumed on-site and emissions attributed to thermal output as part of the industrial sector and/or the natural gas sector. A second option would be to regulate emissions from all electricity production, including both electricity used on-site and electricity delivered to the grid, as part of the electricity sector, and to regulate emissions attributed to thermal output as part of the industrial sector or the natural gas sector. A third option would be to regulate the unit once as a single source and not split the GHG emissions into various sectors.

Since a CHP unit is one technological process, typically with only one piece of equipment, splitting the emissions into two or more sectors could raise the potential for uneven or unclear regulatory treatment of these units. The converse of that is to group all of the outputs into one sector. This option has been previously recommended by the Electricity Producers and Users Coalition and the California Association of Cogenerators (EPUC/CAC) in this joint proceeding.[7]

One option for regulating CHP units would be to place all of the outputs into the electricity sector, at least for those CHP units that deliver electricity to the grid, since the Commissions have already recommended a cap-and-trade for that sector. The Commissions would need to determine whether to recommend that just a part of CHP output or the entire output should fall into the electricity sector cap-and-trade. (This is discussed in more detail in the next section)

Answering the question of what sector(s) to regulate CHP in is a critical component of deciding if CHP should be regulated as part of a market-based system such as cap-and-trade or whether more programmatic approaches may be appropriate.

[7] See EPUC/CAC comments filed on November 14, 2007 and its comments on the proposed decision of the joint Commissions filed February 28, 2008.

- **Question: 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.**
- **Question: Should GHG emissions from CHP systems be regulated in one sector? If so, which one? How?**
- **Question: 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?**
- **Question: 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.)**
- **Question: Should CHP units be placed in different sectors based on CHP unit capacity size?**
- **Question: 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?**

A. Topping Cycle vs. Bottoming Cycle

When discussing the approach to regulating emissions from a CHP plant, it is important to note a critical distinction between two different types of CHP units. The basic depiction describing a CHP unit in Figure 1 is generic, but the order in which the heat and electricity is generated from the fuel source varies. A topping cycle CHP plant typically generates electricity first and then captures the useful thermal waste heat to drive a secondary process. A bottoming cycle is the opposite, where it first generates heat and then often through some small supplemental firing, is able to capture the useful waste heat to generate electricity.[8] Regardless of whether a CHP unit is a topping cycle or a bottoming cycle, there is still generation of both electricity and useful thermal heat from the unit. However, the technological distinction makes a difference in terms of the primary function of the unit from the site-owner's perspective.

A *topping cycle* generates electricity first and then captures waste heat for a secondary process. Often the captured waste heat is used to displace fuel that would be used to

[8] Some generic representations of these processes can be found at http://www.epa.gov/chp/basic/index.html

generate heat and the electricity displaces power that otherwise would be purchased from the grid. An example is that the waste-heat can be used as steam to heat buildings; if not for the CHP unit, the site would be using a fuel to heat water into steam to heat the building.

By contrast, a *bottoming cycle* unit is primarily used for generating heat for an industrial process. The industrial process needs a very high amount of high-temperature heat, leading to a large amount of waste heat that can be captured and then converted into electricity. If the electricity were not generated, almost the same amount of fuel would be needed for the industrial process. In most cases, there is only a relatively small amount of supplemental firing needed that occurs to generate the electricity because of the high value of the waste heat that is remaining after the manufacturing process. An example of this would be in the cement manufacturing industry. Subsequently, much of the electricity that is generated from a bottoming cycle CHP facility has a much lower emissions rate than the same amount of electricity from a dedicated electricity-only production facility.

Because of the primary differences in function, there is the potential to treat a topping cycle CHP unit differently than a bottoming cycle unit. The current reporting method of ARB recognizes this distinction. Thus, their current total fuel methodologies recognize that the bottoming cycle units may utilize additional heat created as part of the manufacturing process. [9] The emissions assigned to the manufacturing process will be a positive number if there is an exothermic reaction, otherwise this bottoming-cycle specific value will be zero. This added emissions value is the ARB method of distinguishing in the reporting requirements between a topping and bottoming cycle unit. In addition, the Federal Energy Regulatory Commission (FERC) recognizes a general distinction in their qualifying facility (QF) program with respect to a topping-cycle and a bottoming-cycle CHP unit.

Because of the basic technological differences in operation and application, it is not clear if the type of GHG regulation should be different for a topping-cycle and a bottoming-cycle CHP unit.

- **Question: 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?**
- **Question: Should the sectors used for GHG regulation be different for topping cycle and bottoming cycle CHP units?**

B. Determining Type of CHP Regulation

In the previous sections, we have identified the issues of the sectoral placement for CHP and the differences between topping cycle and bottoming cycle CHP units. In this section, we discuss in a little more detail the option of inclusion of CHP into a cap-and-trade program or treatment of CHP emissions via direct regulation. The Public Utilities

[9] http://www.arb.ca.gov/cc/ccei/reporting/GHGReportRegUpdate12_05_07.pdf, pages A-56 to A-61.

Commission and Energy Commission have previously recommended the inclusion of the electricity sector, but not the natural gas sector, in a cap-and-trade program if one is adopted under AB 32. It may also be likely, though not yet determined, that if there is a cap-and-trade program, certain industrial sectors may be included. Since some CHP units have emissions associated both with electricity production and industrial processes, the Commissions may wish to make a recommendation about whether and/or how CHP could be handled as part of cap and trade. Alternatively or additionally, CHP emissions could also be addressed through direct regulatory measures.

If there is a cap-and-trade, it is presently unclear if there is a fundamental difference between placing CHP in a separate sector versus the placement within the electricity sector. Either way, particularly for CHP that delivers electricity to the grid, staff proposes that there be a fundamental principle to ensure that CHP units have a level playing field in terms of their GHG compliance costs with other methods of electricity generation.[10] We include further discussion of this issue in the next section.

Staff also recognizes that it could be desirable to have a distinction in sector placement based on capacity size. Data from the Energy Information Agency suggests that there are a large number of small capacity units that result in a low amount of MW and a large amount of generation from a small number of units. This is demonstrated in Table 1.

- **Question: Should CHP be part of a cap-and-trade program or not? If so, should the entire unit or certain CHP outputs be part of the cap and trade program?**

C. Deliverer and On-Site Generation

In D.08-03-018, the Commissions defined the point of regulation for the electricity sector based on a "deliverer" approach. While the decision spoke at length about how the deliverer structure would work for on-grid generation in California and for imports into California, it did not resolve how CHP generation should be treated.

The first issue is to determine whether CHP should be considered "deliverers" for their power delivered to the California grid. The second is to determine the appropriate treatment for electricity that is delivered on-site only, or "behind the meter" and not to the distribution or transmission grid.

- **Question: 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?**
- **Question: 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?**

[10] See Staff Paper on options for Allocation of GHG Allowances in the Electricity Sector, filed April 16, 2008 in R.06-04-009.

D. Allocation Methodology for CHP

On April 16, 2008, Public Utilities Commission and Energy Commission staff released a straw proposal on allocation options for the electricity sector under a cap and trade model. The staff's allocations straw proposal first presents three approaches in their "pure" form, and then recommends a "preferred" method if that approach were selected. The three options are administrative allocation based on historic output of emissions, administrative allocation based on electricity output and an auction with Auction Revenue Rights (ARRs). In this issues paper we do not discuss allocations for CHP based on the pure methods, but rather on the recommended preferred options identified for the electricity sector. The three preferred methods as identified in the April 16, 2008 staff paper are:

1) Initial administrative allocation of no more than 50% of allowances to deliverers on a historical emission basis. The remaining allowances distributed entirely by auction, or through a combination of auctioning and output-based allocation. The share of allowances allocated on an emissions basis would decline rapidly in subsequent years.

2) Initial allocation of 90% of allowances to deliverers on an output basis, with the remainder distributed by auction, transitioning to greater percentages of auctioning. Allowances would only be allocated to deliverers from GHG-emitting resources, and this would be done on a fuel-specific basis.

3) Initially auctioning 75% of allowances, with the remaining allowances allocated administratively. The majority of revenues would be recycled to retail providers on a historical emissions basis for uses to implement the goals of AB 32, and the revenue allocation would transition slowly to be based on sales over time.

These preferred allocation methods do not discuss allocations with respect to CHP units.[11] If ARB decides to regulate CHP via a cap and trade program as part of the electricity sector or separately, there would be a need to determine if the electricity allocation rules apply to all the GHG emissions or separately for (i) the emissions generated by the production of electricity and (ii) the emissions generated by the production of heat used for other purposes. There are three options for including CHP if it were to be included in the electricity sector: (i) the entire unit, with both electricity used on-site and delivered to the grid and on-site thermal (ii) both electricity used on-site and delivered to the grid but not the on-site thermal or (iii) just the electricity that is delivered to the grid but not the on-site thermal or the electricity used on-site. If GHG from CHP facilities were to be regulated via cap and trade but not in the electricity sector, then a different allocation methodology may need to be determined.

- **Question: 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?**

[11] Page 16 of allocations staff straw proposal.

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

IV. CHP as a Potential Emissions Reduction Strategy

CHP has the potential to lead to a significant net decrease in GHG emissions. To illustrate this, EPUC/CAC, in their previous comments, presented the following scenario as illustrated in Figure 2.[12] The scenario compares a site without CHP installed to one with a CHP unit. This example shows that the implementation of a CHP plant leads to an overall net decrease in GHG emissions for the state. However, it also shows an increase of the on-site emissions responsibility for the facility with a CHP unit.[13] The proper installation and operation of a CHP unit may lead to an economy-wide decrease in emissions but has the potential to increase on-site emissions responsibility.[14]

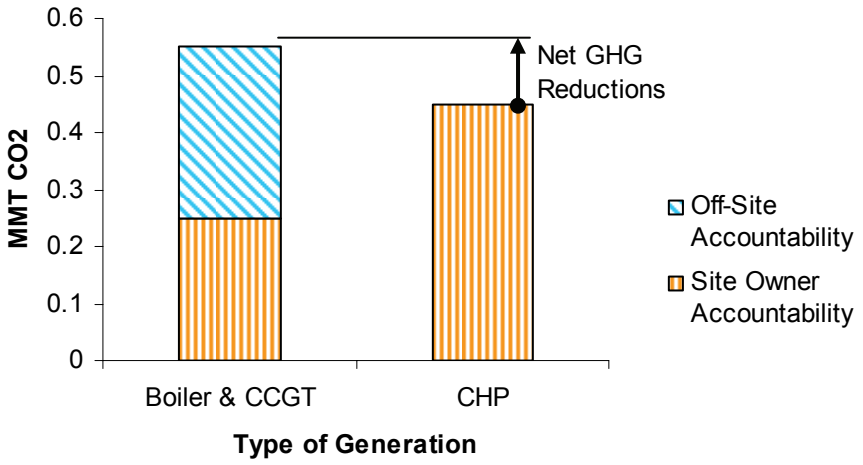

Figure 2: Emissions Responsibility of Boiler + Off-Site CCGT Versus CHP. Values are Illustrative Only.

[12] Please note: values are for illustrative purposes only.
[13] This scenario was presented on the record before the First Deliverer decision was released, and that decision has the potential to change the relevance of the some of the details of the example. However, the main thrust of the example still holds true.
[14] Note: before the CHP unit is built, the off-site emissions will occur at a power plant, where the power plant would be responsible for them.

Since there is a net decrease in overall emissions to the atmosphere under this example, but an increase in on-site GHG emissions, there is the potential for the chosen regulatory approach to create a disincentive to CHP facilities.

We seek comment on whether CHP should be treated as a potential emission reduction measure under AB 32. It is possible for some CHP installations simply to result in a replacement of emissions from central station power generation with CHP emissions, not resulting in any GHG emissions reductions. Staff seeks comment on the relative potential benefits of CHP installations. In addition, if CHP should be considered a potential emission reduction measure, staff seeks comment on the best approaches to minimizing the potential disincentives for CHP installation under the regulatory treatments examined in the sections above. In addition, we seek input on whether the Commissions should encourage additional CHP installations with favorable regulatory treatment or programmatic initiatives.

- **Question: Should CHP be considered an emission reduction measure under AB 32? Why or why not?**
- **Question: 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?**
- **Question: Should ARB and/or the Commissions consider policies or programs to encourage installation of CHP for GHG reduction purposes? Why or why not?**

A. CHP Efficiency Threshold

If CHP is to be considered an emission reduction measure under AB 32, ARB and/or the Commissions would need to determine that the CHP installation actually causes a net reduction in GHG relative to power delivered from the grid. One approach to ensuring this outcome would be the use of an efficiency threshold for CHP installations.

There are many different methods to apply an efficiency threshold to ensure additional reductions are achieved. Below, staff discusses several different ways of encouraging efficient CHP systems.

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.

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.

A third approach 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.

If such efficiency standards were to be adopted, staff proposes that they be technology and fuel neutral, to the extent possible. There are multiple different technologies and applications of CHP. These technologies include gas turbines, microturbines, spark ignition reciprocating engines, steam turbines, compression ignition reciprocating engines and fuel cells.[15] In this discussion, the staff does not intend a preference for one technology over another, but rather intends to emphasize overall GHG emissions reductions.

It is also worth noting that even if ARB decides not to treat bottoming-cycle and topping-cycle CHP units differently for purposes of determining compliance with the statewide greenhouse gas emissions limit and any cap and trade system, for purposes of determining whether a CHP unit qualifies as an emissions reduction measure there could be separate efficiency calculations created for the two technological processes.

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

B. Legal and Regulatory Barriers to CHP

While the purpose of this paper is to understand how to categorize the GHG emissions that are emitted from a CHP unit, there are some other legal and regulatory barriers facing CHP units. These may be relevant to address if parties believe that CHP should be promoted as an emission reduction measure.

Both the 2005 PIER study and the 2007 IEPR cite several barriers to CHP deployment in California. These barriers include non-bypassable charges and inability to easily sell to the wholesale electricity market—the ability to sell excess electricity to the local utility. Another barrier as noted by IEPR is the inter-connection rules which make it harder to sell power delivered off-site.

[15] See EPA's Introduction to CHP Catalog of Technologies at http://www.epa.gov/chp/basic/catalog.html

In addition to some of the regulatory barriers, there is a certain amount of legislative uncertainty with respect to CHP. The Public Utilities Commission had previously provided funding through the Self-Generation Incentive Program (SGIP) to small CHP units. These units were given incentives up to 1 MW of capacity but allowed to be sized up to 3 MW. AB 2778 removed the Public Utilities Commission's ability to offer incentives for any technology that combusts natural gas, with the exception of fuel cells. This in essence took CHP from natural gas out of the program.

A new law, AB 1613, creates a new way for the Commissions to promote small CHP units, sized up to 20 MW. The Public Utilities Commission is currently working on a strategy to address this legislation and modify the program or create a new one. For larger CHP units, they have typically participated in power markets as qualifying facilities (QFs).

In addition, in Phase I of R.06-04-009, the Public Utilities Commission implemented the Emissions Performance Standard (EPS), which sets emissions limits for power purchases from GHG-emitting electricity facilities. The EPS includes rules for calculating emissions from a CHP within the context of this performance standard.

Finally, when discussing the location of new CHP units, there are certain specific rules about criteria pollutants. Depending on the efficiency of the CHP unit, the number of criteria pollutants emitted on site could increase or decrease, but there is likely to be a transfer of criteria pollutants from off-site generators to on-site locations. Thus while CHP can reduce GHG emissions overall, the impact on criteria pollutants is less clear. Staff seeks comment on whether the Commissions should seek to encourage CHP as a GHG emission reduction measure in light of these issues related to criteria pollutants.

- **Question: 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.**
- **Question: Should the Commissions pursue policy or programmatic measures to overcome some of the barriers to CHP deployment?**
- **Question: Would including all of CHP in cap and trade create a disincentive if natural gas is not regulated under cap and trade?**

V. Consolidated List of Questions

Throughout this staff proposal, at the end of each section, staff has asked one or more questions to provoke party comments. To make this process easier, a copy of all of the questions asked throughout the text are re-presented below. For the sake of clarity in the comment and reply comment process, the questions have been numbered.

1) **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.**
2) **Should GHG emissions from CHP systems be regulated in one sector? If so, which one? How?**
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?**
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.)**
5) **Should CHP units be placed in different sectors based on CHP unit capacity size?**
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?**
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?**
8) **Should the sectors used for GHG regulation be different for topping cycle and bottoming cycle CHP units?**
9) **Should CHP be part of a cap-and-trade program or not? If so, should the entire unit or certain CHP outputs be part of the cap and trade program?**
10) **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?**

11) 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?

12) 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?

13) 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?

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

15) 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?

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

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?

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

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

20) 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?

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?

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.

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

24) Would including all of CHP in cap and trade create a disincentive if natural gas is not regulated under cap and trade?

(END OF ATTACHMENT)