Comments of Southern California Edison Company on Guidelines for Certification of Combined Heat and Power Systems Pursuant to the Waste Heat and Carbon Emissions Reduction Act, Committee Proposed Guidelines, and Draft Initial Statement of Reasons

2008 Rulemaking on Implementation of the Waste Heat and Carbon Emissions Reduction Act	)))	Docket No. 08-WHCE-1

I. INTRODUCTION

Southern California Edison Company (SCE) appreciates the efforts of the California Energy Commission (CEC) in developing the "Guidelines for Certification of Combined Heat and Power Systems under the Waste Heat and Carbon Emissions Reduction Act – Committee Proposed Guidelines" (Guidelines) pursuant to Public Utilities Code section 2840, et seq. SCE respectfully submits its comments on the Guidelines and the CEC's "Draft Initial Statement of Reasons" (Statement of Reasons) below.

On December 17, 2009, the California Public Utilities Commission (CPUC) adopted a feed in tariff for small combined heat and power (CHP) system pursuant to Public Utilities Code section 2840, *et seq*. (AB 1613, Blakeslee). The overall responsibility for developing eligibility requirements for participating CHP systems to ensure that they will reduce overall fuel consumption and thus reduce greenhouse gas (GHG) emissions, however, falls to the CEC in its implementation of the AB 1613 guidelines.

In order to ensure that GHG emissions reductions are achieved, changes must be made to the Guidelines. Accordingly, SCE offers comments in the following key areas:

- Reinstatement of the fuel savings standard. The fuel savings metric for CHP systems, as outlined in the October 2009 Staff Draft Guidelines,[1] was removed from the November guidelines. While the CEC has committed to evaluating the correct values and possibly establishing a standard at some point in the future, SCE urges the CEC

[1] Guidelines for Certification of Combined Heat and Power Systems under the Waste Heat and Carbon Emissions Reduction Act – Staff Draft Guidelines, October 2009, 4.

to establish a fuel savings standard to encourage the development of new, clean, and efficient CHP and ensure accurate measurement of GHG emissions reductions.

- Premium and consistent efficiency standards. SCE applauds the increasing of the efficiency standard from 60% to 62% for topping cycle systems. However, SCE continues to maintain that a higher efficiency standard is appropriate if substantial GHG reductions are to be realized. Indeed, if SCE's current CHP fleet, many of which are 10 to 20 year old technologies, can maintain an average efficiency of 65%, surely new state-of-the-art systems will be capable of achieving this level of efficiency. Additionally, the CEC should enforce consistent standards for both topping and bottoming cycle systems. There is no reason these systems should have different efficiencies, as proposed in the Guidelines.
- Clarification of the CEC staff's Statement of Reasons on the perceived inconsistency in utility comments regarding the performance of a natural gas combined cycle (NGCC) and as-available capacity pricing. The fact that the excess electrical energy that CHP facilities provide to the utility may be as-available is not justification to eliminate the fuel savings standard.

SCE also submits its recommended corrections to Appendix A of the Guidelines.

II. COMMENTS

A. A Fuel Savings Standard Is Crucial to Achieving GHG Reductions and Should Be Included in the Final Certification Guidelines.

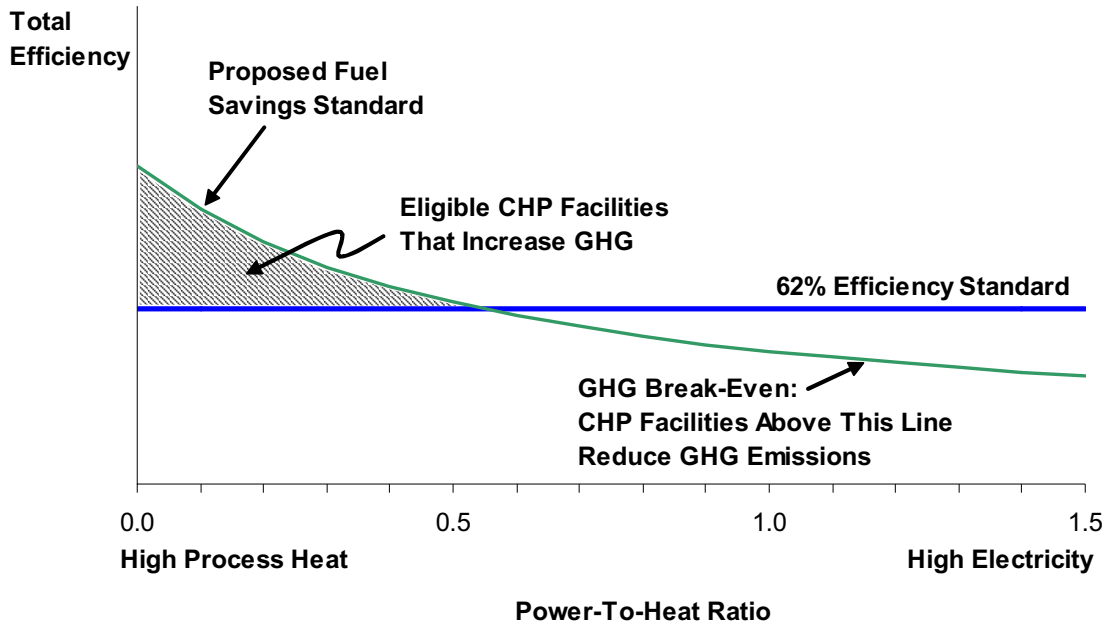
The October 2009 staff draft guidelines incorporated a fuel savings standard that compared eligible CHP systems to the separate production of thermal energy from a process heat boiler and electrical generation from a relatively efficient electric generator. This fuel savings standard was subsequently removed from the November 2009 Draft Guidelines due to conflicting stakeholder feedback and lack of consensus on the values for the thermal and electric comparisons. SCE recognizes that the selection of benchmarks for separate thermal and

electrical output on which to base the fuel savings standard (the "double benchmark") has been controversial. However, SCE urges the CEC to reinstate the fuel savings standard with this double benchmark so an appropriate performance measure will be in place to ensure that all eligible CHP systems can be relied upon to achieve state policy goals.

Figure 1 illustrates the design challenges associated with setting only a single CHP efficiency standard. The "break-even" point at which a CHP facility reduces natural gas usage (and thus GHG emissions) relative to separate generation varies with the relative mix of process heat and electrical output from the CHP facility. This relative proportion of electricity (power) to thermal energy (heat) is commonly referred to as the power-to-heat ratio.[2] Since CHP systems blend together the attributes of an electricity generator and a process heat boiler, they typically have overall efficiencies between those of a stand-alone electricity generator (about 42% to 47% efficient) and a stand-alone process heat boiler (about 80% to 85% efficient). A CHP facility with total efficiency and a power-to-heat ratio above the break-even line reduces fuel consumption and thus GHG emissions. Holding facilities to only a 62% total efficiency standard, and eliminating the fuel savings standard, will enable facilities that increase fuel consumption (and GHG emissions) to also participate in the tariff.

[2] In Figure 1, a ratio of electricity generation to process heat production of about 0.55 or greater represents the point at which a fuel savings standard and efficiency standard intersect.

Figure-1
A Single Efficiency Standard of 62% Allows CHP Facilities that Increase GHG to Meet Eligibility Requirements.



For CHP facilities that produce relatively higher amounts of electricity compared to process heat (the right side of the graph), the 62% total efficiency standard is sufficient and the fuel savings standard is not critical. However, for facilities with relatively higher amounts of process heat production (on the left side of the graph), the fuel savings standard is critical. If only a single efficiency standard is established, facilities could operate at 62% efficiency but in fact *contribute* to higher fuel consumption and increased GHG emissions. This is illustrated in Figure 1 in the area above the efficiency line and below the GHG break even line. While the number of projects in this range may be limited, it seems reasonable to incorporate both a fuel savings standard and efficiency standard that will provide an effective means to encourage a wide range of CHP facilities and ensure *all* projects achieve the objectives of AB 1613.

SCE encourages the reinstatement of the fuel savings standard as proposed in the October guidelines. SCE supports further evaluation of the values and recommends that the CEC work with stakeholders either through a workshop or other working group to more closely evaluate the

established benchmark values and make any modifications, if necessary, at some point in the future.

B. SCE Supports the CEC's Increase of the Efficiency Standard for Topping Cycle CHP Systems to 62 Percent.

SCE applauds the CEC's recognition of a premium efficiency standard and the movement to a 62% efficiency standard. However, SCE urges the adoption of even higher efficiency targets to align with the Integrated Energy Policy Report (IEPR) and the State's goal of achieving meaningful GHG reductions, "As CHP technology continues to develop, efficiencies of more than 70 percent can be expected to become standard and cost effective."[3]

In the Statement of Reasons, the CEC points to the 65% average efficiency performance of SCE's CHP fleet as a rationale for the 62% level established in the Guidelines.[4] There are two key points that should be considered when referencing this data. First, 65% is still an *average* efficiency level and many of SCE's projects continually operate well above this level, some reaching efficiencies in the 80% to 89% range. Second, as many of these systems are 20 to 30 years old and have operated between 60% to 65% efficiency levels for two to three decades, newer systems eligible under AB 1613 should not face major challenges in achieving higher efficiencies, especially as technology continues to improve. At the very least, SCE recommends that any efficiency level be revisited over time to recognize advancements in technology and address the State's growing need for greater levels of fuel and emissions reductions.

Finally, the efficiency standards should be consistent for both topping and bottoming cycle systems. The draft guidelines suggest a topping cycle system meet a 62% efficiency standard while bottoming cycle systems meet a 60% efficiency standard. There is no theoretical or statutory reason for such a distinction. Both systems use waste heat to produce power. The mere fact that one system produces electricity at the top of the cycle, while the other system

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[3] California Energy Commission, *2009 Integrated Energy Policy Report*, Final Committee Report, December 2009, CEC-100-2009-003-CTF.

[4] Draft Initial Statement of Reasons, November 2009, CEC-200-2009-020-D, 12-13.

produces electricity at the bottom of the cycle, should make no difference in establishing an efficiency standard. SCE urges the Commission to adopt consistent standards for both bottoming and topping cycle systems.

C. AB 1613 Systems Must Be Properly Sized and Operated to Meet Expected Thermal Load, Not Maximum Thermal Load.

In the section on Topping Cycle Thermal Energy Output Limit in the Statement of Reasons, there is an assertion that without the ability to size the CHP unit to the maximum thermal demand, extra CHP units that do not export electricity or a redundant boiler/furnace/process heater would be required to meet any thermal demands above the minimum.[5] The Statement of Reasons also notes that such redundancy would therefore conflict with the Act's intent to encourage CHP because smaller CHP would not be economical. These assertions are misguided. Given that thermal loads can fluctuate over time, a CHP system that is sized to the maximum thermal load will likely be underutilized at many other times. This could result in either 1) running the CHP system at partial electrical output to match the thermal need, or 2) continuing to run the CHP system and dumping the unused waste heat. In SCE's experience, an oversized CHP system sends unneeded heat to the thermal host, which must be dumped into the atmosphere with wasteful steam vents or heat dump radiators. Surely it is not the intent of AB 1613 to encourage oversized CHP that wastes energy. SCE recommends that Section III(b) be revised to read: "The thermal energy output of a topping cycle CHP system, as designed shall be no larger than the minimum thermal load served by the CHP system as useful thermal energy."

D. There Is No Inconsistency in Comments Regarding the Performance of an NGCC and As-Available Capacity Pricing.

As one rationale for not adopting a fuel savings standard based on double benchmarks, the Statement of Reasons notes that "Investor owned utility positions don't seem to be consistent

[5] *Id.*.

between the two proceedings [R.08-06-024 at the CPUC and Docket No. 08-WHCE-1 at the CEC]. A CHP system that is not paid as though it were a NGCC [natural gas combined cycle gas turbine] should not be required to perform as though it were a NGCC."[6] This perception of inconsistency is unfounded. It fails to recognize the key difference in contexts between: 1) discussions before the CPUC of contract pricing methodologies that would satisfy the ratepayer indifference requirements of AB 1613, and 2) the separate discussions before the CEC regarding the implementation of efficiency standards to further the emissions reduction and fuel savings goals of the statute. The statement confuses the performance in delivery of a power product to the utility buyer with the equally important but distinct area of CHP plant performance in emissions and fuel efficiency.

In the CPUC proceeding R. 08-06-024, the price for power delivered by the CHP projects to the utility has been discussed at length. SCE has commented that the use of a combined cycle gas turbine proxy in the MPR-based pricing methodology proposed by the CPUC staff was inappropriate because, among other things, it would result in overpayment for the as-available nature of the power product being offered by the CHP.[7] However, just because the delivery of excess power to the utility from a CHP facility is as-available or intermittent, it does not follow that the facility will not be serving a customer's on-site electrical and thermal loads at a high capacity factor, i.e. base-loaded or nearly so. Indeed, the intent of AB 1613 is precisely to encourage CHP facilities which are closely matched to the energy requirements of a host customer. It is the totality of CHP facility operation – primarily serving on-site customer energy needs, but secondarily providing surplus electrical energy to the utility – that must be addressed in the Guidelines.

In this docket, SCE has argued that a combined cycle gas turbine such as its Mountainview plant would provide an appropriate benchmark for a fuel savings standard for new

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[6] *Id. at* 16.

[7] In R.08-06-024, the power purchase contracts developed for AB1613 CHP projects provide only for as-available capacity. This is based on both the initial draft as-available contract prepared by the CPUC staff as a basis for negotiations among the parties, and also the insistence of the CHP parties who participated in the contract workshops that their members could not be bound by the performance requirements that would be inherent in providing a firm capacity product to the utility.

CHP facilities.[8] There is no inconsistency between SCE's position here and its position with regard to the contract price to be set by the CPUC. Indeed, they should not even be linked. The fact that the excess electrical energy that CHP facilities provide to the utility will be as-available in nature is no justification for the CEC to dilute the efficiency and fuel savings performance requirements.

E. Recommended Corrections to Appendix A.

See Attachment 1.

III. CONCLUSION

SCE appreciates the CEC's consideration of these comments, and looks forward to working with the CEC and CPUC to implement the AB 1613 Guidelines and Tariff.

Respectfully submitted,

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December 22, 2009

[8] Comments of Southern California Edison Company on Staff Draft Guidelines for Certification of Combined Heat and Power Systems Pursuant to the Waste Heat and Carbon Emissions Reduction Act, October 19, 2009, 2.

ATTACHMENT 1 TO THE COMMENTS OF SOUTHERN CALIFORNIA EDISON COMPANY ON GUIDELINES FOR CERTIFICATION OF COMBINED HEAT AND POWER SYSTEMS PURSUANT TO THE WASTE HEAT AND CARBON EMISSIONS REDUCTION ACT

CALIFORNIA
ENERGY
COMMISSION

GUIDELINES FOR CERTIFICATION OF COMBINED HEAT AND POWER SYSTEMS PURSUANT TO THE WASTE HEAT AND CARBON EMISSIONS REDUCTION ACT, PUBLIC UTILITIES CODE, SECTION 2840 ET SEQ.

COMMITTEE PROPOSED GUIDELINES

November 2009
CEC-200-2009-016-CTD

Arnold Schwarzenegger, *Governor*

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Abstract

Assembly Bill 1613 (Blakeslee, Chapter 713, Statutes of 2007), amended by Assembly Bill 2791 (Blakeslee, Chapter 253, Statutes of 2008), is designed to encourage the development of new combined heat and power systems in California with generating capacity not greater than 20 megawatts. The Act directs the California Energy Commission to adopt by January 1, 2010, guidelines establishing technical and legal criteria for eligibility of combined heat and power systems for programs to be developed by the California Public Utilities Commission and publicly owned utilities. The Act directs the California Public Utilities Commission to establish a standard tariff for the sale of electricity, and it requires a local publicly owned utility serving end-use customers to provide a market for the purchase of excess electricity. The Guidelines and forms establish the technical and legal criteria and the reporting requirements for the sale of excess electricity from combined heat and power systems.

Keywords: Assembly Bill 1613, AB 1613, bottoming cycle, combined heat and power, energy efficiency standard, environmental performance standard, export tariff, fuel savings standard, greenhouse gas emissions, marginal power plant, NO_x emissions, performance monitoring, topping cycle, waste heat utilization

California Energy Commission
PROPOSED
Guidelines for Certification as an Eligible Customer-Generator of a Combined Heat and Power System Pursuant to the Waste Heat and Carbon Emissions Reduction Act, Public Utilities Code Section 2840 et seq.

I. Scope

These Guidelines set forth the technical and legal requirements that combined heat and power (CHP) systems must meet to be certified as an "eligible customer-generator" of an electric corporation or as a "retail end-use customer" of a publicly owned electric utility pursuant to the Waste Heat and Carbon Emissions Reduction Act, California Public Utilities Code Sections 2840 through 2845.

II. Definitions

For purposes of these Guidelines, the following terms shall be defined as follows:

a) The Act: The Waste Heat and Carbon Emissions Reduction Act, California Public Utilities Code Sections 2840 through 2845.

b) Applicant: The Owner/Operator of a CHP System seeking Energy Commission certification of compliance under these Guidelines of its CHP System.

c) Bottoming Cycle CHP System: A CHP system in which the input energy (for example, fuel) is used first to produce useful thermal energy for a process and the residual thermal energy is then used for electricity production.

d) Carbon dioxide equivalent: As defined in Section 95102(a)(33) of Title 17 of the California Code of Regulations.

e) Certified CHP System: An Eligible CHP system that has been certified by the Energy Commission as complying with these Guidelines.

f) Combined Heat and Power (CHP) System: A new or eligible retrofit system, with a net electrical generating capacity less than or equal to 20 megawatts, located at a residential, commercial or industrial facility owned and operated by an "Eligible Customer-Generator" or "retail end-use customer," as those terms are used in California Public Utilities Code sections 2840.2(b) and 2841.5, respectively, that produces both electricity and thermal energy and that may produce mechanical energy also.

g) Connected On-Site Thermal Load: For a Topping Cycle, the equipment at the host residential, commercial or industrial facility that uses the thermal energy from a CHP system.

h) Electrical Corporation: As defined in Public Utilities Code section 218.

i) Eligible Customer-Generator: A CHP system that has been shown to meet these Guidelines.

j) Eligible Retrofit: A CHP system that was operational prior to January 1, 2008, that did not receive funding under the Self Generation Incentive Program, that previously did not meet two or more criteria for Certification and that was modified after January 1, 2008, to meet all of the criteria for Certification.

k) Energy Commission: The State Energy Resources Conservation and Development Commission.

l) Heating Value: The amount of energy released when a specified amount of fuel is burned completely and the combustion products are returned to the state of the reactants. The heating value is dependent on the phase of water/steam in the combustion products. If H_2O is in liquid form, heating value is called HHV (Higher Heating Value). When H_2O is in vapor form, heating value is called LHV (Lower Heating Value).

m) Net Generating Capacity: The nameplate rating of a CHP System as designated by the manufacturer at temperature, humidity and elevation conditions specified by the International Organization for Standardization, minus parasitic electrical loads of the ancillary equipment needed to operate the CHP system.

n) Owner/operator: The individual or entity responsible for compliance and reporting requirements of a Certified CHP System.

o) Publicly Owned Utility: A "local publicly owned electric utility" as defined in Public Utilities Code Section 224.3.

p) Supplementary Firing: Combustion of fuel to add heat to an already hot gas stream 1) within a Topping Cycle CHP System in order to increase the amounts or temperature of the thermal output or 2) within a Bottoming Cycle CHP System to increase the amount of electrical energy or mechanical energy production.

q) Topping Cycle CHP System: A CHP system in which the input energy (for example, fuel) is used first for electricity production and at least some of the reject heat from electricity production is then ~~used~~ recovered as ~~useful~~ thermal energy.

r) Useful Energy Output: Energy from a CHP System used in a productive manner for a beneficial use; may include thermal, mechanical and electrical energy.

III. Standards for Certification of CHP Systems

A CHP System shall meet all of the criteria set forth in this section.

a) Net Electrical Generating Capacity Limit

The net electrical generating capacity of the CHP System shall be no more than 20 megawatts (MW).

b) Topping Cycle Thermal Energy Output Limit

The thermal energy output of a Topping Cycle CHP system, as designed, shall be no larger than the maximum one-hour thermal load served by the CHP system as useful thermal energy.

c) Energy Conversion Efficiency Standard

A Topping Cycle CHP System shall achieve an Energy Conversion Efficiency of no less than 62 percent, both as designed and on an annual operating basis. The Energy Conversion Efficiency shall be calculated by dividing the Useful Energy Output of the CHP System by the fuel energy input on a HHV basis.

A Bottoming Cycle CHP System that uses ~~supplementary~~ Supplementary ~~firing~~ Firing shall achieve an Energy Conversion Efficiency of no less than ~~60~~ 62 percent both as designed and on an annual operating basis. The Energy Conversion Efficiency shall be calculated as ~~-~~the Useful Energy Output attributed to Supplementary Firing ~~occurring downstream of the supplementary burner~~ divided by the ~~supplementary~~ Supplementary ~~firing~~ Firing fuel energy input, on a HHV basis.

A Bottoming Cycle CHP System that does not use ~~supplementary~~ Supplementary ~~firing~~ Firing is exempt from the Energy Conversion Efficiency Standard.

d) Greenhouse Gas Emission Standard

A CHP System shall meet a Greenhouse Gas (GHG) Emission Standard of 1,100 pounds of carbon dioxide equivalent emissions per megawatt-hour (1,100 lb CO_2 equivalent/MWh) or such value as may be revised by the CPUC and CEC from time to time, crediting 1 MWh per 1,341 hp-hr of useful mechanical energy output, and 1 MWh for each 3.4121 MMBtu of useful thermal energy output. Carbon dioxide equivalent emissions shall be calculated according to Title 17, California Code of Regulations, Section 95125.

A Bottoming Cycle CHP System that does not use ~~supplementary~~ Supplementary ~~firing~~ Firing is exempt from the Greenhouse Gas Emission Standard.

e) Thermal Energy Utilization Standard for Bottoming Cycle CHP Systems

(1) The waste heat from process(es) (which is the thermal energy input to the electricity generator) of a Bottoming Cycle CHP system must have little or no commercial value

for the process(es) at the residential, commercial or industrial facility, the fuel(s) and thermal energy must be used to maximize process efficiency in the facility, and the waste heat must exist in the absence of an electricity generating system.

f) Date of operation

The CHP must be placed in operation, either as new construction or eligible retrofit, after January 1, 2008.

g) NO_x Emission Standard

A CHP System shall meet an oxides of nitrogen (NO_x) emission standard of 0.07 pounds of NO_x per megawatt hour (0.07 lb NO_x/MWh) of electrical energy produced, crediting mechanical energy produced at the rate of 1 MWh per 1,341 horsepower-hour (hp-hr). If the CHP system energy conversion efficiency meets the Energy Conversion Efficiency Standard, the useful thermal energy produced may be credited toward meeting the emission standard at the rate of 1 MWh per 3.412 million Btu.

IV. Initial Qualification of a CHP System

a) Submission of Application Forms

To demonstrate compliance with Section III of these Guidelines, each applicant seeking certification of an Eligible CHP Facility shall submit to the Executive Director of the Energy Commission and the Electrical Corporation or Publicly Owned Utility to which Applicant seeks to sell electricity, a Form CEC-2843. The Form CEC-2843 shall be completed in accordance with the accompanying instructions, shall include all required schedules and attachments, and shall include a signed declaration, executed under penalty of perjury by an authorized agent of Applicant, attesting to the veracity of all information contained therein.

b) Determination of Completeness of Application

Within 14 days of the receipt of the Form CEC-2843, the Executive Director may inform Applicant that its submission is incomplete, and specify the additional information required. Applicant may submit the additional information required in an addendum to the Form CEC-2843, which shall be deemed a part of Applicant's Form CEC-2843.

The application shall be deemed complete on the 15th day after receipt by the Energy Commission of the Form CEC-2843 or any addendum thereto if no additional information is requested by the Executive Director.

c) Determination of Compliance

The Executive Director shall review the Form CEC-2843, including all attachments, schedules, and addenda thereto. If the Form CEC-2843 demonstrates that the CHP System complies with the requirements of Section III of these Guidelines, the Executive

Director shall issue a Certificate of Initial Compliance certifying that Applicant's proposed CHP system is a Certified CHP System.

If the Executive Director determines that the CHP System does not comply, he/she shall issue a written Statement of Denial, identifying all deficiencies in the Application Forms. The Applicant may submit revised Form CEC-2843 for review.

The Executive Director shall issue the Certificate of Initial Compliance or Statement of Denial within 30 days of the date the Form CEC-2843 is deemed complete.

d) Appeal of Executive Director's Determination

Either the Applicant or the Electrical Corporation or Publicly Owned Utility to which Applicant seeks to sell electricity may appeal the Executive Director's determination to the Energy Commission, by submitting a written appeal to the Chairman of the Electricity and Natural Gas Committee within 30 days of the Executive Director's determination. The appeal shall explain why the issuance of the Certificate of Initial Compliance or Statement of Denial was in error.

The appeal will be heard by the Energy Commission at a duly noticed business meeting within 60 days of the receipt, at which time the Energy Commission shall review the matter de novo, and issue either a Certificate of Compliance or a Statement of Denial for the proposed project, or continue the matter pending the receipt of additional information.

V. Ongoing Compliance, Performance Monitoring and Annual Reporting

a) Submittal of Annual Reporting Form

(1) The Owner/Operator of a Certified CHP System is responsible for maintaining ongoing compliance of the system with the requirements in Section III of these Guidelines. To demonstrate ongoing compliance, the Owner/Operator shall file a completed Form CEC-2843 Annual on a calendar year basis no later than April 1st of the following calendar year.

(2) Each Form CEC-2843 Annual shall be completed in accordance with its accompanying instructions, shall include all required attachments, and shall bear the original signature of an authorized agent of the Applicant, executed under penalty of perjury, attesting to the veracity of all information contained therein.

b) Review of the Annual Reporting Form

The declaration of compliance of the Owner/Operator shall be assumed to be true. The Executive Director shall review the Annual Reporting Form, attachments and supporting data to determine whether a Certified CHP System continues to meet all technical performance requirements only if the CHP System Owner/Operator declares

that the CHP System was not in compliance or if the declaration of compliance is challenged by the CPUC, the Electrical Corporation or Publicly Owned Utility purchasing electricity from the Certified CHP System. The Executive Director may direct Energy Commission staff to perform an audit of the CHP System and thermal host facility. If the review and/or audit determine that the CHP System is not in compliance, the Executive Director shall issue a Notice of Non-Compliance.

c) Correction of Non-Compliance

If the Executive Director issues a Notice of Non-Compliance, the Applicant shall file a Compliance Plan with the Energy Commission and the CPUC within three months and shall execute the Compliance Plan. The Executive Director may decertify the CHP System if correction is not demonstrated within the next full year Annual Report.

APPENDIX A:
California Energy Commission
Application Forms and Instructions for Certification of a Combined Heat and Power System Pursuant to the Waste Heat and Carbon Emissions Reduction Act, Public Utilities Code Section 2840 et seq.

Form CEC-2843 Application for Certification as a Qualifying Combined Heat and Power (CHP) System

Line	*Field Description*	
1	**CHP System Name**	
2	**CEC Plant ID**	
3	**EIA Plant ID**	
4	**Qualifying Facility ID (if applicable)**	
5	**Thermal Host/Thermal Facility**	
a	Business Name	
b	Street Address	
c	City	
d	County	
e	Zip Code	
f	Contact Person Name	
g	Phone	
h	Email	
6	**CHP System Owner/Operator**	
a	Full :Legal Name	
b	PO Box	
c	Street Address	
d	City	
e	State	
f	Zip Code	
g	Contact Person Name	
h	Phone	
i	Email	
7	**Applicant for CHP System Certification**	
a	Full :Legal Name	
b	PO Box	
c	Street Address	
d	City	
e	State	
f	Zip Code	
g	Contact Person Name	
h	Phone	
i	Email	
8	**NAICS Code of Thermal Host**	
9	**NAICS Code of Direct Onsite User of Electricity**	
10	**Principal Products of Thermal Host**	
11	**Thermal End Use (1)**	
12	**CHP System Type (2)**	

13	**Generator Specific Information**	
a	Generator (Unit) ID	
b	Generator Nameplate Capacity (MW)	
c	Prime Mover Type(s)	
d	Prime Mover Manufacturer(s)/Supplier(s)	
e	Prime Mover Model Number	
f	ISO Power Rating (MW) @ 100% Output	
g	Primary Fuel Type	
h	Secondary Fuel Type	
i	Ancillary Equipment Description	
j	Ancillary Equipment Load @ 100% Output (MW)	
k	Net Electrical Generating Capacity: (Prime Mover ISO Power Rating) – (Ancillary Equipment Load) =___(MW)	
l	Net Electrical Generating Capacity > 20 MW? If yes, do not submit Form CEC-2843	
Notes	(1) For example: Space heating, space cooling, drying, distillation, calcining, other (please specify) _____ (2) Topping cycle, without supplementary firing. Topping Cycle with supplementary firing. Bottoming cycle without supplementary firing. Bottoming cycle with supplementary firing. Other: (please specify)_____	

14 Declaration

I certify under the penalty of perjury of the laws of the State of California that I am authorized by

(type in Applicant's Full Legal Name Here)

to submit the enclosed Form 2843 with Schedules and Required Attachments. This Form fulfills the requirement of California Public Utilities Code Section 2840 et seq. The Matters contained in this report are, to the best of my knowledge and belief and based on diligent investigation, true, accurate, complete and in compliance with these regulations.

(Signature)

(Printed Name)

(Company Name)

(Federal Tax Identification Number)

(Date)

Submit Form CEC-2843 to:
CHP Guru
California Energy Commission
1516 Ninth Street, MS-20
Sacramento, CA 95814

Instructions for Form CEC-2843
Application for Certification as a Qualifying Combined Heat and Power (CHP) System

Purpose: Form CEC-2843, associated Schedules, and required Attachments provide forecasts of fuel use, electric generation, thermal energy usage, and emissions information related to combined heat and power (CHP) system power plant operations. This information is used by Energy Commission to certify a CHP System as qualifying under AB 1613, Statutes of 2007, as a Certified CHP System.

Authority: California Public Utilities Code Section 2840 et seq.
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Who must file: Each Owner/Operator of a CHP system located within California who seeks to be an "Eligible customer-generator" of an electric corporation or a "retail end-use customer" of a publicly owned electric utility.

When to file: Prior to signing a contract for the sale of electricity. An associated Form CEC-2843 Annual is to be filed annually after the CHP system becomes operational.

How to file: Reports in paper or electronic file format may be submitted by email or U.S. mail. Each submittal must be accompanied with a declaration.

Where to file:
CHP Guru
California Energy Commission
1516 Ninth Street, MS-20
Sacramento, CA 95814
or
CHPGuru@energy.state.ca.us

Instructions
Note that Form CEC-2843 closely follows the format of Form CEC-1304. CHP System Owner/Operators who file both Form CEC-2843 and Form CEC-1304 should report the same values for the same field on both forms. If the values are different, the differences should be explained as an Attachment to the Signed Declaration for each form.

1. **CHP System Name.** Name of the combined heat and power system.
2. **CEC Plant ID**. The California Energy Commission will assign this code of identification when the power plant is first reported on Form CEC-2843. The respondent should use the Commission assigned code in subsequent filings.
3. **EIA Plant ID**. Code of identification used by the Energy Information Administration. Also known as EIA Facility Code.
4. **Qualifying Facility ID**. Identification code used by the purchasing utility for PURPA qualifying facilities. Also known as QFID.
5. **Thermal Host Facility/Thermal Facility**: Name and location of the thermal host for a Topping Cycle System or the name and location of the source of waste heat for a Bottoming Cycle System, including contact information.

6. **CHP System Owner/Operator**. The full legal name of the CHP system Owner/ Operator and principal business address, including contact information.
7. **Applicant for CHP** System Certification. The full legal name of the entity that will enter into a contract for the sale of electricity.
8. **NAICS Code of Thermal Host or Thermal Facility.** For a topping cycle provide the NAICS (North American Industry Classification System) code of the entity that consumes the useful thermal output (steam or waste heat) of the CHP system. For bottoming cycle, provide the NAICS code of the entity that delivers waste heat to the CHP system. For information about the NAICS, go to http://www.census.gov/epcd/www/naics.html
9. **NAICS Code of Direct Onsite User of Electricity**. If all or part of electricity produced by the CHP system is consumed by an entity onsite, other than consumption by the auxiliary equipment of the power plant, provide the NAICS codes of that entity. For information about NAICS codes, go to http://www.census.gov/epcd/www/naics.html
10. **Principal Products**. The major products or processes associated with the use of thermal energy.
11. **Thermal End Use**. See notes on Form CEC-2843.
12. **CHP System Type**. See notes on Form CEC-2843.
13. **Generator Specific Information**.

    a. Provide the commonly used name for the CHP System
    b. The sum of the nameplate capacity in MW of all generators in the CHP system
    c.–f. Provide the specifics about each of the prime movers composing the generating system

    g.–h. Provide the commonly used fuel and all other fuels that will be fired.

    i.–j. Auxiliary Equipment is all equipment required to operate the CHP system other than the equipment that is packaged with the CHP system and that is not included in the power output capacity designated by the prime mover or CHP system supplier. The auxiliary equipment load estimate is critical if the prime mover output is close to the 20 MW size limit in AB 1613.

    Note: Additional information is required in the required attachments describing and showing the CHP system and thermal facility schematics.

Form CEC-2843
Application for Certification as a Qualifying Combined Heat and Power (CHP) System

Schedule A:
Predicted Annual Energy Inputs, Outputs and Thermal Energy Usage

Required Schedule as part of Form CEC-2843

Applicant Name _____ CEC Plant ID: _____

Table 1a: Topping Cycle Predicted Annual Fuel Input and Energy Outputs.

1	2	3	4	5	6	7	8	9	10	11	12	13
Month	Standard Hours per Month (hours)	Generator Equivalent Full Load Hours per Month (hours)	Fuel Energy Input (MMBtu)	Net Electricity Generation (MWh)	On-Site Electricity Use from CHP System (MWh)	Electricity Export from CHP System (MWh)	Useful Mechanical Energy Output from CHP System (hp-hr)	CHP System Thermal Energy Output (MMBtu)	CHP System Thermal Energy Return (MMBtu)	Waste Heat to Thermal Host Facility (MMBtu)	Host Site Thermal Energy Process Demand (MMBtu) (1)	Useful Thermal Energy Output (MMBtu) (2)
Jan.	744											
Feb.	696											
March	744											
April	720											
May	744											
June	720											
July	744											
Aug.	744											
Sept.	720											
Oct.	744											
Nov.	720											
Dec.	744											
Annual Total (2)	8,760											
Average Annual Hourly Value (3)			F ave.	P ave.			M ave.					Q. Ave.

(1) Excludes dumped thermal energy and stack exhaust energy with Host Facility.

(2) The lesser of Waste Heat to Thermal Host Facility and Host site Thermal Energy Connected Load

(3) The Average Hourly Value for Energy Inputs and outputs is the Annual Total divided by the Annual Generator Equivalent Full Load Hours

Table 1b: Bottoming Cycle Predicted Annual Fuel Input and Energy Outputs.

1	2	3	4	5	6	7	8	9	10	11	12	13
Month	**Standard Hours per Month (hours)**	**Generator Equivalent Full Load Fired Hours per Month (hours)**	**Supplementary Fuel Energy Input (MMBtu)**	**Net Electricity Generation (MWh)(4)**	**On-Site Electricity Use from CHP System (MWh)(4)**	**Electricity Export from CHP System (MWh)(4)**	**Useful Mechanical Energy Output from CHP System (hp-hr)(4)**	**CHP System Thermal Energy Output (MMBtu)**	**CHP System Thermal Energy Return (MMBtu)**	**Waste Heat to Thermal Host Facility (MMBtu)**	**Host Site Thermal Energy Process Demand (MMBtu) (1)**	**Useful Thermal Energy Output (MMBtu) (2)(4)**
Jan.	744											
Feb.	696											
March	744											
April	720											
May	744											
June	720											
July	744											
Aug.	744											
Sept.	720											
Oct.	744											
Nov.	720											
Dec.	744											
Annual Total (2)	8,760											
Average Annual Hourly Value (3)			F ave.	P ave.			M ave.					Q. Ave.

(1) Excludes dumped thermal energy and stack exhaust energy with Host Facility.

(2) The lesser of Waste Heat to Thermal Host Facility and Host site Thermal Energy Connected Load

(3) The Average Hourly Value for Energy Inputs and outputs is the Annual Total divided by the Annual Generator Equivalent Full Load Hours

(4) Values attributed to Supplementary Firing only.

Compliance with Energy Conversion Efficiency Standard

1. **A. Topping Cycle. Predicted Annual Output Efficiency** _____ X 100 = _____%
   Table 1a: (Sum of Columns 5, 8 and 13) Divided by Column 4. (Use consistent units)

1. **B. Bottoming Cycle, Predicted Electrical Efficiency** _____ X 100 = _____%
   Table 1b: (Sum of Columns 5 and 8) Divided by Column 4. (Use consistent units)

If Line 1.A. is less than 62%, the CHP System will not qualify. Do not file Form CEC-2843.

If Line 1.B. is less than ~~60~~62%, the CHP System will not qualify. Do not file Form CEC 2843.

Greenhouse Gas Emission Standard, Topping Cycle and Supplementary Firing only

2. **Carbon Dioxide Emission Factor** _____ lb/MMBtu
   (A default value for natural gas of 53.42 kg CO_2/MMBtu or 117.77 lb CO_2/MMBtu may be used)

3. **Other Greenhouse Gases, Emission Factor** _____ lb/MMBtu
   (A default value of 0.0009 kg/MMBtu x 21 for methane + 0.0001 kg/MMBtu x 310 for nitrous oxide may be used. This will add 0.05 lb/MWh to the carbon dioxide emission factor)

4. Carbon Dioxide Equivalent Emission Factor _____ lb/MMBtu
   (Add Lines 2 plus Line 3)

Compliance with Greenhouse Gas Emission Rate, Topping Cycle Only

5. Emission Rate = Carbon Dioxide Equivalent Emission Factor X F_{ave} ÷
   Useful Energy Output = _____ lb/MWh

   Table 1a: (Useful Energy Output = P_{Ave} + M_{Ave}/1,341 + Q_{Ave}/3.4121)

If Line 5 is more than 1,100 lb/MWh, the CHP System will not qualify. Do not file Form CEC-2843.

Compliance with Greenhouse Gas Emission Rate, Supplementary Firing Only

6. Emission Rate = Carbon Dioxide Equivalent Emission Factor X F_{ave} ÷
   Useful Energy Output = _____ lb/MWh

   Table 1b: (Useful Energy Output = P_{Ave} + M_{Ave}/1,341 + Q_{Ave}/3.4121)

If Line 6 is more than 1,100 lb/MWh, the CHP System will not qualify. Do not file Form CEC-2843.

Required Attachments to CEC Form 2843, Schedule A

Attachment A1.

Discussion and Mass and Energy Balance (Cycle) Diagram for the CHP System and the Connected Thermal Load under Average Hourly Operating Conditions. Include the assumptions and calculations to support all mass and energy flows between CHP system components and the thermal utilization and thermal dissipation equipment. Identify heat rejection facilities (devices for the diversion of thermal energy to the environment without providing a beneficial use) and bypass devices used for the direct discharge of thermal energy to the environment. Include a calculation of the useful thermal energy output, that portion used in a productive manner for a beneficial use.

Attachment A2.

Summarize the key results of an engineering feasibility study that 1). Evaluates the suitability of CHP based on the coincidence of electrical and thermal loads, fuel and electricity tariffs, 2) Considers options to CHP, such as end use energy efficiency improvements and adoption of Best Practices, 3). Shows the technical feasibility, cost effectiveness and environmental benefits of the CHP system, and 4). Describes CHP configuration options and the rationale for the configuration chosen.

Attachment A3.

For a bottoming cycle CHP system, show that the CHP system complies with the Thermal Energy Utilization Standard.

Attachment A4.

For a bottoming cycle CHP system using Supplementary Firing, provide the diagrams requested in Attachment A1 with no Supplementary Firing and with the designed amounts of Supplementary Firing. Also provide a table or curve showing the Energy Output rates attributable to Supplementary Firing verses Supplementary Firing fuel input rate.

Instructions for Form CEC-2843
Application for Certification as a Qualifying Combined Heat and Power (CHP) System

Schedule A: Predicted Annual Energy Inputs, Outputs and Thermal Energy Usage

Purpose of Schedule:

1. Compile the energy input and energy output estimates that provide the basis for determining if the CHP system, as designed and as predicted to operate over a 12 month period of time, will meet the technical performance requirements in the Guidelines.
2. Convert the reported energy input and energy output estimates to Annual Average Hourly Values.
3. Present the equations that compare the Predicted CHP System performance, as represented by Annual Average Hourly Values, to the Guideline's Performance Standards.

Instructions

1. In Table 1a, F_{ave} is the fuel energy input to the CHP system, P_{ave} is the useful net electrical energy output, M_{ave} is the useful mechanical energy output, and Q_{ave} is the useful thermal energy output. In Table 1b, F_{ave} is the Supplementary Firing fuel energy input to the CHP system, P_{ave} is the useful net electrical energy output, M_{ave} is the useful mechanical energy output, and Q_{ave} is the useful thermal energy output attributable to the Supplementary Firing.
2. **Reporting Monthly Values.** Monthly summations of energy flows were chosen as a way to recognize the seasonal difference in the cost of electricity generation. Diurnal and weekly variations and load profiles may be submitted as additional attachments.
3. **Generator Equivalent Full Load Hours per Month.** This is the same as a monthly Capacity Factor times the Standard Hours per Month or the hours when Supplementary Firing will be used.
4. **Fuel Energy Input.** Report Fuel Energy on a Higher Heating Value basis. Higher Heating Value should be used throughout. For a bottoming cycle, report only the fuel energy input for ~~supplemental~~ Supplementary ~~firing~~Firing.
5. **Net Electricity Generation.** In Table 1a, ~~Report~~ report gross electricity generation minus parasitic losses in operating the CHP system or auxiliary CHP system loads. In Table 1b, report gross electricity generation minus parasitic losses in operating the CHP system or auxiliary CHP system loads attributable to Supplementary Firing only.

6. **On-site electricity use and electricity export.** Electrical energy export includes deliveries to both an electric utility and a nearby facility.
7. **Useful Mechanical Energy Output.** The direct use of mechanical energy for applications such as pumping, without the conversion of mechanical energy to electrical energy and back to mechanical energy, can be credited toward useful energy output.
8. **CHP Thermal Energy Output and Return**. The maximum available thermal energy is the difference between the enthalpy of the thermal fluid output from the CHP system and the enthalpy of the thermal fluid return. These values must be consistent with the Attachment showing the CHP System Schematic and the mass and energy balance.
9. **Host Site Thermal Energy Process Demand.** The process demand is limited to thermal energy used in a productive manner for a beneficial use. The process demand must exist even in the absence of a CHP system.
10. **Compliance with the Technical Requirements.** Compliance with the Guidelines is determined by a spreadsheet using data fro**m** Tables 1a and 1b. The equations are given in Schedule A.

Form CEC-2843
Application for Certification as a Qualifying Combined Heat and Power (CHP) System

Schedule PF. Predicted Full Load Operation

Required Schedule as part of Form CEC-2843

Applicant Name _____ CEC Plant ID: _____

Fuel Input and Energy Outputs for One Hour of CHP System Operation at Full Load Output of the Prime Mover(s) at ISO Conditions.

1. Fuel Energy Input, HHV (F_{Peak}) _____ MMBtu ÷ 3.412 =_____ MWh

2. Net Electricity Generation (E_{net}) _____ MWh

3. Useful Mechanical Energy Output (M_{net}) _____ hp-hr ÷ 1,341 = _____ MWh

4. CHP System Thermal Energy Output _____ MMBtu

5. Thermal Energy Return to CHP System _____ MMBtu

6. Thermal Energy to Host Facility (Line 4 minus Line 5) _____ MMBtu

7. Host Site Thermal Energy Process Demand _____ MMBtu

8. Useful Thermal Energy Output (Q_{peak})
(Enter the lesser of Line 6 or Line 7) _____ MMBtu ÷ 3.412 = _____ MWh

9. A. Predicted Efficiency at Full Load, Topping Cycle _____ X 100 = _____%
(Sum of Line 2 + Line 3 + Line ~~9~~8) Divided by Line 1. (Use consistent units)

9. B. Predicted Efficiency at Full Load, Bottoming Cycle _____ X 100 = _____%
(Sum of Line 2 + Line 3 + Line 8) Divided by Line 1. (Use consistent units)(Use Energy Outputs attributable to Supplementary Firing)

Thermal Output Sizing of Topping Cycle CHP System

10. Maximum sustained one hour demand of the host site for useful thermal energy during one year of operation. _____ MMBtu

11. Compliance with Thermal Sizing Limit _____
(Divide Line 6 by Line 10)

If Line 9.A. is less than 62 percent ,or if Line 9.B. is less than ~~60~~ 62 percent, the CHP System will not qualify. Do not file Form CEC-2843.

*If Line 11 is greater than 1, the CHP may not qualify. The Description of the CHP System and connected thermal load and the Schematics **must** explain and justify why the CHP system was oversized for the thermal load.*

Required Attachments to Schedule PF

Attachment PF1.

Description and Schematic of the CHP System and its components (e.g., prime mover, waste heat recovery system, fuel compressor, air compressor, water pump, cooling tower, blowers) with the CHP System Boundary shown.

Attachment PF2.A.

For a Topping Cycle, a Description and Schematic of the Connected Thermal Load at the Host Facility with Facility Boundary shown.

Attachment PF2.B

For a Bottoming Cycle, a Description and Schematic of the Thermal Process whose exhaust waste heat becomes an energy input for electricity generation.

Attachment PF3.A.

For a Topping Cycle, Mass and Heat Balance (Cycle) Diagram for CHP System and the Connected Thermal Load with the prime mover/generator operating at 100% output.

Attachment PF3.B.

For a Bottoming Cycle, Mass and Heat Balance (Cycle) Diagram for the Thermal Process and the CHP System with full supplemental burner firing.

Instructions for Form CEC-2843
Application for Certification as a Qualifying Combined Heat and Power (CHP) System

Schedule PF. Predicted Full Load Operation

Required Schedule as part of Form CEC-2843

Purpose of Schedule:

1. For the Applicant to demonstrate that the CHP System as designed and when operating at full load under ISO conditions will meet the Energy Output Efficiency Standard. For the Applicant to demonstrate that the Thermal Energy Output of the CHP System as designed and operating at full load under ISO conditions will not exceed the thermal demand of the host site.

Instructions

Lines 1 to 5. Enter the CHP System Specifications, as provided by the vendor, for operation under ISO conditions.

Line 7. Enter a one hour thermal energy demand that corresponds to full load operation of the prime mover.

Line 10. Enter the host site's maximum one hour thermal energy demand. This value should be equal to or greater than the value on Line 7.

Form CEC-2843
Application for Certification as a Qualifying Combined Heat and Power (CHP) System

Schedule NO_x. Emissions of Nitrogen Oxides

Required Schedule as part of Form CEC-2843

Applicant Name _____ CEC Plant ID: _____

Table NO_x-1. Fuel Consumption, NO_x Emissions, and Energy Output as a Function of Prime Mover Load or, for a Bottoming Cycle, as a function of Supplementary Burner firing level.

% Full Load	1 Hour Fuel Input (MMBtu, HHV)	NO_x Emissions (ppmvd)	NO_x Emissions (lb/MMBtu)	1 Hour Electric Output (MWh)	1 Hour Mechanical Output (hp-hr)	1 Hour Useful Thermal Output (MMBtu)
100						
Min						

Predicted Annual Fuel Consumption, NO_x Emissions, and Energy Outputs under Projected CHP System Operating Profile

1. **Average Annual Hourly Fuel Energy Input** _____ MMBtu
2. **NO_x Emissions** **a.**_____ ppmvd **b.** _____ lbm/MMBtu
3. **Electrical Generation** _____ MWh
4. **Mechanical Energy Output** _____ hp-hr
5. **CHP System Net Thermal Output** _____ MMBtu
6. **CHP System Useful Thermal Energy Output** _____ MMBtu
7. **Maximum Energy Output** _____ MWh
   (Sum of Lines 3, 4, and 5, in units of MWh)
8. **Useful Energy Output** _____ MWh
   (Sum of Lines 3, 4 and 6, in units of MWh)

Compliance with NO_x Emission Standard

9. A. Topping Cycle NO_x Emissions _____ lb/MWh
(Divide Line 2b by Line 8)

9. B. Bottoming Cycle NO_x Emissions _____ lb/MWh
(Divide Line 2b by Line 8)

If Line 9.A or 9.B is greater than 0.07 lb/MWh, the CHP System will not qualify. Do not file CEC Form-2843.

Required Attachments to Schedule NOx

Attachment NO_x1.

Manufacturer/Vendor/Supplier NO_x Emissions Specifications

Attachment NO_x2.

Warranty or Service Agreement

Alternative 1.

Prime mover/generator manufacturer or CHP system supplier guarantee or warranty that NO_x emissions will not exceed specifications for a minimum of three years.

Alternative 2. Service Agreement for servicing and maintaining CHP system to remain within manufacturer specified NO_x emission limits for a minimum of three years.

Attachment NO_x3.

Copy of either the local Air Quality Management District (AQMD) permit to operate or the Application for an AQMD permit to operate.

Attachment NO_x4.

Copy of, or an internet link for, local AQMD regulations(s) governing criteria pollutant emissions from a CHP System or Supplementary fired burner.

Attachment NO_x5.

NO_x monitoring protocol to be used to satisfy AQMD and AB 1613 requirements.

Instructions for Form CEC-2843
Application for Certification as a Qualifying Combined Heat and Power (CHP) System

Schedule NO_x: Prediction of Annual NO_x Emissions

Purpose of Schedule:

1. Compile NO_x emission predictions based on equipment specifications and engineering analyses
2. Document that the CHP System Owner/Operator has obtained or is obtaining an air quality permit to operate.
3. Present an Air Quality Monitoring Protocol to demonstrate that the CHP System emissions will be measured and reported.

Background

AB 1613 requires that Qualifying CHP Systems have NO_x emissions of no more than 0.07 lb/MWh. This limit is the same as that given in ARB Distributed Generation Standards required by the ARB Certification Program. Local Air Quality Management Districts (AQMDs) may have different and perhaps lower emission limits.

Instructions

1. **Table NO_x-1**. Provide prime mover, CHP system vendor, or supplementary burner vendor specifications for NO_x emissions at five load points, ranging from full load to minimum load or firing level.
2. **Energy Inputs and Outputs.** These estimates will be transferred from Schedule A, Table 1.
3. **NO_x Emissions, Line 2.** Select a value from Table NO_x-1 that represents the annual average hourly operating conditions.
4. **For Bottoming Cycles with supplementary firing,** Useful Energy Output is the sum of hourly electrical energy output plus mechanical energy output, plus useful thermal energy recovery from the supplementary firing with the industrial or commercial process operating under annual average hourly operating conditions and the supplementary burner operating at full rated
output

APPENDIX B:
California Energy Commission
Annual Performance Reporting Forms for a Combined Heat and Power System that has been Certified Pursuant to the Waste Heat and Carbon Emissions Reduction Act, Public Utilities Code Section 2840 et seq.

Form CEC-2843 Annual
Report of Operation as a Qualifying Combined Heat and Power (CHP) System

For the Period _____ to _____

(Report for a partial or full calendar year)

Owner/Operator Name _____ CEC Plant ID: _____

Line	*Field Description*	
1	**CHP System Name**	
2	**CEC Plant ID**	
3	**EIA Plant ID**	
4	**Qualifying Facility ID** (if applicable)	
5	**Thermal Host/Thermal Facility**	
a	Business Name	
b	Street Address	
c	City	
d	County	
e	Zip Code	
f	Contact Person Name	
g	Phone	
h	email	
6	**CHP System Owner/Operator**	
a	Full Legal Name	
b	PO Box	
c	Street Address	
d	City	
e	State	
f	Zip Code	
g	Contact Person Name	
h	Phone	
i	email	

Statements of Compliance with the Performance Guidelines

7. The Energy Conversion Efficiency was greater than or equal to 62% _____ *Initial*
8. If a Topping Cycle or Supplementary Fired Bottoming Cycle, the Carbon Dioxide Equivalent Emission Rate was no greater than 1,100 lb/MWh. _____ *Initial*
9. The NO_x Emission Rate was no more than 0.07 lb/MWh _____ *Initial*

Required Schedules as part of Form CEC-2843 Annual

Form CEC-2843 Annual Schedule A

Form CEC-2843 Annual Schedule NO_x

Attachment 1.
Identify any change in the ownership or operator of the CHP system and/or the thermal facility. If none, enter N/A here _____

Attachment 2.
Describe any change in the CHP system, the thermal host facility, or their operation that could affect continued status as a Qualifying CHP System. If none, enter N/A here; _____

Attachment 3.
Copy of Reports submitted to the California Environmental Protection Agency, Air Resources Board, pursuant to the Regulation for the Mandatory Reporting of Greenhouse Gas Emissions, Subchapter 10, Article 2, Sections 95100 to 95133, Title 17, California Code of Regulations. If none, enter N/A here; _____

Attachment 4
Required if and only if the CHP System failed to meet any of the annual compliance standards). A). Explanation of why the CHP system failed to comply. B). Schedule for actions to bring the CHP system into compliance.

14 Declaration	
I certify under the penalty of perjury of the laws of the State of California that I am authorized by	
(type in Company Name here)	
to submit the enclosed Form 2840 with Schedules and Required Attachments. This Form fulfills the requirement of California Public Utilities Code Section 2840 et seq. The matters contained in this report are, to the best of my knowledge and belief and based on diligent investigation, true, accurate, complete and in compliance with these regulations.	
(Signature)	
(Printed Name)	
(Company Name)	
(Federal Tax Identification Number)	
(Date)	

Submit Form CEC-2843 to:
CHP Guru
California Energy Commission
1516 Ninth Street, MS-20
Sacramento, CA 95814

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Form CEC-2843 Annual
Report of Operation as a Qualifying
Combined Heat and Power (CHP) System

For the Period _____ to _____

Annual Schedule A:
Annual Energy Inputs, Outputs and Thermal Energy Usage

Required Schedule as part of Form CEC-2843 Annual

Owner/Operator Name _____ CEC Plant ID: _____

Table 1a. Topping Cycle Measured Calendar Year Fuel Input and Energy Outputs.

1	2	3	4	5	6	7	8	9	10	11	12	13
Month	Standard Hours per Month (hours)	Generator Equivalent Full Load Hours per Month (hours)	Fuel Energy Input (MMBtu)	Net Electricity Generation (MWh)	On-Site Electricity Use from CHP System (MWh)	Electricity Export from CHP System (MWh)	Useful Mechanical Energy Output from CHP System (hp-hr)	CHP System Thermal Energy Output (MMBtu)	CHP System Thermal Energy Return (MMBtu)	Waste Heat to Thermal Host Facility (MMBtu)		Useful Thermal Energy Output (MMBtu) (1)
Jan												
Feb												
March												
April												
May												
June												
July												
Aug												
Sept												
Oct												
Nov												
Dec												
Annual Total												
Average Annual Hourly Value (2)			F ave.	P ave.			M ave.					Q. Ave.

(1) Thermal energy .from the CHP system used in a productive manner for a beneficial use

(2) The Average Hourly Value for Energy Inputs and outputs is the Annual Total divided by the Annual Generator Equivalent Full Load Hours.

Table 1b. Bottoming Cycle Measured Calendar Year Fuel Input and Energy Outputs.

1	2	3	4	5	6	7	8	9	10	11	12	13
Month	Standard Hours per Month (hours)	Generator Equivalent Fired Full Load Hours per Month (hours)	Fuel Energy Input (MMBtu)(3)	Net Electricity Generation (MWh)(3)	On-Site Electricity Use from CHP System (MWh)	Electricity Export from CHP System (MWh)	Useful Mechanical Energy Output from CHP System (hp-hr)(3)	CHP System Thermal Energy Output (MMBtu)	CHP System Thermal Energy Return (MMBtu)	Waste Heat to Thermal Host Facility (MMBtu)		Useful Thermal Energy Output (MMBtu) (1)(3)
Jan												
Feb												
March												
April												
May												
June												
July												
Aug												
Sept												
Oct												
Nov												
Dec												
Annual Total												
Average Annual Hourly Value (2)			F ave.	P ave.			M ave.					Q. Ave.

(1) Thermal energy .from the CHP system used in a productive manner for a beneficial use

(2) The Average Hourly Value for Energy Inputs and outputs is the Annual Total divided by the Annual Generator Equivalent Full Load Hours.

(3) Values attributed to Supplementary Firing only.

Compliance with Energy Conversion Efficiency Standard

1. **A. Topping Cycle. Annual Output Efficiency** _____ X 100 = _____%
   Table 1a: (Sum of Columns 5, 8 and 13) Divided by Column 4. (Use consistent units)

1. **B. Bottoming Cycle, Electrical Efficiency** _____ **X 100 =** _____**%**
   Table 1 b: (Sum of Columns 5 and 8) Divided by Column 4. (Use consistent units)

If Line 1.A. is less than 62%,or if Line 1.B. is less than ~~60~~62% the CHP System did not qualify. Submit a Compliance Plan.

Greenhouse Gas Emission Standard, Topping Cycle Supplementary Firing only

2. Carbon Dioxide Emission Factor _____ lb/MMBtu
(A default value for natural gas of 53.42 kg CO_2/MMBtu or 117.77 lb CO_2/MMBtu may be used)

3. Other Greenhouse Gases, Emission Factor _____ lb/MMBtu

(A default value of 0.0009 kg/MMBtu x 21 for methane + 0.0001 kg/MMBtu x 310 for nitrous oxide may be used. This will add 0.05 lb/MWh to the carbon dioxide emission factor)

4. Carbon Dioxide Equivalent Emission Factor _____ lb/MMBtu
(Add Lines 2 plus Line 3)

Compliance with Greenhouse Gas Emission Rate

5. Emission Rate = Carbon Dioxide Equivalent Emission Factor X F_{ave} ÷

Useful Energy Output = _____ lb/MWh

Table 1a: (Useful Energy Output = P_{Ave} + M_{Ave}/1,341 + Q_{Ave}/3.4121)

If Line 5 is more than 1,100 lb/MWh, the CHP System did not qualify. Submit a Compliance Plan.

6. Emission Rate = Carbon Dioxide Equivalent Emission Factor X F_{ave} ÷

Useful Energy Output = _____ lb/MWh

Table 1b: (Useful Energy Output = P_{Ave} + M_{Ave}/1,341 + Q_{Ave}/3.4121)

If Line 6 is more than 1,100 lb/MWh, the CHP System did not qualify. Submit a Compliance Plan.

Required Attachment to Annual Schedule A

Attachment Annual A1.
Mass and Heat Balance (Cycle) Diagram for the CHP System and the Connected Thermal Load under Average Hourly Operating Conditions. Include the data, working papers, assumptions and calculations used to obtain all mass and energy flows between CHP system components and the thermal utilization and thermal dissipation equipment.

Attachment Annual A2.
Monitoring and Data Collection Protocol. (Required only for the first Annual Filing of Form CEC-2843 Annual). The Protocol must include at least the following:

1. Instrumentation Diagram/Data Collection Point Diagram for the CHP System and the Connected Thermal Load. Identify the physical or chemical properties being measured, the instrument Manufacturer and Model Number.
2. Data Collection Plan, with data collection at least every 15 minutes, summed to daily and then monthly tabulations. Only the monthly data is reported, but the Energy Commission must have access to the more frequent data recording records.
3. Equations and data compilation methods used to convert measured data to reported values in the CEC-Forms 2843 Annual, Schedules and Attachments.

Instructions for Form CEC-2843 Annual Report of Operation as a Qualifying Combined Heat and Power (CHP) System

Annual Schedule A:
Annual Energy Inputs, Outputs and Thermal Energy Usage

Purpose of Schedule:

1. Compile the energy input and energy output values that provide the basis for determining if the CHP system met the technical performance requirements in the Guidelines.
2. Convert the reported energy input and energy output values to Annual Average Hourly Values, metrics that are in units that are easy to comprehend.
3. Present the equations that compare the CHP System performance, as represented by Annual Average Hourly Values, to the Guideline's Performance Standards.

Instructions

1. **Reporting Monthly Values.** Monthly summations of energy flows were chosen as a way to recognize the seasonal difference in the cost of electricity generation. Diurnal and weekly variations and load profiles may be submitted as additional attachments.
2. **Generator Equivalent Full Load Hours per Month**. This is the same as a monthly Capacity Factor times the Standard Hours per Month or the hours when Supplementary Firing were used.
3. **Fuel Energy Input**. Report on a Higher Heating Value basis. For bottoming cycle, report Supplementary Firing.
4. **Net Electricity Generation.** In Table 1a, r~~R~~eport electricity generation minus parasitic losses in operating the CHP system or auxiliary system loads. In Table 1b, report electricity generation minus parasitic losses in operating the CHP system or auxiliary system loads attributable to Supplementary Firing only.
5. **Useful Mechanical Energy Output.** The direct use of mechanical energy for applications such as pumping, without the conversion of mechanical energy to electrical energy and back to mechanical energy, can be credited toward useful energy output.
6. **CHP Thermal Energy Output and Return.** The maximum available thermal energy is the difference between the enthalpy of the thermal fluid output from the CHP system and the enthalpy of the thermal fluid return. These values must be consistent with the Attachment showing the CHP System Schematic and the energy balance. If the CHP system includes a Dump Radiator or a Cooling Tower for managing thermal energy delivery to the host facility, those components should be included within the CHP System Boundary.

7. **Useful Thermal Energy Output** The thermal energy output is the thermal energy from the CHP system that was used in a productive manner for a beneficial use. The process demand must exist even in the absence of a CHP system.

8. **Compliance with the Technical Requirements.** Compliance with the Guidelines is determined by a spreadsheet using data from Tables 1a or 1b. The equations are given in Schedule A Annual.

Form CEC-2843 Annual
Report of Operation as a Qualifying Combined Heat and Power (CHP) System

For the Period _____ to _____

Annual Schedule NO_x. Emissions of Nitrogen Oxides

Required Schedule for Form CEC-2843 Annual

Owner/Operator Name _____ CEC Plant ID: _____

Annual Fuel Consumption, NO_x Emissions, and Energy Outputs

1. **Annual Fuel Consumption** _____ MMBtu
   (From Annual Schedule A, Table 1a/b)
2. **NO_x Emissions** _____ lbm
3. **Electrical Generation** _____ MWh
   (From Annual Schedule A, Table 1a/b)
4. **Mechanical Energy Output** _____ hp-hr
   (From Annual Schedule A, Table 1a/b)
5. **CHP System Net Thermal Output** _____ MMBtu
   (From Annual Schedule A, Table 1a/b)
6. **CHP System Useful Thermal Energy Output** _____ MMBtu
   (From Annual Schedule A, Table 1a/b)
7. **Maximum Energy Output** _____ MWh
   (Sum of Lines 3, 4, and 5, in units of MWh)
8. **Useful Energy Output** _____ MWh
   (Sum of Lines 3, 4 and 6, in units of MWh)

Compliance with NO_x Emission Standard

9. **A. Topping Cycle Emissions** _____ lb/MWh
   (Divide Line 2b by Line 8)
9. **B. Bottoming Cycle Emissions** _____ lb/MWh

If Line 9.A or 9.B is greater than 0.07 lb/MWh, the CHP System did not qualify. Submit a Compliance Plan.

Required Attachments to Annual Schedule NO_x

Attachment NO_x1.

Option 1.
Summary of Source test results as reported to the local AQMD. Calculations converting the source test results to lb NO_x/MMBtu and lb NO_x/MWh. Identification of Testing Method used and entity that performed the testing.

Option 2.
Summary of continuous monitoring test results as reported to the local AQMD. Calculations converting the source test results to lb NO_x/MMBtu and lb NO_x/MWh.

Option 3.
Copy of service agreement or warranty guaranteeing that the prime mover or supplementary burner will operate within specifications. Calculations showing that the operation within equipment specifications over the annual operating load profile will yield NO_x emissions less than 0.07 lb/MWh.

Attachment NO_x2.

Cover letter and summary of criteria pollutant emissions reports submitted to the local AQMD.

Attachment NO_x3.
Notification, if any, that the CHP system was in violation of any air quality operating permit.

Instructions

There are no separate instructions for Annual Schedule NO_x