

CALIFORNIA  
ENERGY  
COMMISSION

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

**DRAFT GUIDELINES**

July 2009  
CEC 200-2009-016-D



Arnold Schwarzenegger, Governor

# **CALIFORNIA ENERGY COMMISSION**

Arthur J. Soinski  
Galen Lemei  
***Principal Authors***

Linda Kelly  
***Project Manager***

Ivin Rhyne  
***Manager***  
**ELECTRICITY ANALYSIS  
OFFICE**

Sylvia Bender  
***Deputy Director***  
**ELECTRICITY SUPPLY  
ANALYSIS DIVISION**

Melissa Jones  
***Executive Director***

## **DISCLAIMER**

This report was prepared by California Energy Commission staff. It does not necessarily represent the views of the Energy Commission, its employees, or the State of California. The Energy Commission, the State of California, its employees, contractors and subcontractors make no warrant, express or implied, and assume no legal liability for the information in this report; nor does any party represent that the uses of this information will not infringe upon privately owned rights. This report has not been approved or disapproved by the California Energy Commission nor has the California Energy Commission passed upon the accuracy or adequacy of the information in this report.

**California Energy Commission**  
**Guidelines for Certification of Combined Heat and Power Systems**  
**Under the Waste Heat and Carbon Emissions Reduction Act**  
**Public Utilities Code Section 2843**

**I. Scope**

These Guidelines set forth the technical requirements that combined heat and power (CHP) systems must meet to qualify 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 Eligible CHP System.
- c) **Bottoming Cycle CHP System:** A CHP system in which the input energy (e.g., fuel) is used first to produce useful thermal energy for a process and some of the 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 for heating and/or cooling from a single fuel. The CHP system includes the unit in which fuel is consumed (e.g. gas turbine, boiler, engine), the electric generator, and the heat recovery unit that transforms otherwise wasted heat to useable thermal energy.

- g) **Connected On-Site Thermal Load:** The equipment at the host residential, commercial or industrial facility that uses the thermal energy from a CHP system in the form of a working fluid (for example, steam or hot water) and returns the working fluid to the combined heat and power system.
- h) **Electrical Corporation:** As defined in Public Utilities Code section 218.
- i) **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.
- j) **Energy Commission:** The State Energy Resources Conservation and Development Commission.
- k) **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<sub>2</sub>O is in liquid form, heating value is called HHV (Higher Heating Value). When H<sub>2</sub>O is in vapor form, heating value is called LHV (Lower Heating Value).
- l) **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.
- m) **Owner/operator:** The individual or entity responsible for compliance and reporting requirements of a Certified CHP System.
- n) **Publicly Owned Utility:** A “local publicly owned electric utility” as defined in Public Utilities Code Section 224.3.
- o) **Supplementary Firing:** Combustion of fuel to add heat to an already hot gas stream in a CHP system in order to increase the temperature of the hot gas stream.
- p) **Topping Cycle CHP System:** A CHP system in which the input energy (for example, fuel) is used first to for electricity production and at least some of the reject heat from electricity production is then used as useful thermal energy.
- q) **Useful Energy Output:** 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 Standard**

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

**b) Topping Cycle Thermal Energy Output Standard**

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

**c) Energy Efficiency Standard**

A Topping Cycle CHP System shall achieve an Energy Efficiency of no less than 60 percent, 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 firing shall achieve an energy conversion efficiency of no less than 40.8 percent calculated as (the sum of the useful electrical energy output plus useful mechanical energy output) divided by the fuel energy input on a HHV basis for supplementary firing.

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

**d) Greenhouse Gas Emission Standard**

A CHP System shall meet a Greenhouse Gas (GHG) Emission Standard of 985 pounds of carbon dioxide equivalent emissions per megawatt-hour (985 lb CO<sub>2</sub> equivalent/MWh), 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 firing is exempt from the Greenhouse Gas Emission Standard.

**e) Thermal Energy Utilization Standard**

(1) A Topping Cycle CHP System shall achieve both of the following thermal energy utilization standards:

(A) The useful electrical energy output plus the useful mechanical energy output plus one-half of the useful thermal energy output, during the 12-month period beginning with the date the CHP system first produces electrical energy, and any calendar year subsequent to that year, shall be no less than 42.5 percent of the total fuel energy input, measured on a HHV basis.

(B) The useful thermal energy output shall be no less than 15 percent of the total fuel energy input, measured on a HHV basis.

(2) 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.

(3) A bottoming cycle CHP system using supplementary firing shall achieve a useful electrical energy output plus useful mechanical energy output that is no less than 50 percent of the fuel energy input, measured on a HHV basis, for supplementary firing.

**f) Date of operation**

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

**g) Fuel Savings Standard**

A Topping Cycle CHP System must use less fuel than would have been used by the separate generation of electricity delivered by the utility grid and an onsite boiler. The power plant supplying the utility grid shall be assumed to have an efficiency of 40.8 percent or a heat rate of 8,358 Btu/kWh on a HHV basis after transmission and distribution losses have been subtracted. The displaced boiler shall be assumed to have a fuel-to-steam efficiency of 80 percent.

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

**h) NO<sub>x</sub> Emission Standard**

A CHP System shall meet an oxides of nitrogen (NO<sub>x</sub>) emission standard of 0.07 pounds of NO<sub>x</sub> per megawatt hour (0.07 lb NO<sub>x</sub>/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

efficiency is greater than or equal to 60 percent, the useful thermal energy produced may be credited toward meeting the standard at the rate of 1 MWh per 3.412 million Btu.

## **IV. Initial Qualification as an Eligible 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 California Energy Commission 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 15<sup>th</sup> 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 Presiding Member 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 either issue a Certificate of Compliance or 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 Eligible 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-2843A with the Executive Director of the Energy Commission annually within 30 days of the anniversary of the date the CHP System was certified.

2) Each Form CEC-2843A shall be completed in accordance with the 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.

3) Exception for small CHP systems and/or those with limited export: The Owner/Operators of a CHP System that has a net generating capacity of 1 MW or less and/or that sells fewer than 5,000 MWh/year of electricity is exempt from Annual Reporting, unless the Owner/Operator has been cited for being in violation of any operating permit.

### **b) Review of the Annual Reporting Form**

The Executive Director shall review the Annual Reporting Form to determine whether a Certified CHP System continues to meet all technical performance requirements. The declaration of compliance of the Owner/Operator shall be assumed to be true. The Annual Reporting Form, attachments and supporting data shall be reviewed 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 or the Electrical Corporation or Publicly Owned Utility purchasing electricity from the Certified CHP System.

### **c) Correction of Non-Compliance**

If Form CEC-2843A indicates deviation from substantive requirements of Section III of the Guidelines, the Executive Director may decertify the CHP System if correction is not demonstrated within 4 years for CHP systems no larger than 1 MW and within 2 reporting years for larger CHP systems.