Sec. 95112:
• Contains reporting requirements for electricity generating units (EGU) and cogeneration unit
• References 40 CFR Part 98, Subparts C and D
• References sec. 95115 for emission calculation method and fuel sampling/monitoring requirements
• Has no counterpart in 40 CFR Part 98
• Covers both Part 75 and non-Part-75 EGUs (unlike 40 CFR Part 98 that treats non-Part-75 EGUs as general stationary combustion sources)

Introduction

§95112 Applicability
• Part 75 power plants, regardless of emissions level
• Stand-alone power plants and cogeneration facilities with >10,000 MTCO₂e of emissions
• Industrial, commercial, institution facilities with on-site EGU that have >10,000 MTCO₂e of facility total emissions
• Any facilities with >10,000 MTCO₂e of emissions that have any non-fuel-based renewable EGU with nameplate capacity of >0.5 MW
2012 Rule Amendments

- Added clarifications based on the feedback and questions received during the previous reporting seasons
- Removed limitations to aggregating units that are integrated into an electricity generating system
- Modified the way supplemental firing is reported
- Reinstated two reporting items for bottoming cycle cogeneration units: input steam to steam turbine and output of heat recovery steam generator (HRSG)

Type of Facilities & Facility Boundary

- Stand-alone electricity generating facility
- Independently operated cogeneration/bigeneration facility co-located with the thermal host
- Independently operated and sited cogeneration/bigeneration facility
- Industrial/institutional/commercial facility with electricity generation capacity [Definitions in §95102(a)]

Type of Facilities & Facility Boundary

- Independently operated cogeneration/bigeneration facility co-located with the thermal host: on contiguous property as the thermal host and/or is located within the same fence line
- Independently operated and sited cogeneration/bigeneration facility: on separate properties that are not contiguous
- Treatment of facility boundaries for these 2 cases are the same
- No common control or common ownership as the thermal host

Type of Facilities & Facility Boundary

- If the cogen/bigen and the thermal host are on contiguous/adjacent property and there is common control or common ownership: the thermal host must be included in the same facility boundary
- Such a facility is an industrial/institutional/commercial facility with electricity generation capacity
- Any applicable emission sources of the thermal host must also be included in the combined GHG report of the cogen/bigen facility and the thermal host
Type of Energy Dispositions

In the reporting tool pull-down menu, select:
– Grid-dedicated facility (most stand-alone power plants)
– Facility that does not provide any generated energy outside of the facility boundary (rare)
– None of the above (most other electricity generating facilities)

• Facility boundary is determined by the “facility” definition in §95102(a), not necessarily by the fence line of the physical property

System Approach

• Reporters are encouraged to aggregate the individual units in an electricity generating system (EGS) if all the units are integrated into the system. (System aggregation is preferred.)
• A system can be a:
  – Cogeneration system
  – Bigeneration system
  – Combined-cycle electricity generation system
  – System of boilers producing steam to power steam turbine generators
• “Integrated” = the units that generate electricity or thermal energy are not the same units that consume fuels, and the energy output from the system cannot be traced to fuel input at related fuel combustion units in an undivided path in a system energy balance diagram

Bigeneration

• EGU that simultaneously produces electricity and steam from the same fuel source but does not utilize waste heat.

System Approach

• If there is more than one EGS at the facility, each system must be reported separately.
• EGU and EGS must never be aggregated with other non-EGU stationary fuel combustion sources. (Treatment for common stack reporting is different.)
• Auxiliary boiler or stand-by boiler:
  – If the boiler contributes to electricity generation (boiler steam feeds a steam turbine generator), it is an integral part of the cogen system
  – If the boiler does not contribute to electricity generation, it is not a part of the cogen system
System Approach

- However, reporters are encouraged to report simple-cycle EGUs at the same disaggregation level as in the reports they submitted to ARB in previous years or in reports submitted to CEC and EIA for consistency.

System Energy Accounting

- “System” boundary is the foundation for determining what energy quantities are to be reported under §95112(a) and (b).

The difference between energy input and energy output is the energy that is wasted (e.g., heat released to the atmosphere, formation of air pollutants, vented steam, mechanical friction).

System Energy Accounting

- Fuels
- Other energy input
- Electricity
- Steam

System Energy Accounting

- Particular end user
- Grid
- On Site Industrial Process or Heating/Cooling
- Supplemental firing fuel
- EGU parasitic load
- Electricity
- Steam
- Other steam use for supporting of power generation
- Particular end user

California Air Resources Board
System Energy Accounting

Follow these steps:
1. Draw a simplified block diagram. [§95112(a)(6) and §95102(a)]
2. Draw the system boundary of the electricity generating system.
3. Identify the energy flows that cross the electricity generating system boundary. (Look for "arrows" that cross the system boundary box.) Map the energy flows to the data items in §95112(b).
4. Identify the processes, operations, and destination to which generated energy is supplied. Map them to the data items in §95112(a).
5. Calculate the quantities required by §95112(a) and (b), and enter data into the reporting tool accordingly.

System Energy Accounting

• §95112(b): accounts for the energy inputs and outputs of the EGU or the electricity generating system
• §95112(a): indicates where the generated energy flows go after they leave the system
• To ensure that system energy balance is completely accounted for, a system energy diagram is critical
• Skipping steps in system energy accounting may lead to erroneous reporting

Simplified Block Diagram:
[§95112(a)(6) and §95102(a)]

- Equipment associated with the electricity generating system, and any equipment or industrial processes outside of the system that may inform energy flows.
- Flows of energy (fuel input, electricity output, heat/steam output) shown with arrows and labels.
- Relative location of fuel meters and other fuel quantity measurement devices. (If necessary, use more than one diagram for legibility.)
Total Thermal Output

- Total amount of usable thermal energy that can potentially be made available for use in industrial/commercial processes, heating/cooling applications, or delivered to other end users. It includes:
  - Thermal energy provided or sold to a particular end-user [§95112(a)(5)(A)];
  - Thermal energy used for supporting power generation that has been included in the §95112(b)(3) quantity but is not accounted for in either §95112(a)(5)(A) or (C) [§95112(a)(5)(B)];
  - Thermal energy used in other on-site industrial processes or heating/cooling applications that are not electricity generation [§95112(a)(5)(C)];
  - Thermal energy that is vented, radiated, wasted, discharged, or otherwise not utilized.

Gross and Net Generation

- Gross generation = total electrical output of the EGU
- Net generation = gross generation minus parasitic load

\[
\begin{align*}
\text{Gross Generation} & = \text{Total Electrical Output of the EGU} \\
\text{Net Generation} & = \text{Gross Generation} - \text{Parasitic Load}
\end{align*}
\]

Steam generated by boilers that are not an integral part of the cogen/bigen system are not included in these quantities. Such steam is not reported unless it is sold to other entities outside of the facility boundary. (§95104(d)(4))
Gross and Net Generation

If there is more than one EGU or EGS at the facility and in the reporting tool configurations:

\[
\text{The Sum of:} \quad \frac{\text{§95112(a)(4)(A)}}{\text{§95112(a)(4)(B)}} = \frac{\text{Net gen for EGU/EGS 1}}{\text{Net gen for EGU/EGS 2}} = \frac{\text{Net gen for EGU/EGS 3}}{\text{etc...}}
\]

Electricity used within the facility boundary that is not generated by the EGU/EGS should not be included in §95112(a)(4) quantities. Such electricity is accounted for in section §95104(d)(1).

Electricity consumed at the facility when the EGUs were not generating electricity should not be counted against net generation, as doing so would make the EGU appear less efficient.

Electricity acquired from outside of the facility boundary should be accounted under §95104(d)(1).

EGU with low capacity factor: it is especially important to distinguish between parasitic load during EGU operation and internal electricity load during EGU downtime.

EGU with high capacity factor: reporter may exercise judgment if the gain in the system efficiency figure is insignificant.

Reporting of Supplemental Firing

If reporting as an aggregated-units configuration (such as in a “system”), the amount of supplemental firing fuel must be aggregated into the total fuel consumption number of the aggregated-units configuration (in the Fuel-Specific Emissions Information sub-module).

New reporting tool feature added: new data fields for reporters to indicate what percentage of the total fuel consumption of the system is supplemental firing (in the Configuration Information sub-module in the unit configuration).
Unit/System Energy Balance

Energy Inputs > Energy Outputs

The Sum of: §95112(b)(4) > The Sum of: §95112(b)(2)

Example 1
Topping Cycle Cogen and an Aux. Boiler

Questions?

• Next: examples of system energy accounting
Example 2
Topping Cycle Cogen with Boilers

Example 3
A Cogen Facility and A Thermal Host

Example 4
Combined Cycle Power Plant
Guidance Document

- Has additional examples of system energy accounting and mapping of the energy flows to §95112(a)&(b) requirements.
- There are countless combinations of generating system configurations. Reporters may need to refer to more than one example when doing system energy balance for their specific facility.
- Resubmit a new simplified block diagram if needed.

Helpful Web Sites

- Email reporting questions to: ghgreport@arb.ca.gov
- Cal e-GGRT Tool Training: Registration, Subparts http://www.arb.ca.gov/cc/reporting/ghg-rep/tool/ghg-tool.htm
- Cal e-GGRT Main Help Page http://www.ccdsupport.com/confluence/display/calhelp/Home
- U.S. EPA Detailed Sector Training Slides http://www.epa.gov/climatechange/emissions/training.html (use as a supplement to ARB summary slides)

Resources

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<td>916.323.4887</td>
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<td>Patrick Gaffney</td>
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<td>Greenhouse Gas Report Verification</td>
<td>Renee Lawver,</td>
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<td>Chief – Greenhouse Gas Emission Inventory Branch</td>
<td>Richard Boots,</td>
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Questions?