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SUBJECT: Calculation of Emission Rate Credits from Non-Affected CHP

EPA provides guidance on how to calculate Emission Rate Credits (ERCs) from non-affected CHP units within the EPA Clean Power Plan rate based rule. The rule language states:

> The CHP unit's electrical output is prorated based on the CO_2 emission rate of the electrical output associated with the CHP unit (a CHP unit's "incremental CO_2 emission rate") compared to a reference CO_2 emission rate. This "incremental CO_2 emission rate" related to the electric generation from the CHP unit would be relative to the applicable CO_2 rate-based emission standard for affected EGUs in the state and would be limited to values between 0 and 1"[1]

The incremental CHP electrical emission rate is calculated as:

CHP electrical CO_2 emission rate = [CHP fuel input*fuel emission factor – (UTO/boiler efficiency * fuel emission factor]/CHP electrical MWh

Where CHP fuel input represents the thermal energy associated with total fuel input and UTO is the useful thermal output from a counterfactual industrial boiler that would have existed to meet thermal load in the absence of the CHP unit.

The prorated electrical output from the CHP unit is calculated as:

Prorated MWh = (1-incremental CHP electrical emission rate/applicable affected EGU rate-based emission standard)*CHP MWh output[2]

Using EPA guidance and data on typical forest product industry biomass CHP units contained within "*Combined heat and power (CHP) as a compliance option under the clean power plan, a template and policy options for State regulators*"[3] and on a typical forest product industry natural

[1] 80 Fed. Reg at 64996
[2] 80 Fed. Reg. at 64996
[3] Combined heat and power (CHP) as a compliance option under the clean power plan, a template and policy options for State regulators. July 2015. Appendix C. http://www.afandpa.org/docs/default-source/default-document-library/chp_pathway_final_7_23_15.pdf?sfvrsn=2

gas CHP unit contained within USEPA's *Catalog of CHP Technologies*[4], calculation of ERCs for forest product industry CHP units is demonstrated. EPA states that the applicable rate-based emission standard can be found in Table 6 – glide path interim performance rates[5], though it is not specified which performance rate within Table 6 should be used for calculations. To be conservative as possible, the final emission rate standard for steam generating units (SGUs) or integrated gasification combined cycle facilities (IGCCs) from Table 6 is used. The forest products industry's most prominent biomass energy sources such as spent liquor solids and manufacturing residuals can be characterized by a zero CO_2 emission factor at the point of combustion, but to be conservative in these calculations, the GHG emissions associated with methane and nitrous oxide from these biomass fuels are considered.

	15 MW back pressure steam turbine, paper mill firing wood waste	15 MW back pressure steam turbine, paper mill firing pulping liquors	15 MW back pressure steam turbine, paper mill firing natural gas	Units
CHP fuel input	736,000	734,000	736,000	MMBtu HHV
Fuel emission factor	2.8	0.4	117.2	lb CO_2eq/MMBtu HHV
UTO	410,500	446,000	521,000	MMBtu HHV
CHP electrical MWh	20,000	20,000	20,000	MWh
Boiler efficiency	65	70	80	%
Incremental CHP electrical emission rate	14.4	1.8	497	lb CO_2eq/MWh
SGU or IGCC rate-based emission standard	1305	1305	1305	lb CO_2/MWh
Prorated MWh ERC fraction	0.989	0.999	0.619	

The prorated MWh ERC fractions from forest products industry CHP units firing spent liquor or manufacturing wood waste are very nearly one, meaning practically 100% of electrical output from these CHP units should be considered eligible for ERCs. The calculated proration for forest products industry natural gas CHP units is 0.619, meaning 62% of the electrical output from these CHP units should be considered eligible for ERCs.

[4] USEPA Catalog of CHP Technologies, December 2008.
[5] 80 Fed. Reg. at 64996