WAC 463-80-050 Calculating total carbon dioxide emissions to be mitigated. (1) Step 1 is to calculate the total quantity of CO_2. The total quantity of CO_2 is referred to as the maximum potential emissions of CO_2. The maximum potential emissions of CO_2 is defined as the annual CO_2 emission rate. The annual CO_2 emission rate is derived by the following formula unless a differing analysis is necessary or appropriate for the electric generating process and type of equipment:

$$CO_{2rate} = \frac{F_s \, x \, K_s}{2204.6} \, x \, T_s + \frac{F_1 \, x \, K_1}{2204.6} \, x \, T_1 + \frac{F_2 \, x \, K_2}{2204.6} \, x \, T_2 \quad \frac{F_3 \, x \, K_3}{2204.6} \, x \, T_3 \ldots \frac{F_n \, x \, K_n}{2204.6} \, x \, T_n$$

where:

CO_{2rate}	=	Maximum potential emissions in metric tons per year
F_{1-n}	=	Maximum design fuel firing rate in MMBtu/hour calculated as manufacturer or designer's guaranteed total net station generating capability in MWe times the new equipment heat rate in Btu/MWe. Determined based on higher heating values of fuel
K_{1-n}	=	Conversion factor for the fuel(s) being evaluated in lb CO_2/MMBtu for fuel F_n
T_{1-n}	=	Hours per year fuel F_n is allowed to be used. The default is 8760 hours unless there is a limitation on hours in a site certification agreement
F_s	=	Maximum design supplemental fuel firing rate in MMBtu/hour, at higher heating value of the fuel
K_s	=	Conversion factor for the supplemental fuel being evaluated in lb CO_2/MMBtu for fuel F_n given fuel
T_s	=	Hours per year supplemental fuel F_n is allowed. The default is 8760 hours unless there is a limitation on hours in a site certification agreement

(a) When there are multiple new fossil-fueled electric generating units, the above calculation will be performed for each unit and the total CO_2 emissions of all units will be summed.

(b) When a unit or facility is allowed to use multiple fuels, the maximum allowed hours on the highest CO_2 producing fuels will be utilized for each fuel until the total of all hours per fuel add up to the allowable annual hours.

(c) When a new unit or facility is allowed to use multiple fuels without restriction, this calculation will be performed assuming that the fuel with the highest CO_2 emission rate is used 100% of the time.

(d) When the annual operating hours are restricted for any reason, the total of all T_{1-n} hours equals the annual allowable hours of operation in the site certification agreement.

(e) Fuel to CO_2 conversion factors (derived from the EPA's AP-42, Compilation of Air Pollutant Emission Factors):

Fuel	K_n lb/MMBtu
#2 oil	158.16
#4 oil	160.96
#6 oil	166.67
Lignite	287.50
Sub-bituminous coal	267.22
Bituminous coal, low volatility	232.21
Bituminous coal, medium volatility	241.60
Bituminous coal, high volatility	262.38
Natural gas	117.6
Propane	136.61

Fuel	K_n lb/MMBtu
Butane	139.38
Petroleum coke	242.91
Coal coke	243.1
Other fossil fuels	Calculate based on carbon content of the fossil fuel and application of the gross heat content (higher heating value) of the fuel
Nonfossil fuels	00.00

(2) **Step 2 - Insert the annual CO_2 rate to determine the total carbon dioxide emissions to be mitigated.** The formula below includes specifications that are part of the total carbon dioxide definition:

$$\text{Total CO}_2 \text{ Emissions} = \text{CO}_{2rate} \times 30 \times 0.6$$

(3) **Step 3 - Determine and apply the cogeneration credit (if any).** Where the cogeneration unit or facility qualifies for cogeneration credit, the cogeneration credit is the annual CO_2 emission rate (in metric tons per year) and is calculated as shown below or similar method:

$$CO_{2credit} = \frac{H_s}{2204.6} \times (K_a) \div n$$

where:

$CO_{2credit}$	=	The annual CO_2 credit for cogeneration in metric tons/year.
H_s	=	Annual heat energy supplied by the cogeneration plant to the "steam host" per the contract or other binding obligation/agreement between the parties in MMBtu/yr as substantiated by an engineering analysis.
K_a	=	The time weighted average CO_2 emission rate constant for the cogeneration plant in lb CO_2/MMBtu supplied. The time-weighted average is calculated similarly to the above method described in subsection (1) of this section.
n	=	Efficiency of new boiler that would provide the same quantity of thermal energy. Assume n = 0.85 unless applicant provides information supporting a different value.

Calculate the metric tons of the cogeneration credit over the 30 year period.

$$\text{Cogeneration Credit} = \text{CO}_{2credit} \times 30$$

(4) **Step 4 - Apply the mitigation factor.**

(a) RCW 80.70.020(4) states that "*Fossil-fueled thermal electric generation facilities that receive site certification approval or an order of approval shall provide mitigation for twenty percent of the total carbon dioxide emissions produced by the facility.*"

(b) The CO_2 emissions mitigation quantity is determined by the following formula:

$$\text{Mitigation Quantity} = \text{Total CO}_2 \text{ Emissions} \times 0.2 - \text{Cogeneration Credit}$$

where:

Mitigation quantity	=	The total CO_2 emissions to be mitigated in metric tons.

$$CO_{2rate} = \text{The annual maximum } CO_2 \text{ emissions from the generating facility in tons/year.}$$

$$0.2 = \text{The mitigation factor in RCW 80.70.020(4).}$$

(5) **Additional restrictions for modifications to an existing facility not involving installation of new generating units.** The quantity of CO_2 to be mitigated is calculated by the same methods used for the new generating units with the following restrictions:

(a) The quantity of CO_2 subject to mitigation is only that resulting from the modification and does not include the CO_2 emissions occurring prior to the modification;

(b) An increase in operating hours or other operational limitations established in a site certification agreement is not an exempt modification under this regulation. However, only increased CO_2 emissions related to the increase in operating hours or changes to any other operational restriction are subject to the CO_2 mitigation program requirements;

(c) The annual emissions (CO_{2rate}) is the difference between the premodification condition and the postmodification condition, but using the like new heat rate for the combustion equipment; and

(d) The cogeneration credit may be used, but only if it is a new cogeneration credit, not a cogeneration agreement or arrangement established prior to July 1, 2004, or used in a prior CO_2 mitigation evaluation.

[Statutory Authority: Chapters 80.70 and 80.80 RCW and RCW 80.50.040. WSR 08-14-064, § 463-80-050, filed 6/25/08, effective 7/26/08.]