**Appendix B: 2017 EPS calculator heat rate adjustment parameters**

**CCCT heat rates**: Commerce obtained reference heat rates for the CCCT configurations from the 2016 and 2017 Gas Turbine World Handbooks (converting to higher heating value heat rates using the conversion factor of 1.108).

**System loss adjustment**: A uniform adjustment (percentage increase) of 2 percent was applied to the CCCT heat rates noted above to account for typical system losses: inlet and exhaust pressure drops, transformer loss, emission control system loss, etc.

**Ageing adjustment**: A literature search revealed an aging heat rate decline of 3 to 5 percent. We selected a uniform adjustment factor of 3.5 percent to be applied to the CCCT heat rates to account for performance degradation due to use of the CCCT. Performance degradation is comprised of reversible and non-reversible elements. Periodic maintenance can partially restore CCCT performance.

**Duct firing adjustment**: CCCTs often have supplemental and lower efficiency duct firing that can boost facility output for a short period. Commerce further adjusted the heat rate of each configuration to reflect 15 percent of additional CCCT capacity from full duct firing and utilized at 30 percent of operational hours, or 1,841 annual hours.[[1]](#footnote-1) The capacity factor of the duct firing increment was assumed to be 80 percent. The duct firing heat rate was assumed to be 9,200 and 9,550 Btu/kWh for large and small CCCTs respectively.

**Start/stop/low output adjustment**: Commerce worked with stakeholders and others to establish an adjustment factor of 7 percent to CCCT heat rates for typical start/stop cycling and low-output operation.

**Cooling technology adjustment**: Commerce worked with stakeholders to develop an adjustment factor of 1 percent for CCCTs that use air-cooling technology and inlet cooling.

**Conversion to emission factors**: Determine final adjusted heat rate for all CCCT configurations and multiply by the appropriate natural gas emission factor to arrive at an emission rate of pounds CO2 per MWh for all configurations. The emission factor used in the survey is the value specified by the Washington Department of Ecology: 117.6 lb./MMBtu.

**Inclusion of other GHG gases**: Add standard values (lb./MWh) for methane and nitrogen oxides emissions determined from Department of Ecology reports.

**Average emission factor**: Average across all CCCT in the survey to arrive at the average GHG emission factor (this will be the state’s updated emission performance standard). This is a simple average and not weighted for capacity or anticipated frequency of purchase of the new CCCTs.

1. A survey of regional CCCTs with duct firing in 2013 indicated the average duct firing capacity value to be 14.3 percent. Another smaller survey revealed that CCCTs used their duct firing about 33 percent of the time. [↑](#footnote-ref-1)