Fryer, Tim

From: Fuerst, Sherry
Sent: Friday, September 12, 2014 3:58 PM
To: Fryer, Tim
Subject: FW: Response to Heat Input, CO2 Performance Standard, and Compression Cost Questions
Attachments: 2014-03-28 CCS BACT Cost Analysis.pdf; 2014-03-28 Combined Cycle Unit Performance.pdf; 2014-03-28 Combined Cycle Units GHG.pdf; 2014-03-28 Siemens Annual Rates.pdf

Tim please add this email to the public web for Lon C. Hill. I sent you the attachment separately too. I didn't think about sending the emails until after I sent all the attachments. Sorry.
Thanks,
Sherry

From: Mona Johnson [mailto:mjohnson@camsesparc.com]
Sent: Friday, March 28, 2014 9:07 AM
To: Fuerst, Sherry
Cc: Nuria de las Casas
Subject: Response to Heat Input, CO2 Performance Standard, and Compression Cost Questions

Sherry:

I have some answers for you regarding your latest questions:

1. **How did we come up with the maximum heat input of 21,136,220 MMBtu/year that is shown in Table 2 of the GHG Permit Application (page 14)**
   - Please refer to the file Combined Cycle Units GHG, attached. The maximum annual heat input is obtained by first evaluating the different vendor scenarios for annual emissions, with consideration given the estimated hours of duct firing as well as no duct firing and then selecting the case with the maximum annual heat input. "Scenario 3" is the maximum case. This represents Siemens Case 10 (75^{o}F, units firing for 4,385 hours with duct burners off) and Case 11 (75^{o}F units firing for 4,375 hours with duct burners on). Refer to the file Siemens Annual Rates.
2. **How did we come up with the expected performance standard range of 830 to 920 lbCO2/MWh, as listed in Table 3 of the GHG Permit Application (page 17)**
   - Please refer to the file Combined Cycle Unit Performance attached. The expected performance range is based on the calculated tons of CO2 per year divided by the maximum output in MW as provided by the vendor.
3. **How much energy it takes to compress the CO2 to implement CCS? What percentage of the energy produced at the plant will it take to compress the gas for transport?**
   - As we discussed earlier, we do not have design data to support the calculation of the percentage of plant energy required to compress the CO2 captured from the exhaust gas and then pressurize it to pipeline conditions (approximately 2000 psia). However, according to the report of the Interagency Task Force on Carbon Capture and Storage (August 2010), Section III.D.1, CO2 capture and compression facilities will require an annualized cost for capture and compression facilities of $114 /metric ton. As presented in the attached calculation (refer to CCS BACT Cost Analysis), assuming a 90% capture efficiency was achieved, a total of 2,050,368 metric tons will be processed annually, at a cost of $230 million which exceeds the capital cost of the proposed plant. The numbers in the CC BACAT Cost Analysis have been updated from what I sent you last week. We found an error in the

calculations related to the conversion to metric tons versus short tons and fixed that in this version. Also, the GWPs have been updated to reflect the most recent values published in the Federal Register (November 29, 2013).

I hope this information helps with your review.

-Mona

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