From:	MARK_EVANS@oxy.com
To:	Wilson, Aimee
Cc:	Chris_Krishna@oxy.com; keil@flash.net
Subject:	CCS Cost Relative to Project Cost
Date:	Monday, February 03, 2014 4:09:30 PM

Aimee,

In response to your request for CCS cost values relative to project cost, we have calculated the following numbers based on a $1,000 MM installed project cost. These ratios are based on project costs as estimated by the engineering, procurement, and construction company selected to execute this project.

Furnace CCS installed cost vs. project installed cost= (($241.2MM (CCS) +111.8MM (pipeline)) / $1000 MM (Project)) = 35.3%

Thermal Oxidizers installed cost vs. project installed cost = (($89.1MM (CCS) + $111.8 MM (Pipeline)) / $1000 MM (Project)) = 20.1%

Combined Furnace capture and thermal oxidizer capture with one pipeline installed cost vs. project installed cost = ($241.2 MM +89.1 MM + $111.8MM) / $1000 MM = 44.2%

Please note that the combined furnace and thermal oxidizer CO_2 capture costs do not include the increased costs necessary for the larger pipeline that would be needed to accommodate both streams; and therefore the ratio would in actuality be higher. However, 44.2% of project costs clearly demonstrates CCS would not be cost effective for this application. Therefore OxyChem did not feel it was necessary to determine the increased pipeline cost for combining these two streams.

Also, the thermal oxidizer cost ratio of 20.1% is relatively low as compared to the furnace CCS cost ratio due to the relatively small amount of CO_2 being recovered. Since use of the thermal oxidizers with waste heat recovery for control of low pressure vents is considered BACT relative to the use of a flare and the added cost of CCS for the thermal oxidizers would raise the cost of installing the thermal oxidizers by more than 30 fold, CCS for the thermal oxidizers is not considered cost effective.

Thanks,
Mark

Mark R. Evans
Environmental Manager - Projects
OxyChem Ingleside
(361)776-6169