

# Are We There Yet?

## CCS and Cost-Effectiveness Analyses

by Carlos Romo

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In 2011, the U.S. Environmental Protection Agency (EPA) issued pioneering guidance on the Best Available Control Technology (BACT) analysis for the control of greenhouse gas (GHG) emissions. In that guidance, EPA acknowledged that carbon capture and sequestration (CCS) is “an expensive technology” that will typically be eliminated under the economic impacts analysis conducted under Step 4 of EPA top-down BACT determinations in air permitting proceedings. Yet, EPA also noted that “CCS may become less costly and warrant greater consideration in Step 4 of the BACT analysis in the future.” Has the future arrived?

A petition by Sierra Club to EPA’s Environmental Appeals Board (EAB) challenging a Prevention of Significant Deterioration (PSD) GHG permit issued in Texas raised this key question for evaluating CCS on BACT cost-effectiveness grounds and was recently denied by the EAB. With GHG New Source Performance Standards (NSPS) for new and existing coal-fired power plants looming, the decision evaluating cost analyses for CCS has potentially important implications.

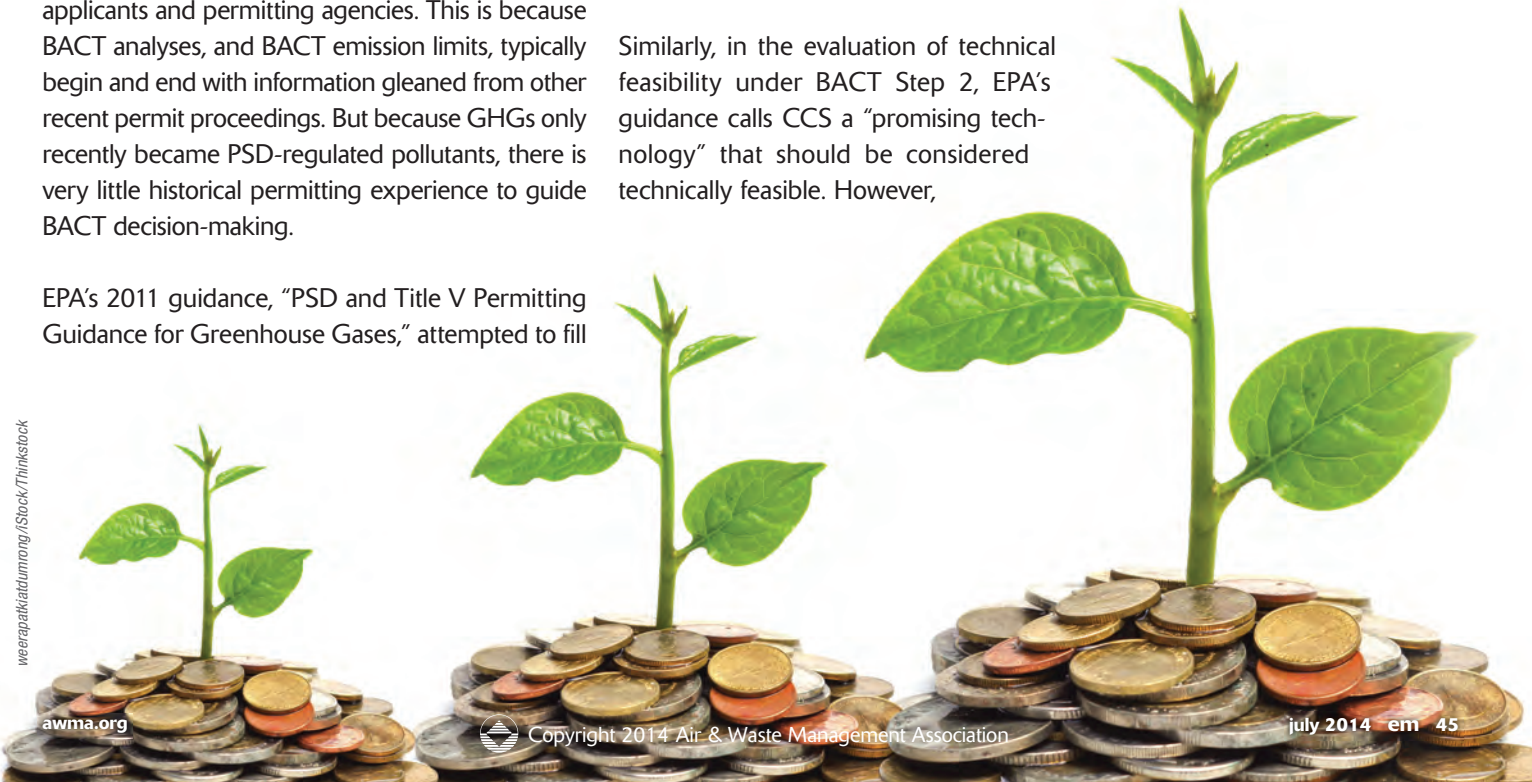
### EPA’s 2011 Guidance

BACT analysis conducted as part of the PSD GHG air permitting process has been a challenge for both applicants and permitting agencies. This is because BACT analyses, and BACT emission limits, typically begin and end with information gleaned from other recent permit proceedings. But because GHGs only recently became PSD-regulated pollutants, there is very little historical permitting experience to guide BACT decision-making.

EPA’s 2011 guidance, “PSD and Title V Permitting Guidance for Greenhouse Gases,” attempted to fill

the void in available information for GHG BACT determinations. The guidance outlines the typical steps a permit applicant or permitting agency would take in conducting a BACT analysis for a PSD pollutant and adds specific guidance relevant to permitting GHG emissions. For example, Step 1 requires consideration of all “available” emissions control technologies. While EPA’s guidance recognizes that “the use of add-on controls to reduce GHG emissions is not as well advanced as it is for most combustion-derived pollutants,” it concludes that CCS is “an add-on pollution control technology that is ‘available’ for facilities emitting [carbon dioxide] in large amounts.”

Similarly, in the evaluation of technical feasibility under BACT Step 2, EPA’s guidance calls CCS a “promising technology” that should be considered technically feasible. However,



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- Additional panelists TBD

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EPA also acknowledges the many technical and logistical hurdles involved with applying CCS to most projects. Still, EPA notes that “[a] number of ongoing research, development, and demonstration programs may make CCS technologies more widely applicable in the future.”

As to the cost-effectiveness of CCS, EPA’s guidance specifically acknowledges that “CCS will often be eliminated from consideration in Step 4 of the BACT analysis” based on cost. Indeed, EPA appears to recognize that a detailed cost evaluation typically seen in many BACT Step 4 analyses may not always be needed for an unproven technology like CCS. In summary, the guidance says, “it may be appropriate, in some cases, to assess the cost effectiveness of a control option in a less detailed quantitative (or even qualitative) manner.” However, EPA also specifically notes that applicants and permitting authorities conducting cost-effectiveness analyses for GHGs must acknowledge that the cost-per-ton threshold for eliminating a control technology for GHGs as BACT will be significantly lower than other PSD pollutants.

### EAB’s 2012 Decision in Palmdale, CA

In one of the first GHG permitting decisions to consider CCS as part of its BACT analysis, EPA Region 9 initially rejected CCS as a technically feasible control option for a natural gas and solar “hybrid” power plant proposed by the City of Palmdale, CA.<sup>1</sup> The analysis focused on “logistical barriers” associated with constructing a pipeline to transport GHGs as part of the CCS project. However, a commenter suggested that the issue was one of cost versus technical feasibility and, therefore, asked EPA Region 9 to analyze the cost-effectiveness of CCS.

EPA Region 9 agreed to more closely examine costs of CCS, but again rejected the add-on technology based on estimated projects costs. In particular, the City of Palmdale estimated that CCS would more than double the annualized costs of the facility from approximately US\$35 million to US\$78 million. The petitioner then questioned this cost estimate on appeal and argued that it “impermissibly compares the overall price for CCS to the price for the facility” rather than comparing “dollars per ton of pollutant reduced/removed.”

EAB rejected the petition and concluded that EPA Region 9 “did not clearly err in determining that CCS was economically infeasible as a GHG control technology for [this project].”

### Sierra Club’s 2014 Petition to EAB

The issue of how air permitting agencies calculate cost-effectiveness for GHGs was once again before EAB in 2014. The Sierra Club raised the cost-effectiveness question in a petition challenging a PSD GHG permit issued by EPA Region 6 for a new ethylene unit at a Baytown, TX, refinery.<sup>2</sup> In its petition, Sierra Club argued that every EPA Region that has considered CCS as part of its BACT analysis for PSD GHG permits mistakenly interprets EAB’s City of Palmdale decision and rejects CCS on the basis of the total costs for CCS compared with the total costs for the project.

In the case of the Baytown project, the applicant estimated that the total cost of US\$735 million for CCS would add approximately 25% to the total cost of the project. Sierra Club claimed that cost-effectiveness information for GHGs on a cost-per-ton basis was not being adequately evaluated. It also noted that this is particularly important information to develop in the Gulf Coast region, where CCS technology is more likely to be cost-effective due to the potential availability of underground storage or enhanced oil recovery projects. Sierra Club’s petition raised other similar arguments related to the cost-effectiveness of CCS for the control of GHGs.

Both EPA and the applicant vigorously defended the administrative record documenting the BACT approach used with the Baytown PSD GHG permit. Indeed, EPA reiterated that the applicant

“calculated a cost-effectiveness of over US\$253/ton CO<sub>2</sub>e” and that EPA specifically agreed with that analysis in response to public comments filed by Sierra Club. EPA also noted that environmental impacts, including the potential increase in ozone precursors, were considered along with economic costs in rejecting CCS in Step 4.

On May 14, 2014, EAB denied Sierra Club’s petition. EAB concluded that cost-per-ton calculation was not useful to EPA “[g]iven the lack of relevant comparable facilities” and highlighted EPA’s significant discretion in evaluating cost-effectiveness of BACT for GHG permits on a case-by-case basis. In particular, it noted that EPA was not required to use only one particular approach in evaluating costs of CCS and rejected adopting a specific cost-per-ton threshold for determining the economic reasonableness of CCS.

### Implications

The timing of EAB’s decision on the Baytown permit could not be more significant. EPA is currently considering approaches it will use in determining a GHG NSPS for new and existing coal-fired power plants and many PSD GHG permits are still pending EPA review in various regions. One key take-away from the recent EAB decision is that GHG BACT analyses are case-specific and there is no one method for determining cost-effectiveness of CCS; cost-per-ton, comparison of annualized costs, and total project costs may all be reasonable approaches to evaluate economic reasonableness of using CCS in any particular case. Thus, the EAB decision sets an important precedent for how CCS is evaluated both as part of BACT and in pending rulemakings considering nationally applicable standards. **em**

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### References

1. See *In re City of Palmdale*, PSD Appeal No. 11-07 (EAB 2012).
2. See *In re ExxonMobil Chemical Company Baytown Olefins Plant*, PSD Appeal No. 13-11 (EAB 2014).

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