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Regulating CO2 as an NSR Pollutant

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In the two years since the U.S. Supreme Court ruled in *Massachusetts v. EPA* that carbon dioxide (CO2) was a "pollutant" within the meaning of the Clean Air Act (CAA),[1] observers have predicted a cascade of regulatory developments flowing from the decision. One such development that could have far-reaching consequences is the regulation of greenhouse gases (GHGs) under the New Source Review (NSR) program. Opponents of the coal-fired power plant industry envision NSR as a mechanism to halt the construction of new coal-fired units and, eventually, to prompt the retirement of all such units.

Massachusetts v. EPA arose from a rulemaking petition seeking to require the U.S. Environmental Protection Agency (EPA) to regulate GHGs emitted by automobiles. The Supreme Court held that the plain meaning of the statute was unambiguous and that subsequent federal legislation addressing climate change, largely through research efforts, did not alter the EPA's duties under the CAA. The Court ruled that the EPA "can avoid taking further action only if it determines that greenhouse gases do not contribute to climate change or if it provides some reasonable explanation as to why it cannot or will not exercise its discretion to determine whether they do."[2]

The EPA has now issued a proposed finding that GHGs contribute to climate change, a finding that, once final, sets the stage for comprehensive regulation under the CAA. Below, we discuss the likely pollution controls on coal-fired power plants if required to install Best Available Control Technology (BACT) and analyze certain issues central to a BACT analysis.

The NSR Program and BACT

NSR is a permitting program that requires preconstruction review and the issuance of a permit for the construction of any new "major emitting facility," or for the "modification" of an existing facility. To obtain a preconstruction permit, the facility must show, among other things, that the project would not result in a violation of an ambient air quality standard in local or downwind areas.[3]

A critical part of the permitting process is the determination of the pollution controls required to be installed before the new or modified source may operate. The NSR program requires the permittee to conduct an analysis of available control technologies for the applicable pollutants and to install the "best available control technology," or BACT.[4] BACT represents an emissions limitation based on the "maximum degree of reduction" of regulated pollutants that is achievable for a facility, taking into account facility-specific "energy, environmental, and economic impacts and other costs."[5] With respect to coal-fired power plants, for example, BACT for sulfur dioxide emissions typically is some form of flue gas desulfurization device or "scrubber." Similarly, BACT for nitrogen oxide (NOx) emissions can be a range of control or combustion devices, such as selective catalytic recovery or low-NOx burners.

EPA's Current Regulatory Treatment of NSR Permitting for CO2

Until *Massachusetts v. EPA*, efforts to have any stationary sources, let alone coal-fired power plants, undergo NSR for GHG emissions were not seriously pressed. Since then, however, EPA regions[6] and state permitting authorities have had to address the issue for nearly every permitting decision. Initial confusion and inconsistent permitting decisions are giving way to the likely result

that new or modified coal-fired power plants will be required to undergo NSR permitting for CO2. Initial skirmishes over this issue have played out in permitting decisions from EPA Regional Offices, decisions of the Environmental Appeals Board (EAB), and missives from EPA Administrators.

Deseret Power

One of the more notable examples of this to date was the EAB's November 2008 decision in *In re Deseret Power Electric Cooperative*.[7] EPA Region 8 had issued a permit to construct a waste-coal-fired generating unit at a Utah power plant; Sierra Club challenged the permit.

The EAB rejected Sierra Club's argument that CO2 clearly was "subject to regulation" under the CAA. Instead, the EAB remanded the permit to EPA Region 8, ruling that the Region erred in determining that its discretion was limited by the EPA's historical interpretation of "subject to regulation." The EAB held that "subject to regulation" was ambiguous, that Congress had not considered the precise issue and did not enact language to address it specifically, and that there was no evidence that the use of the term "regulation" in the 1990 Amendments to the CAA[8] was an attempt to constrain the EPA's interpretation of the phrase "subject to regulation."[9]

EPA Interpretive Rule on Pollutants Subject to PSD Review

On December 18, 2008, the EPA issued a memorandum providing its "definitive" interpretation of the regulatory definition of "regulated NSR pollutant"—which, in turn, implements the key statutory term, "subject to regulation under this Act."[10] The EPA explained that it has never treated CO2 as "subject to regulation" under the CAA, and that it was now exercising its discretion formally to interpret its Prevention of Significant Deterioration (PSD) rules as requiring enactment by Congress or regulatory promulgation of an emission standard or limitation for a pollutant before emissions of that pollutant could become subject to PSD requirements.[11] On December 31, 2008, the EPA provided notice of this interpretation in the Federal Register and designated the interpretation as nationally significant under Section 307 of the CAA (*hereinafter* Interpretive Rule).[12]

Sierra Club filed a petition for reconsideration of the Interpretive Rule on December 31, 2008, and filed a petition to review the Interpretive Rule in the U.S. Court of Appeals for the D.C. Circuit on January 15, 2009. On February 17, 2009, new EPA Administrator Lisa P. Jackson granted the petition for reconsideration, but denied Sierra Club's request to stay the effectiveness of the Interpretive Rule.[13]

Desert Rock

The EPA's new interpretation would not need to wait long for its first test. Sierra Club and other environmental organizations challenged EPA Region 9's July 31, 2008 issuance of a PSD permit for construction of a new 1,500 megawatt (MW) coal-fired plant on the Navajo Reservation in New Mexico. Before the EAB could rule on the CO2 BACT issue, EPA Region 9 withdrew the portion of its permit action regarding its decision not to impose limitations on emissions of CO2 to reconsider the issue "in light of the Board's opinion in *Deseret*" and the EPA's interpretive rule.[14]

EPA Region 9 then issued an Addendum, in January 2009, taking the position that the EPA's interpretation "reflects a properly adopted interpretive rule," and that the Region "is required to follow the Agency's interpretation of the federal PSD regulations set forth in that memorandum."[15] Accordingly, Region 9 determined that CO2 is not currently a "regulated NSR pollutant" and that it would not revise the permit to include limitations for CO2.[16] On April 27, 2009, Region 9 requested that the EAB remand the permit so that the Region could reconsider certain environmental and air quality issues.

For the time being, new and modified power plants need not consider potential NSR implications of CO2. However, since permits are not final until appeals to the EAB are completed, permit proceedings have effectively ground to a halt until the EPA rules on reconsideration of its Interpretive Rule. The most likely outcome seems to be that the EPA will require new or modified power plants to undertake NSR for CO2, which leads to the following issue: what is BACT for CO2?

The BACT Process

The NSR program requires, among other things, that measures to control emissions be established by the permitting authority before the beginning of construction and be in place before the source commences operations. The BACT requirement applies both to new major sources and to existing major sources undergoing modification. These requirements apply to all regulated NSR pollutants for which the increase in emissions is "significant."[17]

EPA regulations define "significant" in two ways. For most regulated NSR pollutants, the EPA has established annual emission rate thresholds, in tons per year. These thresholds range from 0.6 tons per year for lead to 100 tons per year for carbon monoxide. To date, the thresholds for all regulated NSR pollutants are less than or equal to the major source thresholds (100 tons per year or 250 tons per year of any regulated NSR pollutant, depending on source type), which are the standards that establish applicability of the NSR program.[18]

The major source thresholds are specified in the statute and may be changed only be amendment of the CAA. If the EPA were to establish a "significance" level for CO2, there is no express statutory prohibition on establishing that level at an emission rate much higher than the major source thresholds, though any such ruling by the EPA would almost certainly bring court challenges.

The second way in which the "significance" level for a regulated NSR pollutant is defined is as follows:

> Significant means, in reference to a net emissions increase or the potential of a source to emit a regulated NSR pollutant that paragraph (b)(23)(i) of this section, does not list, any emissions rate.[19]

Thus, if the EPA first regulates CO2 emissions through performance standards without simultaneously establishing a significance level in tons per year, any CO2 emissions increase resulting from construction or modification at a major source will be subject to the BACT requirement. The administrative burden of such a requirement on both the EPA and industry is incalculable.

The CAA requires that BACT for a proposed facility be determined on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs. This includes both beneficial impacts of an available control technology, such as the direct environmental benefit resulting from an avoided increase in emissions of the target pollutant, and adverse impacts, such as the economic cost to the permittee. The permitting authority, usually the state agency, is responsible for weighing the identified impacts and reaching a conclusion regarding BACT based on its reasoned consideration of those impacts.[20]

The EPA generally requires BACT analyses to be performed on a source-by-source and pollutant-by-pollutant basis using five key steps:

Step 1: Identify All Control Technologies

"Available" control options are those technologies or techniques with a practical potential for application to the subject emission units and pollutants. All potential options are listed in this step.

Step 2: Eliminate Technically Infeasible Options

The technical feasibility of each identified control option is then evaluated with respect to source-specific factors. Demonstrations of technical infeasibility must show, based on physical, chemical and engineering principles, that technical difficulties would preclude the control option from being employed successfully on the subject emissions unit.

Step 3: Rank Remaining Control Technologies by Control Effectiveness

All control alternatives not eliminated in step 2 are ranked in order of overall control effectiveness. For each option, estimated control efficiency and overall emissions reduction must be documented.

Step 4: Evaluate Most Effective Controls and Document Results

Beneficial and adverse energy, environmental and economic impacts of each remaining control option are listed and considered. If the option with the highest control effectiveness is rejected as BACT due to unacceptable energy, environmental or economic impacts, the rationale must be documented for the public record and the next best control option subjected to the same evaluation.

Step 5: Select BACT

Finally, the most effective control technology not eliminated in the previous step is proposed as the technological basis for BACT, and an emission limit representing BACT is proposed in the draft permit.

Does BACT Allow the EPA to Consider Requiring Alternative Production Processes?

The CAA requires the EPA to consider "production processes," "clean fuels," and "innovative fuel combustion techniques" as control options.[21] The Sierra Club and other environmental groups argue that this requirement mandates consideration of alternative process technologies, such as integrated gasification combined cycle (IGCC), in place of proposed pulverized coal-fired boilers.

What little authority exists on the question is divided. A Georgia state court has ruled that the permitting authority must include in the BACT analysis any method of producing the desired product from the desired raw material, regardless of any process equipment changes necessitated by the decision.[22] Most permitting authorities—and the U.S. Court of Appeals for the 7th Circuit—have concluded that the BACT determination should not require substantial addition or redesign of process equipment.[23] Accordingly, step 1 of the BACT analysis considers only air pollution control technologies or minor equipment alterations that can be applied to the process technology proposed by the permit applicant. This approach is consistent with how most permitting authorities have performed BACT analyses for conventional air pollutants. One of the issues the EPA is actively reconsidering in connection with the Desert Rock power plant, discussed *supra*, is whether it can require permit applicants to consider IGCC technology in the BACT analysis.

CO2 Control Technology Options

Other than energy efficiency measures, which generally will reduce the fuel consumption rate of the facility or unit for which BACT for CO2 emissions is being determined, the control options under consideration will involve capturing and sequestering CO2, commonly referred to as carbon capture and sequestration (CCS). Depending on the type of facility, a number of capture technologies are available. Similarly, depending on the facility location, there may be several available options for sequestration, most of which involve transportation over significant

distances. Because of very limited commercial demonstration to date, all of these capture technologies and most of the sequestration options would not likely be considered "technically feasible" by most permitting authorities under Step 2 of the BACT analysis. If technical feasibility were established through demonstration projects, however, agencies will have to decide whether to require a facility to apply such technologies.

For CCS applied to a proposed stationary source, the beneficial impacts in many instances will be difficult to quantify and the adverse impacts will be substantial. This is illustrated by the two questions likely to be the most vexing to permitting authorities.

To What Extent, if any, Should Decreases in CO2 Emissions be Required at the Expense of Increases in Emissions of Conventional Air Pollutants?

CCS technologies are highly energy-intensive, especially in the majority of cases where compression of CO2 to a supercritical state is required to facilitate pipeline transportation to a site suitable for sequestration. The Intergovernmental Panel on Climate Change's 2005 *Special Report on Carbon Dioxide Capture and Storage* indicates that for coal-fired power plants the increase in fuel usage to support CCS would range from 24 to 40 percent; for natural gas-fired combined-cycle (NGCC) plants, the increase is 11 to 22 percent.[24]

Using the low end of the range and applying current BACT levels for conventional pollutants, application of CCS to a nominal 850 MW coal-fired plant would decrease CO2 emissions by 6 million tons per year while increasing emissions of nitrogen oxides by more than 400 tons per year, sulfur dioxide by more than 500 tons per year, and particulate matter by approximately 300 tons per year. For a 600 MW NGCC plant, application of CCS would decrease CO2 emissions by 1.5 million tons per year while increasing emissions of nitrogen oxides by 13 tons per year and emissions of particulate matter by 23 tons per year.

These collateral increases in emissions of conventional pollutants are substantial, especially for coal-fired plants, and they have well-defined impacts on air quality in the area immediately surrounding the facility. Permitting authorities making BACT determinations for CO2 emissions will have to weigh these and other adverse impacts against the beneficial impacts they believe will accrue from avoided CO2 emissions.

What is the Economic Value of Avoided CO2 Emissions from a Proposed Stationary Source in the U.S.?

For emissions of conventional air pollutants, most permitting authorities do not establish bright lines for acceptable levels of cost-effectiveness. Relatively few NSR permits, however, have required control technologies with an incremental cost of more than $10,000 per ton of avoided emissions, and there is a general understanding of the economic value of avoided emissions from various types of emission sources in various locations.

There is no such precedent for CO2. In addition to being energy-intensive, CCS is also exorbitantly costly in relation to other air pollution control technologies. Given the lack of commercial demonstration, cost estimates vary widely, but are at least $50 to $100 per ton of CO2 avoided. While these values are lower on a per-ton basis than the costs of control technologies for conventional air pollutants, this effect is dwarfed by the relative magnitude of the emissions. Even at the low end of the cost range, application of CCS to a 600 MW coal-fired power plant would represent an incremental cost of $300 million per year. This is well outside the range of absolute costs that have been contemplated in BACT analyses over the past 30 years. Even for facilities that produce only electricity, for which overseas production is not a realistic alternative, requiring CCS as BACT would certainly affect the economic viability of proposed projects.

Further complications arise for facilities other than electric power plants. Again using a rough low-end estimate of $50 per ton of CO2 avoided through CCS, the incremental costs for a 200,000 barrel-per-day oil refinery would be more than $150 million per year, and costs for a 4,000 ton-per-day portland cement plant would be more than $50 million per year. A permitting authority making a BACT determination for such a facility would have to weigh the beneficial impacts of avoided CO2 emissions against these economic costs and the considerable energy usage required for operation of the CCS systems. The permitting authority might also consider the adverse environmental impacts associated with the generation of the energy required for the CCS.

Finally, the agency might also consider the likelihood that the incremental cost of the CCS requirement would render such a facility not economically viable. Refined transportation fuels, portland cement, and many other commodities can be produced overseas and transported to the U.S. at generally competitive costs without the economic burden of CCS at U.S. facilities. Even in the European Union, where there is an established market, the cost of carbon credits currently is about € 15 per ton,[25] well below the range of costs associated with CCS. Accordingly, it is reasonable to conclude that a BACT determination requiring CCS for a facility other than a power plant would simply shift the production of the proposed facility to an international location where CCS would not be applied. Because CO2 is not a pollutant for which locally increased concentrations are a concern, there is no environmental benefit of such a requirement.

Conclusion

In sum, under current law, notwithstanding the administrative actions that the EPA may soon undertake, it seems very unlikely that the EPA or state permitting authorities will determine that CCS represents BACT for CO2 emissions from stationary sources because of the substantial costs and uncertain environmental benefits of such determinations. By contrast, the issue of whether the EPA will seek to require consideration of alternative combustion technologies, such as IGCC, remains very much open. A change of this consequence is best considered in the context of a nationally applicable rulemaking, subject to review in the D.C. Circuit, not in a plant-specific permitting decision on a record compiled by a regional office.

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[1] *Massachusetts v. Environmental Protection Agency*, 549 U.S. 497, 127 S. Ct. 1438 (2007).
[2] *Id.* at 1462.
[3] *See generally* 42 U.S.C. § 7475.
[4] *See id.* § 7475(a)(4).
[5] 42 U.S.C. § 7479(3).
[6] In addition to its headquarters in Washington, D.C., the U.S. Environmental Protection Agency (EPA) has 10 Regional Offices throughout the country. *See* EPA, *EPA Organizational Structure*, http://www.epa.gov/epahome/organization.htm (last visited May 13, 2009).
[7] *In re Deseret Power Electric Cooperative*, 14 E.A.D. __ (Nov. 13, 2008), *available at* http://yosemite.epa.gov/oa/EAB_Web_Docket.nsf/Recent~Additions/C8C5985967D8096E85257500006811A7/$File/Remand...39.pdf (hereinafter *In re Deseret Power*).
[8] Clean Air Act Amendments of 1990, Pub. L. No. 101-549, 104 Stat. 2399.
[9] *See In re Deseret Power*, *supra* note 7.
[10] *See* 42 U.S.C. § 74745(a)(4).

[11] *See* Environmental Protection Agency, Interpretation of Regulations That Determine Pollutants Covered by the Federal PSD Permit Program, 74 Fed. Reg. 80,300 (Dec. 31, 2008) (to be codified at 40 C.F.R., pt. 52).
[12] *See id.*
[13] *See* Letter from Lisa P. Jackson, Administrator of the EPA, to Sierra Club (Feb. 17, 2009), *available at* http://www.epa.gov/air/nsr/documents/20090217LPJlettertosierraclub.pdf.
[14] *See In re Desert Rock Energy Co., LLC*, Notice of Partial Withdrawal of Permit, EPA-R09-OAR-2009-0259-0001 (Jan. 7, 2009), *available at* http://www.regulations.gov/fdmspublic/component/main?main=DocumentDetail&o=090000648094a82b.
[15] EPA Region 9, *Addendum to the Statement of Basis for the Desert Rock Energy Facility PSD Permit*, EPA-R09-OAR-2009-0259-0021 (Jan. 14, 2009), *available at* http://www.regulations.gov/fdmspublic/component/main?main=DocumentDetail&o=090000648094a7ec.
[16] *See id.*
[17] *See generally* 42 U.S.C. § 7475(a).
[18] *See* 40 C.F.R. § 52.21(b)(23)(i).
[19] 40 C.F.R. § 52.21(b)(23)(ii).
[20] *See generally* 42 U.S.C. § 7479(3).
[21] *See id*.
[22] *See Friends of the Chattahoochee, Inc. v. Couch*, No. 2008CV146398 (Ga. Super. Ct., Fulton Cty.) (June 30, 2008).
[23] See *Sierra Club v. EPA*, 499 F.3d 653 (Aug. 24, 2007).
[24] *See* Intergovernmental Panel on Climate Change, *Special Report on Carbon Dioxide Capture and Storage* (2005), *available at* http://www.ipcc.ch/pdf/special-reports/srccs/srccs_wholereport.pdf.
[25] *See, e.g.,* http://www.pointcarbon.com.