An Overview on GHG PSD Permitting

Extended Abstract # 64

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INTRODUCTION

As of January 2, 2011, new and modified facilities must assess if federal construction permitting (e.g., Prevention of Significant Deterioration (PSD) permitting) is required for greenhouse gases (GHGs). In general, in order to determine if a project triggers PSD permitting, an existing major PSD facility must assess if the proposed project's net emission increase exceeds the Significant Emission Rate (SER) for each pollutant.[1] For an existing minor PSD facility or for a proposed new facility, PSD permitting is triggered if the project emission increase of a single pollutant exceeds the major source threshold (e.g., 100 or 250 tons per year (tpy) for most non-GHG PSD pollutants, or 100,000 tpy GHGs).

If a facility undergoes a PSD applicability analysis and concludes that PSD permitting is required for GHGs, the critical part of the PSD permit application will include the Best Available Control Technology (BACT) analysis. GHGs are inherently a different type of pollutant than the criteria pollutants typically regulated under the PSD permitting program. Whereas criteria pollutants by definition require EPA to set National Ambient Air Quality Standards (NAAQS), EPA has not classified GHGs as a criteria pollutant and does not intend to set NAAQS for GHGs. If a NAAQS is not established for a pollutant, modeling ambient air quality impacts for that respective pollutant is not required as part of the PSD permitting process. As such, even if a project triggers PSD permitting for GHGs alone, there are no modeling implications for GHG emissions.

This extended abstract will provide a description on why GHGs are considered a "regulated air pollutant" and "subject to regulation" under the PSD permitting program; an explanation on how an existing or new facility can trigger (or avoid) PSD permitting for GHGs; and a discussion on what needs to be assessed for GHG BACT. Note that because of the recent nature of permitting GHGs under the PSD program and that a number of GHG control technologies are still in the research stages, GHG BACT determinations are expected to vary significantly over the next few years.

Overview of the PSD Permitting Program for GHGs

The federal PSD regulations are codified at 40 Code of Federal Regulations (CFR) 52.21. States may incorporate by reference the PSD regulations into their respective state regulations, or include regulatory text in the state regulations that are at least as stringent as the federal PSD regulations. For the purposes of this abstract, only the federal PSD regulations are discussed. Additionally, PSD permitting is only required for pollutants that are in attainment with the

[1] Note that for PSD applicability, a PSD major source of GHGs alone may not trigger PSD permitting if a non-GHG pollutant emission increase exceeds the SER, but the GHG emission increase does not exceed the SER. This will be further explained further in the extended abstract.

respective NAAQS. As such, a facility may need to prepare a construction permit application that addresses PSD permit requirements for pollutants in attainment areas as well as the non-attainment NSR (NA NSR) requirements for the pollutants in non-attainment areas. Because EPA will likely not develop a NAAQS for GHGs, it is expected that GHGs will never receive a non-attainment designation from EPA. This abstract only addresses PSD permitting for GHGs and does not delve into NA NSR requirements for criteria pollutants in non-attainment areas.

If a business decides to construct a new stationary source, or modify an existing stationary source, the business will need to assess whether a PSD permit will be required to begin construction on the project. PSD permits can take between one to two years to be issued by a local or state permitting agency. As such, it is critical to assess if a project will trigger PSD permitting early on in the design and development stages of a proposed project. Because a PSD permit may be required for GHGs, it is necessary for facilities to investigate GHG emissions early on in the project development as well.

The pollutant GHG is defined as the aggregate group of the following six GHGs: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. The sum of the products of each individual GHG emissions and the respective global warming potential is referred to as the carbon dioxide equivalence (CO_2e) emissions. CO_2e emissions are compared to specific thresholds in order to assess if GHG permitting is required.

PSD Applicability Overview

Traditionally, a facility is considered a "major PSD source" if the potential to emit (PTE) of any regulated New Source Review (NSR) pollutant exceeds either 100 tpy or 250 tpy, depending on if the facility is included in the "list of 28" source categories.[2] However, when GHGs became a "regulated NSR pollutant," it became obvious that new thresholds needed to be set because 100 tpy (or 250 tpy) is an extremely small quantity for GHG emissions. For perspective, a one MMBtu/hr natural gas boiler that would be common in a commercial setting has a potential to emit approximately 465 tons CO_2e per year.[3] As such, EPA adopted a different threshold to evaluate if a stationary source would be considered "major" for GHG emissions.

For non-GHG pollutants, it is fairly straightforward to explain how to conduct a PSD applicability review. For an existing major stationary source, the applicant evaluates if the net emission increase for each regulated NSR pollutant is greater than the respective SER. If the net emission increase is greater than the SER, PSD permitting is required for that particular pollutant. For an existing minor PSD source or a proposed new facility, if the project emissions increase exceeds the major source thresholds (e.g., 100 tpy or 250 tpy) for at least one regulated NSR pollutant, PSD permitting is required for the respective pollutant; note that for a minor source, if at least one non-GHG pollutant is greater than 100 tpy (or 250 tpy), all other non-GHG pollutants must be compared to the lower SER to determine if PSD permitting is required for that particular pollutant. While actually calculating the net emission increase can be extremely

[2] A facility that is listed in a source category specified at 40 CFR 52.21(b)(1)(i)(a) is considered a major source if the PTE exceeds 100 tpy of a regulated NSR pollutant.

[3] Using emission factors obtained from 40 CFR 98, Subpart C, Tables C-1 and C-2 and GWP obtained from 40 CFR 98, Subpart A, Table A-1.

complicated, the concept of determining PSD permitting applicability is rather simple. When EPA added GHGs to the PSD regulations, describing the applicability analysis became tricky.

Per 40 CFR 52.21(b)(50(iv), any pollutant that is otherwise subject to regulation is considered a "regulated NSR pollutant." The PSD regulations go on to define what is meant by "subject to regulation" in a rather convoluted manner. The pollutant GHG is only subject to regulation if specific criteria are met. Likewise, if the criteria are not met, than the pollutant GHG is not subject to regulation. Essentially, the criteria specified in 40 CFR 52.21(b)(49)(iv) and (v) states that GHGs are subject to regulation (and in almost all scenarios, PSD permitting) if an applicant proposes one of the following:

1. To construct a completely new facility and the CO_2e PTE is greater than 100,000 tpy;
2. To construct a completely new facility and at least one non-GHG pollutant PTE is greater than 100/250 tpy and the CO_2e PTE is greater than 75,000 tpy;
3. To modify an existing minor PSD source of GHGs and the modification results in a net emission increase of greater than 100,000 tpy CO_2e;
4. To modify an existing major PSD source for at least one non-GHG pollutant, and the modification results in a net emission increase greater than the SER for a non-GHG pollutant, and greater than 75,000 tpy for CO_2e; or
5. To modify an existing major PSD source of GHGs and the modification results in a net emission increase of greater than 75,000 tpy CO_2e. [4]

At this point and in order to avoid confusion, it is best to provide an example on how to conduct a PSD applicability assessment for GHGs. Company A proposes to construct a new chemical plant in an area that is in attainment for all regulated NSR pollutants. The new chemical plant will have a PTE of 105,000 tpy CO_2e and 80 tpy nitrogen dioxide (NO_2). The chemical plant will have a PTE of less than 100 tpy for all non-GHG pollutants. As such, because the PTE of CO_2e is greater than 100,000 tpy CO_2e, GHGs are "subject to regulation" and PSD permitting is therefore required for both CO_2e and NO_2 (the SER for NO_2 is 40 tpy).

Five years after the chemical plant has been constructed, Company A proposes to increase the capacity of the facility. Following the capacity increase project, the chemical plant will experience a net emission increase of 60,000 tpy CO_2e and 50 tpy NO_2. Because the net emission increase of CO_2e is less than 75,000 tpy, GHGs are not subject to regulation and PSD permitting is not required for GHGs as a result of the capacity increase project. Because GHGs are not subject to regulation in this example, the facility would not be considered a "major" source under the PSD regulations because pre-project NO_2 emissions are less than 100 tpy. As such, PSD permitting is not required for NO_2 because the net emission increase does not exceed the major source threshold of 100 tpy. This is an entirely new concept where a facility major

[4] Note that in the situation where GHGs are considered subject to regulation, the applicant would need to compare the GHG PTE to the mass-based thresholds (100 tpy or 250 tpy) for a new stationary source or existing minor source, or the net emission increase to the mass-based threshold of zero tpy for an existing major source. In practice, it is highly unlikely that GHGs would be considered subject to regulation and the facility would have a PTE of less than 100 tpy or 250 tpy.

00source status can change depending on the quantity of emissions increase associated with a proposed construction project.[5]

GHG BACT Analysis

If an applicant determines that PSD permitting is required for GHGs alone, the heart of the PSD application will be the GHG BACT analysis. Exhaustive air quality modeling will not be required for GHG PSD permitting alone. Traditionally, EPA recommends using the standard five step "top-down" BACT evaluation process to identify the emission limit and control device that will be considered as BACT. The next sections present a brief explanation on the "top-down" BACT process expected for a GHG PSD permit application.

Step 0: Defining the Basic Business Purpose

The applicant should define the basic business purpose of the proposed project. By clearly demonstrating why a business would pursue a proposed project, the applicant may be able to restrict certain potential BACT options that might typically be listed in Step 1 described below. With few (if any) end-of-pipe controls available for controlling GHG emissions, GHG BACT findings are likely to result in energy efficiency requirements. As an example, alternative fuel types maybe a viable option to reduce GHG emissions, but if the alternative fuel type is outside the basic business purpose of the proposed project, the permit writer may be able to determine that the alternative fuel not be considered at Step 1 of the process.

Step 1: Identify All Control Technologies

The applicant should first identify all available control technologies for GHG emission control irrespective of technical or economic infeasibility. Control technologies may include alternative fuel types, different emission sources, or any combination of technologies that may lower GHGs. Improved energy efficiency is expected to be the primary control technology for combustion-related GHGs. EPA has indicated that Carbon Capture and Storage (CCS) is a viable control technology. EPA has issued a number of guidance documents to aid facilities in determining reasonable options to reduce GHG emissions from particular industrial sectors.[6]

Step 2: Eliminate Technically Infeasible Options

Once all possible control technologies have been identified, the applicant can eliminate all options that are technically infeasible. If a control option is successfully implemented in practice at a similar facility, the technology is considered feasible. Note that for CCS, if a facility cannot capture **or** sequester the CO_2, the technology may be deemed as technically infeasible.

[5] For further examples, please refer to EPA's website:
http://www.epa.gov/nsr/ghgdocs/TriggeringPSDatnonAnywaySourcesandMods.pdf
[6] http://www.epa.gov/nsr/ghgpermitting.html

Step 3: Rank Remaining Control Technologies by Control Effectiveness

Under Step 3, the applicant must rank each technically feasible control technology in order of control effectiveness (e.g., percent pollutant removed, emission rate, reduction in emissions over time).

Step 4: Evaluate Most Effective Controls and Document Results

The applicant may consider economic, environmental, and energy-related impacts of the control technologies ranked under Step 3. If a control device is considered "economically infeasible," the control device can be removed from the list of options provided under Step 3. However, what an industrial facility may consider as economically infeasible will differ from what an environmental group may deem economically infeasible. Typically, there are established thresholds that are considered infeasible, such as $5,000 or more per ton NO_x removed. However, EPA has not provided guidance on what the cost effectiveness threshold is expected to be for GHGs.

Step 5: Select BACT

Finally, GHG BACT is selected based on the highest ranking control technology that is not removed under Step 4. Typically, a GHG BACT requirement will stipulate the control device as well as a set BACT emission rate or standard. EPA has stated that GHG BACT emission standards may be averaged over longer period (annual) to account for load variations inherent to combustion equipment.

Summary

In summary, the addition of GHGs to the PSD permitting program further complicates the emission calculations that need to be prepared to assess if a PSD permit is required for a proposed construction project at a new or existing facility. Facilities should be well aware of the GHG emissions from the proposed project due to the length of time it typically takes to obtain a PSD permit. In addition, if a PSD permit is required, the BACT determination may impact how the stationary source is designed. Finally, industry should remain on top of recent BACT determinations so that when a construction project does come up, the facility will be as prepared as possible to accurately predict what the final BACT determination will be for their proposed project.