

# Greenhouse Gas Permitting Guidance

Office of Air and Radiation  
Office of Air Quality Planning and Standards  
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# Presentation Outline

- PSD and Title V Permit Programs
- Key Steps in the Permitting of GHGs
- GHG Permitting Guidance (Section-by-Section Overview)
- GHG Technical Tools and Other Resources
- Answer Questions

# PSD and Title V Permit Programs

- Prescribed in Clean Air Act
- PSD Program aimed at reducing the amount of pollution added to the atmosphere
  - Does not apply to every source; only to large/major sources that are newly built or substantially modified.
  - Emission reductions are achieved through the use of Best Available Control Technology (BACT).
  - BACT is determined on a case-by-case basis, and takes into account technical feasibility, cost, and other environmental and energy considerations.

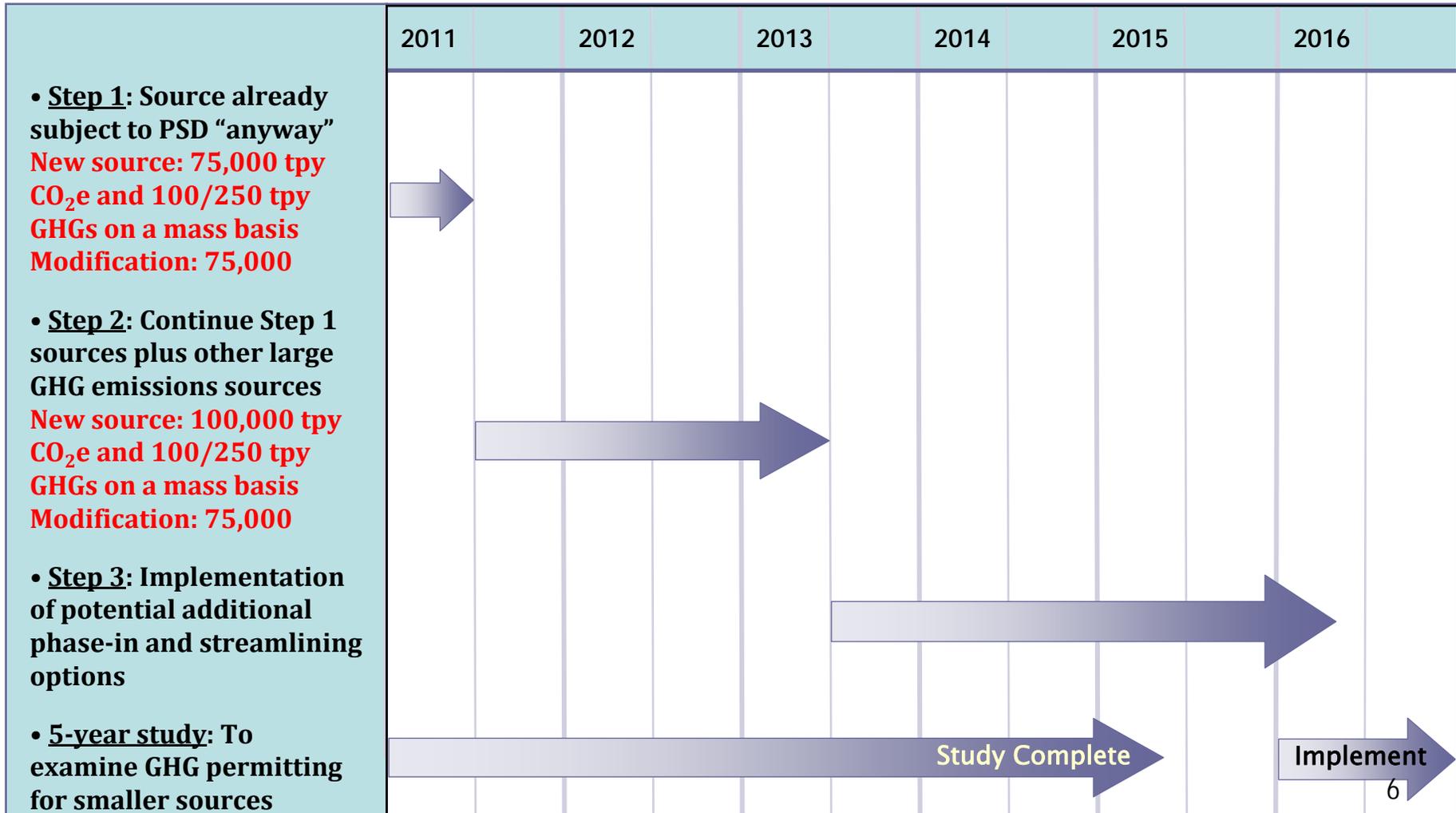
## PSD and Title V Permit Programs (cont.)

- Title V program intended to improve sources' compliance with other CAA requirements.
  - Does not add new pollution control requirements, but requires that each permit contain all air quality control requirements or “applicable requirements” required under the CAA (*e.g.*, NSPS and SIP requirements, including PSD).
  - Requires that certain procedural requirements (such as adequate monitoring) be followed, especially with respect to compliance with the applicable requirements.

# Key Steps in the Permitting of GHGs

- May 2007 – Supreme Court Ruling
- December 2009 – Endangerment Finding on GHGs
- April 2010 – GHG Emissions Standards for Light-Duty Vehicles  
 Stationary Source Permitting Triggered Beginning Jan. 2, 2011
- May 2010 – Tailoring Rule Limits GHG Air Permitting to the Largest Sources of GHG Emissions
- November 2010 – Guidance, Technical Resources and Training to States and Sources on Implementation of GHG Permitting

# Permitting Steps under the Tailoring Rule



# GHG Permitting Guidance

## Section-by-Section Overview

# GHG Guidance: Introduction

- Provides statutory and regulatory background for the permitting and regulation of GHGs.
- Explains the PSD and Title V permitting requirements are generally no different for GHGs.
- Reiterates that this document is guidance, not a rule.
  - EPA and delegated permitting authorities should follow this guidance when issuing permits.
  - SIP-approved permitting authorities have discretion to establish alternative approaches, as long as they comply with CAA and Federal rules.
  - Permitting authorities have the discretion to be more stringent than the policies in this guidance.

# GHG Guidance: PSD Applicability

- Explains general PSD applicability requirements for new and modified sources of “regulated NSR pollutants.”
- Reiterates GHG applicability thresholds and framework from Tailoring Rule.
  - GHG applicability based on both mass and CO<sub>2</sub>e emissions, resulting in a 2-part test for new sources and a 4-part test for modifications.
- Demonstrates how to calculate CO<sub>2</sub>e-based emissions using global warming potential (GWP).
  - Includes a simplified example for a modified source.

## GHG Guidance: PSD Applicability (cont.)

- Modifications must answer “yes” to all of the following questions to trigger PSD permitting for GHG:
  - Is the increase in CO<sub>2</sub>e emissions at least 75,000 TPY?
  - Is the net increase in CO<sub>2</sub>e emissions at least 75,000 TPY?
  - Is the increase in mass emissions at least 0 TPY?
  - Is the net increase in mass emissions at least 0 TPY?
- Federal contemporaneous netting period (i.e., 5 years before construction of the proposed modification) remains unchanged.
- For a few years, netting “look back” (and baseline actual emissions) may include periods before Jan. 2, 2011.

# GHG Guidance: PSD Applicability (New Sources)

<p align="center"><b>Permits issued from January 2, 2011, to June 30, 2011</b></p>	<p align="center"><b>Permits issued on or after July 1, 2011</b></p>
<p>PSD applies to GHGs, if:</p> <ul style="list-style-type: none"> <li>• The source is otherwise subject to PSD (for another regulated NSR pollutant); and</li> <li>• The source has a GHG PTE equal to or greater than 75,000 TPY CO<sub>2</sub>e</li> </ul>	<p>PSD applies to GHGs, if:</p> <ul style="list-style-type: none"> <li>• The source is otherwise subject to PSD (for another regulated NSR pollutant); and</li> <li>• The source has a GHG PTE equal to or greater than 75,000 TPY CO<sub>2</sub>e</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• The source has a GHG PTE equal to or greater than:               <ul style="list-style-type: none"> <li>○ 100,000 TPY CO<sub>2</sub>e, and</li> <li>○ 100/250 TPY mass basis</li> </ul> </li> </ul>

# GHG Guidance: PSD Applicability (Modified Sources)

Permits issued from January 2, 2011, to June 30, 2011	Permits issued on or after July 1, 2011
<p>PSD applies to GHGs, if:</p> <ul style="list-style-type: none"> <li>• Modification is subject to PSD for another regulated NSR pollutant, and has a GHG emissions increase and net emissions increase:               <ul style="list-style-type: none"> <li>○ Equal to or greater than 75,000 TPY CO<sub>2</sub>e, and</li> <li>○ Greater than -0- TPY mass basis</li> </ul> </li> </ul>	<p>PSD applies to GHGs, if:</p> <ul style="list-style-type: none"> <li>• Modification is subject to PSD for another regulated NSR pollutant, and has a GHG emissions increase and net emissions increase:               <ul style="list-style-type: none"> <li>○ Equal to or greater than 75,000 TPY CO<sub>2</sub>e, and</li> <li>○ Greater than -0- TPY mass basis</li> </ul> </li> </ul> <p>OR BOTH:</p> <ul style="list-style-type: none"> <li>• The existing source has a PTE:               <ul style="list-style-type: none"> <li>○ Equal to or greater than 100,000 TPY CO<sub>2</sub>e, and</li> <li>○ Equal to or greater than 100/250 TPY mass basis</li> </ul> </li> <li>• Modification has a GHG emissions increase and net emissions increase:               <ul style="list-style-type: none"> <li>○ Equal to or greater than 75,000 TPY CO<sub>2</sub>e, and</li> <li>○ Greater than -0- TPY mass basis</li> </ul> </li> </ul> <p>OR BOTH:</p> <ul style="list-style-type: none"> <li>• The source is an existing minor source for PSD, and</li> <li>• Modification alone has actual or potential GHG emissions:               <ul style="list-style-type: none"> <li>○ Equal to or greater than 100,000 TPY CO<sub>2</sub>e, and</li> <li>○ Equal to or greater than 100/250 TPY mass basis</li> </ul> </li> </ul>

# GHG Guidance: Biomass

- Acknowledges external requests to exclude emissions of GHG from bioenergy and other biogenic sources for the purposes of the BACT analysis and the PSD program.
- Permitting authorities currently have the discretion to consider the environmental, energy and economic benefits that may accrue from the use of certain types of biomass and other biogenic sources in Step 4 of the BACT process.
  - Variety of federal and state policies have recognized that some types of biomass can be part of a national strategy to reduce dependence on fossil fuels and to reduce emissions of GHGs.

## GHG Guidance: Biomass (cont.)

- EPA intends to issue guidance in January 2011 that will provide a suggested framework for analyzing the environmental, energy and economic benefits of biomass in BACT Step 4.
  - Forthcoming guidance will include qualitative information on relevant factors to consider with respect to biomass combustion, such as specific feedstock types and trends in carbon stocks at different spatial scales (national, regional, state).
- EPA intends to determine, by May 2011, whether to initiate a rulemaking for PSD applicability for sources of biogenic emissions.
  - Specifically, whether to quantify carbon emissions from bioenergy or biogenic sources by applying separate accounting rules for different types of feedstocks that reflect the net impact of their carbon emissions.

# GHG Guidance: BACT General Approach

- Explains EPA's 5-step "top down" process and how each step should be applied for GHG permitting.
  - Step 1: Identify all available control technologies
  - Step 2: Eliminate technically infeasible options
  - Step 3: Rank remaining options by emissions control effectiveness
  - Step 4: Evaluate economic, energy, and other environmental impacts
  - Step 5: Select best option as BACT for the source

## GHG Guidance: BACT General Approach (cont.)

- Reiterates the CAA requirement that BACT is a case-by-case determination, providing discretion to the permitting authority.
  - Does not prescribe GHG BACT for any source type.
  - Emphasizes the importance of a detailed case- and fact-specific record to justify the permitting decisions reached by the permitting authority.
- Addresses several policy issues raised by CAAAC GHG BACT Workgroup.
- Focuses BACT analysis on achieving emission reductions within the fence line of the facility.
  - Although impacts/benefits beyond the fence line can be considered later in Step 4 of BACT process (*i.e.*, collateral impacts analysis).

## GHG Guidance: BACT General Approach (cont.)

- Focuses on BACT options that reduce GHG emissions by improving energy efficiency.
  - In most cases, energy efficiency improvements will satisfy the BACT requirement for GHGs.
  - BACT for a new source may consider source-wide emissions reductions resulting from energy efficiency at the source.
    - May include, for example, non-emitting units such as electric fans, pumps that draw energy from emitting units.
  - BACT for a modified existing source can consider energy efficiency reductions that are part of the changed emissions unit.
    - Focuses on achieving the highest possible efficiency at the changed emitting unit(s) – *e.g.*, evaluating a 58% turbine when a 57% unit is proposed.
  - Recommends use of industry-established benchmarking tools to assist in comparing efficiency of control options and determining BACT limits.

# GHG Guidance: BACT Step 1

- Defines term “available” and describes the types of available control options to be considered:
  - Inherently Lower-Emitting Processes/Practices/Designs,
  - Add-on Controls, and
  - Combinations of Inherently Lower Emitting Processes/Practices/Designs and Add-on Controls.
- Explains that, while there is currently no NSPS for GHG, if there is one, the CAA requires that it be considered under Step 1 and it would set the floor for a BACT analysis.
- Carbon Capture and Storage (CCS) is “available” and should be considered in Step 1 of a BACT analysis for high CO<sub>2</sub>-emitting sources.

## GHG Guidance: BACT Step 1 (cont'd)

- Provides criteria for determining what control options or source configurations would “fundamentally redefine” a source.
  - BACT should consider the most energy efficient design and control options for a proposed source.
  - Specific types of fuels or facility design are neither required nor precluded.
  - Clean fuels which reduce GHG emissions should be considered, but not if a change in primary fuel type would fundamentally redefine the source.
  - Permitting authorities have discretion to conduct a broader analysis and consider changes in the primary fuel.

## GHG Guidance: BACT Step 2

- A technology is “technically feasible” if it has been demonstrated in practice or is available and applicable to the source type under review.
  - The term “demonstrated” is focused on the technology being used in the same type of source, such as a similar plant producing the same product.
  - A technology is “available” if it can be obtained through commercial channels or is otherwise available within the common meaning of the term.
  - An available technology is “applicable” if it can reasonably be installed and operated on the source type under consideration.

## GHG Guidance: BACT Step 2 (cont.)

- For Carbon Capture and Storage:
  - CCS technology is composed of 3 main components: (1) CO<sub>2</sub> capture and/or compression, (2) transport, and (3) storage.
  - CCS may be eliminated if any of the 3 components working together are deemed technically infeasible for the proposed source.
    - *e.g.*, no space available for CO<sub>2</sub> capture equipment at an existing facility; right-of-ways prevent building a pipeline or access to an existing CO<sub>2</sub> pipeline; no access to suitable geologic reservoirs for sequestration or other storage options.
  - CCS may be eliminated if it can be shown that there are significant differences pertinent to the successful operation for each of these three main components from what has already been applied to a different source type.

## GHG Guidance: BACT Step 3

- Ranking of control options should be based on total CO<sub>2</sub>e, rather than total mass or mass for the individual GHGs, in order to best reflect the impact on the environment.
- Ranking control options based on their net output-based emissions ensures that the thermal efficiency of the control option, as well as the power demand of that control measure, is fully considered.
  - Where plant-wide measures to reduce emissions are being considered as GHG control techniques, the concept of overall control effectiveness will need to be refined to ensure the suite of measures with the lowest net emissions from the facility is the top-ranked measure.

## GHG Guidance: BACT Step 4

- Costs of GHG Control
  - It is reasonable to anticipate the CO<sub>2</sub>e cost effectiveness (\$/ton) for GHG control will be significantly lower than typical cost effectiveness for control of criteria pollutants, due to the considerable difference in the volume of emissions.
  - Existing methodology for calculating cost effectiveness is appropriate for GHGs.
- Trade-offs between GHG and other pollutants
  - When conducting BACT reviews for both GHG and non-GHG pollutants at a source, permitting authorities continue to have discretion to evaluate the trade-offs associated with decreasing one pollutant versus increasing another.

## GHG Guidance: BACT Step 4 (cont.)

- CCS Costs
  - Currently, CCS is an expensive technology and may often make the price of electricity from a power plant uncompetitive, even when underground storage of the captured CO<sub>2</sub> exists near the power plant.
  - Therefore, CCS will often be eliminated from consideration in Step 4 of the BACT analysis based on cost (assuming it is not already eliminated earlier in the top-down process based on technical feasibility).
    - However, there are cases now where the economics of CCS are more favorable (e.g., enhanced oil recovery).
  - CCS may become less costly and warrant greater consideration in Step 4 of the BACT analysis in the future.

# GHG Guidance: BACT Step 5

- BACT selection essentially should default to the highest level of control for which the applicant could not adequately justify its elimination based on energy, environmental and economic impacts.
- Permitting agency is responsible to fully justify the BACT decision in the permit record.
- Documentation and rationale presented must:
  - ensure that the applicant has addressed all of the most effective control options that could be applied, and
  - show that the applicant has adequately demonstrated that energy, environmental, or economic impacts justify any proposal to eliminate the more effective control options.

## GHG Guidance: BACT Step 5 (cont.)

- May consider converting the BACT emissions limit to a net output basis for the permitted emissions limit.
- Should focus on longer-term averages (*e.g.*, 30- or 365-day rolling average) rather than short-term averages (*e.g.*, 3- or 24-hr rolling average).
- Permits can also include conditions requiring the use of a work practice such as an Environmental Management System (EMS) focused on energy efficiency as part of that BACT analysis.
  - The ENERGY STAR program provides useful guidance on the elements of an energy management program.

# GHG Guidance: Modeling and Monitoring

- Since there are no NAAQS or PSD increments, ambient modeling (*i.e.*, additional impacts analysis or Class I area) is not required for GHG emissions.
- Unnecessary for applicants to gather monitoring data to assess ambient air quality for GHGs, since GHGs do not affect “ambient air quality” in the sense that other pollutants do.

## GHG Guidance: Modeling and Monitoring (cont.)

- EPA does not consider it necessary to evaluate additional impacts analysis or Class I area for GHG emissions, since quantifying the exact impacts attributable to a specific GHG source obtaining a permit in specific places and points would not be possible with current climate change modeling.
  - GHG emissions serve as the more appropriate and credible proxy for assessing the impact of a given facility.
  - Compliance with the BACT analysis is the best technique that can be employed at present to satisfy the additional impacts analysis and Class I area requirements of the rules related to GHGs.

# GHG Guidance: Title V Permits

- Reiterates title V applicability under Tailoring Rule:
  - Under Step 1, no sources subject to title V based solely on GHG emissions.
  - Step 2 includes 'anyway' Step 1 sources and those with GHG emissions of at least 100,000 TPY CO<sub>2</sub>e and 100 TPY (mass basis).
- Reiterates Tailoring Rule statements on title V fees
  - EPA rules currently do not require sources to pay title V fees based on GHGs.
  - Permitting authorities should review resource needs for GHG sources and determine if their existing fee structure is adequate.
  - EPA will assist permitting authorities that need help in determining fees to address resource needs for GHG sources.

## GHG Guidance: Title V Permits (cont.)

- GHG Mandatory Reporting Rule not considered an “applicable requirement” under title V regulations.
- Encourages the use of Flexible Air Permits, particularly if a source is able to improve energy efficiency and reduce GHG emissions over time.

# GHG Guidance: Appendices

- Applicability Flow Charts for New and Modified Sources
- Applicability Example for Modified Source
- BACT Examples:
  - Natural Gas Boiler
  - Municipal Landfill
  - Refinery Hydrogen Plant
- Resource Library for GHG Emissions Estimation
- Resource Library for GHG Control Measures
- Cost Effectiveness Calculations

# EPA Technical Tools and Other Resources

- White Papers on:
  - utilities, refineries, cement, large commercial/industrial/institutional boilers, pulp and paper, iron and steel, and nitric acid plants
- Control Technology Clearinghouses
  - RACT/BACT/LAER
  - GHG Mitigation Strategies
- GHG Permitting Action Team
- GHG Training for Permitting Authorities, Industry and Other Stakeholders
- One-stop website for GHG permitting resources:  
[www.epa.gov/nsr/ghgpermitting.html](http://www.epa.gov/nsr/ghgpermitting.html)

# Questions?