

# Petrochemical Production



## Final Rule: Mandatory Reporting of Greenhouse Gases

*Under the Mandatory Reporting of Greenhouse Gases (GHGs) rule, owners or operators of facilities that produce petrochemicals (as defined below) must report emissions from petrochemical processes and all other source categories located at the facility for which methods are defined in the rule. Owners or operators are required to calculate GHG emissions by one of three alternative methods and follow the specified procedures for quality assurance, missing data, recordkeeping, and reporting.*

*Facilities that produce petrochemicals should review the requirements of 40 CFR part 98, subpart MM (Suppliers of Petroleum Products) to determine if they must also report emissions under 40 CFR part 98, subpart MM.*

## How Is This Source Category Defined?

Petrochemical production consists of each process that produces acrylonitrile, carbon black, ethylene, ethylene dichloride, ethylene oxide, or methanol, except the following are excluded from the petrochemical production source category:

- Processes that produce a petrochemical as a byproduct.
- A direct chlorination process that is operated independently of an oxychlorination process to produce ethylene dichloride.
- A facility that makes methanol, hydrogen, and/or ammonia from synthesis gas if the annual mass production of either hydrogen recovered as product or ammonia exceeds the annual mass production of methanol.
- Processes that produce bone black.
- Processes that produce a petrochemical from biobased feedstock.

## What GHGs Must Be Reported?

Petrochemical production facilities must report the following gases:

- Carbon dioxide (CO<sub>2</sub>) process emissions from each petrochemical unit. Process emissions include CO<sub>2</sub> generated by reaction in the process, and CO<sub>2</sub>, methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O) generated by combustion of process off-gas in stationary combustion units and flares.
- CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O emissions from burning supplemental fuel in stationary combustion units that also burn process off-gas.
- CO<sub>2</sub> captured and reported under 40 CFR part 98, subpart PP (Suppliers of Carbon Dioxide) by following the requirements under subpart PP.

In addition, each facility must report GHG emissions for any other source categories for which calculation methods are provided in other subparts of the rule.

## How Should GHG Emissions Be Calculated?

Owners or operators must estimate the GHG emissions from each petrochemical process unit. Process emissions include CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O emissions generated by chemical reactions in the process and combustion emissions of process off-gas and liquid wastes. Within a process unit, only one of the following three approaches may be used.

- **Continuous Emission Monitoring System (CEMS).** If all process vent emissions and emissions from combustion of process off-gas are routed to one or more stacks, and CEMS are used on each stack to measure CO<sub>2</sub> emissions (except for flare stacks), then the owner must report by following the Tier 4 methodology of 40 CFR part 98, subpart C. For each stack (excluding flare stacks) that includes emissions from combustion of petrochemical process off-gas, calculate CH<sub>4</sub> and N<sub>2</sub>O emissions using emission factors in Table C-2 in subpart C and the Tier 3 methodology in subpart C. For each flare stack, calculate CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions using the methodology specified in 40 CFR 98.253, subpart Y (Petroleum Refineries).
- **Mass Balance.** Except as allowed below for ethylene processes, process units without applicable CEMS must use a mass balance approach for each petrochemical process unit to estimate process emissions of CO<sub>2</sub> for each calendar month. (Separate estimates for CH<sub>4</sub> and N<sub>2</sub>O emissions are not required.) To complete the mass balance, measure:
  - Volume or mass of each gaseous and liquid feedstock and product for each calendar month.
  - Mass rate of each solid feedstock and product for each calendar month.
  - Carbon content of each feedstock and product based on monthly samples.
- **Ethylene Processes.** For ethylene processes only, because nearly all process emissions from this process are from the combustion of process off-gas, the final rule allows estimation of emissions from all stationary combustion units that burn process off-gas (with or without supplemental fuel) in accordance with the Tier 3 or Tier 4 procedures in 40 CFR part 98, subpart C. In addition, this option requires CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O emissions from each flare to be estimated using the procedures in 40 CFR 98.253(b) (Petroleum Refineries).

A checklist for data that must be monitored is available at:

[www.epa.gov/ghgreporting/documents/pdf/checklists/PetrochemicalProduction.pdf](http://www.epa.gov/ghgreporting/documents/pdf/checklists/PetrochemicalProduction.pdf).

## When Must Reports be Submitted?

The submission date for the annual GHG report can vary in the first 3 years of the program.

- Reporting Year 2010. The report was required to be submitted by September 30, 2011.
- Reporting Year 2011. The due date depends on which source categories are included in the report. If the report includes one or more of the source categories listed below, then the report must be submitted by September 28, 2012. This reporting deadline applies to all subparts being reported by the facility. In addition, if the facility contains one or more of these source categories and the facility submitted a GHG annual report for reporting year 2010 under another subpart (e.g., subpart C for general stationary fuel combustion), then by April 2, 2012 you must notify EPA through e-GGRT that you are not required to submit the second annual report until September 28, 2012 (the notification deadline according to 4 CFR 98.3(b) is March 31, 2012, however, because this date falls on a Saturday in 2012, the notification is due on the next business day).

- Electronics Manufacturing (subpart I)
- Fluorinated Gas Production (subpart L)
- Magnesium Production (subpart T)
- Petroleum and Natural Gas Systems (subpart W)
- Use of Electric Transmission and Distribution Equipment (subpart DD)
- Underground Coal Mines (subpart FF)
- Industrial Wastewater Treatment (subpart II)
- Geologic Sequestration of Carbon Dioxide (subpart RR)
- Manufacture of Electric Transmission and Distribution (subpart SS)
- Industrial Waste Landfills (subpart TT)
- Injection of Carbon Dioxide (subpart UU)
- Imports and Exports of Equipment Pre-charged with Fluorinated GHGs or Containing Fluorinated GHGs in Closed-cell Foams (subpart QQ)

If the report contains none of the source categories listed above, then the report must be submitted by April 2, 2012 (the deadline is March 31, 2012, however, because this date falls on a Saturday, the annual report is due on the next business day).

- Reporting Year 2012. Starting in 2013 and each year thereafter, the report must be submitted by March 31 of each year, unless the 31st is a Saturday, Sunday, or federal holiday, in which case the reports are due on the next business day.

## What Information Must Be Reported?

In addition to the information required by the General Provisions at 40 CFR 98.3(c), each annual report must include the following information:

If a CEMS is used to measure CO<sub>2</sub> emissions, then you must report the relevant information required under 40 CFR part 98, subpart C and the following information listed below:

- The petrochemical process unit ID or other appropriate descriptor, and the type of petrochemical produced.
- The CO<sub>2</sub> emissions from each stack and the combined CO<sub>2</sub> emissions from all stacks (except flare stacks) that handle process vent emissions and emissions from stationary combustion units that burn process off-gas for the petrochemical process unit.
- The CH<sub>4</sub> and N<sub>2</sub>O emissions from each stack and the combined CH<sub>4</sub> and N<sub>2</sub>O emissions from all stationary combustion units that burn process off-gas from the petrochemical process unit; the cumulative annual heat input used in 40 CFR 98.33 (c); and the annual fuel flow value(s).
- The ID or other appropriate descriptor of each stationary combustion unit that burns process off-gas.
- Information listed in 40 CFR 98.256(e) for each flare that burns process off-gas.
- The annual quantity of each type of petrochemical produced from each process unit (metric tons).

For processes that use the mass balance methodology, the following information must be reported for each petrochemical process unit and each type of petrochemical product:

- The petrochemical process unit ID number or other appropriate descriptor.
- The type of petrochemical produced, names of other products, and names of carbon-containing feedstocks.
- Annual CO<sub>2</sub> emissions calculated.

- Each of the monthly volume, mass, and carbon content values used in your calculations.
- The molecular weights for gaseous feedstocks and products used in your calculations.
- Annual quantity of each type of petrochemical produced from each process unit (metric tons).
- The name of each method listed in 40 CFR 98.244 used to determine a measured parameter.
- The dates and summarized results of the calibrations of each measurement device.
- Identification of each combustion unit that burned both process off-gas and supplemental fuel.
- If you comply with the alternative to sampling and analysis specified in 40 CFR 98.243(c)(4), the amount of time during which off-specification product was produced, the volume or mass of off-specification product produced, and if applicable, the date of any process change that reduced the composition to less than 99.5 percent.

If you use the combustion methodology specified in 40 CFR 98.243(d), you must report the following information:

- For each stationary combustion unit that burns ethylene process off-gas (or group of stationary sources with a common pipe), the relevant information listed in 40 CFR 98.36 for the selected Tier 3 or Tier 4 methodology. If a stationary combustion source serves multiple ethylene process units or units other than the ethylene process unit, estimate based on engineering judgment the fraction of fuel energy and emissions attributable to each ethylene process unit.
- Information listed in 40 CFR 98.256(e) for each flare that burns ethylene process off-gas.
- Name and annual quantity of each feedstock.
- Annual quantity of ethylene produced from each process unit (metric tons).

EPA has temporarily deferred the requirement to report data elements in the above list that are used as inputs to emission equations (76 FR 53057, August 25, 2011). For the current status of reporting requirements, including the list of data elements that are considered to be inputs to emissions equations, consult the following link: <http://www.epa.gov/ghgreporting/reporters/cbi/index.html>

## For More Information

This document is provided solely for informational purposes. It does not provide legal advice, have legally binding effect, or expressly or implicitly create, expand, or limit any legal rights, obligations, responsibilities, expectations, or benefits in regard to any person. The series of information sheets is intended to assist reporting facilities/owners in understanding key provisions of the final rule.

Visit EPA's Web site ([www.epa.gov/ghgreporting/reporters/index.html](http://www.epa.gov/ghgreporting/reporters/index.html)) for more information, including the final preamble and rule, additional information sheets on specific industries, the schedule for training sessions, and other documents and tools. For questions that cannot be answered through the Web site, please contact us at: [GHGreporting@epa.gov](mailto:GHGreporting@epa.gov).