Overview of Updates to the Natural Gas Sector Emissions Calculations for the Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2011

Over the last 18 months, EPA has received a significant amount of new information on the natural gas industry, particularly related to natural gas production. Specifically, EPA received input from stakeholders through the following mechanisms:

- The formal public notice and comment process of the oil and gas NSPS to control VOCs (http://www.epa.gov/airquality/oilandgas/)
- A stakeholder workshop on the natural gas sector emissions estimates (http://www.epa.gov/climatechange/ghgemissions/Sept2012stakeholderworkshop.html)
- Data submitted under subpart W of EPA's Greenhouse Gas Reporting Program (GHGRP)
- The expert review and a 30 day public comment period for the Inventory of U.S. Emissions and Sinks: 1990-2011

The updated estimates in the Inventory reflect this new information. The key changes from last year's Inventory are to two sources: liquids unloading, and completions and workovers with hydraulic fracturing. We also made additional changes to the report to allow for more transparency.

The updates to the 1990-2011 Inventory include:

Liquids unloading

- EPA incorporated data from a newly available study, "Characterizing Select Sources of Methane Emissions from Unconventional Natural Gas Production" (API/ANGA 2012).
- The study data show that there is more widespread use of emissions control technologies than had been assumed in the previous Inventory. It also demonstrated that duration of emissions from liquids unloading activities is shorter than had been assumed in the previous Inventory.

Hydraulic fracturing

- The analysis for the 2012 NSPS rulemaking regulating VOCs from the oil and gas industries contained updates to the methodology used previously to estimate emissions from hydraulic fracturing. The Inventory incorporates the same emissions estimation methodologies for hydraulic fracturing used in the NSPS.
- EPA updated the coverage of wells with hydraulic fracturing (e.g., including the wells in Marcellus Shale in PA for the first time) using DI Desktop, a well accepted database of nationwide data.

Other updates

- More transparent information on methodologies, activity data, and emission factors.
- Guidance on the appropriate use and application of these data, as information from the Inventory has been misinterpreted in the past.

Use of and comparison with GHGRP data

Natural gas facilities reported methane emission estimates to EPA's Greenhouse Gas Reporting Program (GHGRP) under Subpart W for the first time in September 2012. EPA published these emission estimates on February 5, 2012.

For the 1990-2011 Inventory, EPA used GHGRP data as an independent check on the draft estimates for those emissions sources calculated through "top-down" national datasets. In the development of this Inventory, EPA prioritized review of preliminary GHGRP data for liquids unloading and well completions with hydraulic fracturing, and refracturing. Initial data from GHGRP were used in a QC cross-check against updates under consideration for those emissions sources. The preliminary cross-checks confirm substantial emissions for these sources and support the direction of the changes.

Completions with Hydraulic Fracturing, and workovers with hydraulic fracturing (refracturing).

Initial GHGRP data show lower CH_4 emissions from well completions with hydraulic fracturing and refracturing than calculated in the Inventory. Facilities reporting to GHGRP reported emissions of 6.2 $MMTCO_2e$ of CH_4 in 2011, while the Inventory estimate for 2011 is 16.7 $MMTCO_2e$. A lower GHGRP result is to be expected, as GHGRP data exclude well completions occurring at facilities below the GHGRP reporting threshold of 25,000 $MMTCO_2e$; however, many of the well completions nationwide are likely captured in the GHGRP data set.

GHGRP data indicate that the Inventory activity data on well completions and use of RECs compare well with the industry-reported activity data.

Liquids Unloading.

Initial GHGRP data show higher CH_4 emissions from liquids unloading than calculated in the GHG Inventory. Facilities reporting to GHGRP reported emissions of 6.0 $MMTCO_2e$ of CH_4 in 2011, while the Inventory estimate for 2011 is 5.4 $MMTCO_2e$. Due to the GHGRP threshold, a lower GHGRP number would be expected, as data reported should not include all liquids unloading occurring nationally, only liquids unloading occurring at facilities meeting the GHGRP reporting threshold. GHGRP data confirm the average emissions per well calculated in the Inventory, but indicate that emissions from liquids unloading are highly variable. A few GHGRP sources report relatively higher emissions from this activity that might not be captured in the average emission factors used in the Inventory. GHGRP data also indicate that nationally, more wells vent emissions from liquids unloading than are included in the GHG Inventory, and that more wells have plunger lifts than included in the Inventory. GHGRP data from the Rocky Mountain region in particular shows a much larger number of wells practicing liquids unloading than are captured in the GHG Inventory.

General use of GHGRP data in Future Natural Gas Inventory Estimates

EPA continues to closely examine, in particular, sources where GHGRP national totals are outside of the range expected based on the Inventory. This includes:

- Assessing whether differences in activity data or emissions factors are driving the emissions total difference
- Evaluating coverage of GHGRP data, which has a threshold for reporting, versus coverage for the Inventory, which represents total national-level emissions
- Determining how to calculate emissions for the entire time series (i.e., 1990-2012) so that emissions calculated in earlier years use a consistent methodology with emissions calculated using more recent data from GHGRP (consistent with UNFCCC reporting guidelines and IPCC guidance)

Next Steps

EPA will continue its efforts to refine emissions estimates for this and other sectors, particularly if further review of GHGRP data and additional information provided by stakeholders can help to address some of the questions arising from comparisons between the GHGRP and draft Inventory results.