Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2011

Public Review Draft

February 27, 2013

Outline

- Overview of GHG Inventory
- Overview of Natural Gas in the GHG Inventory
- Key Changes from Previous GHG Inventory: Natural Gas
- Use of Subpart W data in GHG Inventory
- Key Areas for Stakeholder Feedback
- Schedule for GHG Inventory

U.S. Greenhouse Gas Emissions Inventory

- Annual national-level inventory submissions to the UNFCCC since 1994
  - Continuous improvement - if better data become available, IPCC good practice and UNFCCC obligates its consideration
  - Emphasis on improving estimates and devoting resources to large sources, or rapidly changing sources ("Key Sources")
  - Annual reassessment of methodologies and refinements for each source category
- Assessment of the relative contribution of different emission sources and greenhouse gases (GHG)
- Record of emissions trends over time
- Each year, Inventory undergoes expert review, public review, and UNFCCC review

2013 Inventory Public Review Draft Results Overview

- US GHG emissions declined 1.5% from 2010 to 2011
  - Increased 8.7% from 1990 to 2011 and 6.7% below 2005 levels

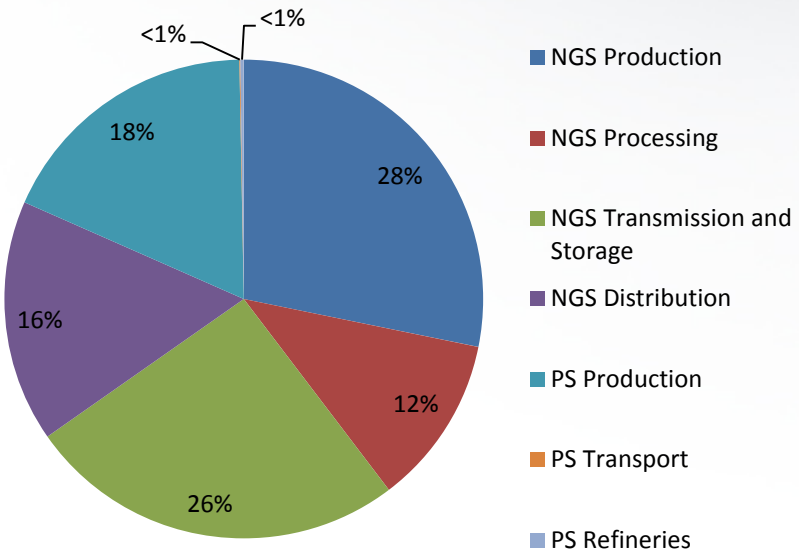
- CO_2 from fuel combustion dominate emissions and trends
  - Decrease in emissions was due to decrease in energy consumption across most sectors, decrease in carbon intensity for the generation of electricity

- Natural gas system emissions are 2.1% of total GHG emissions

- PR Inventory includes recalculations to several sources
  - Natural gas, agricultural soils, international bunker fuels

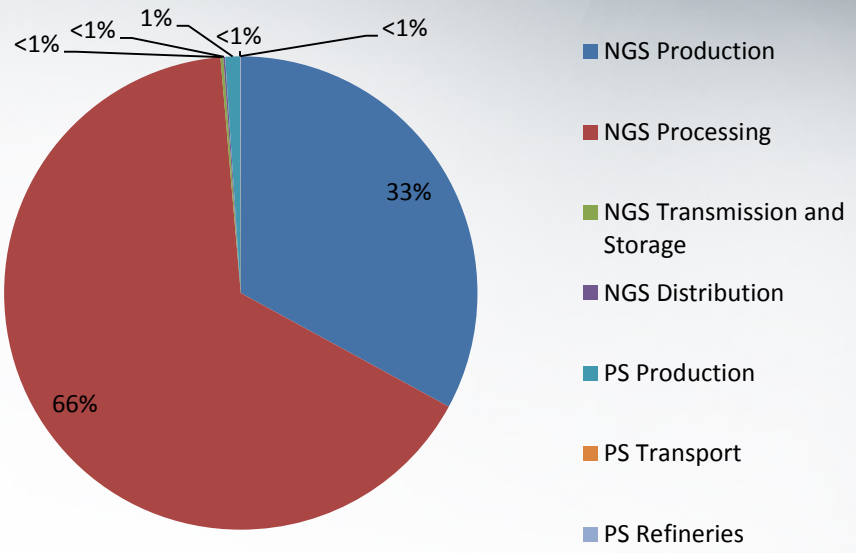
Oil and Gas in the Inventory

CH_4 Emissions



- NGS: 140 $MMTCO_2e$ CH_4
- PS: 32 $MMTCO_2e$ CH_4

CO_2 Emissions



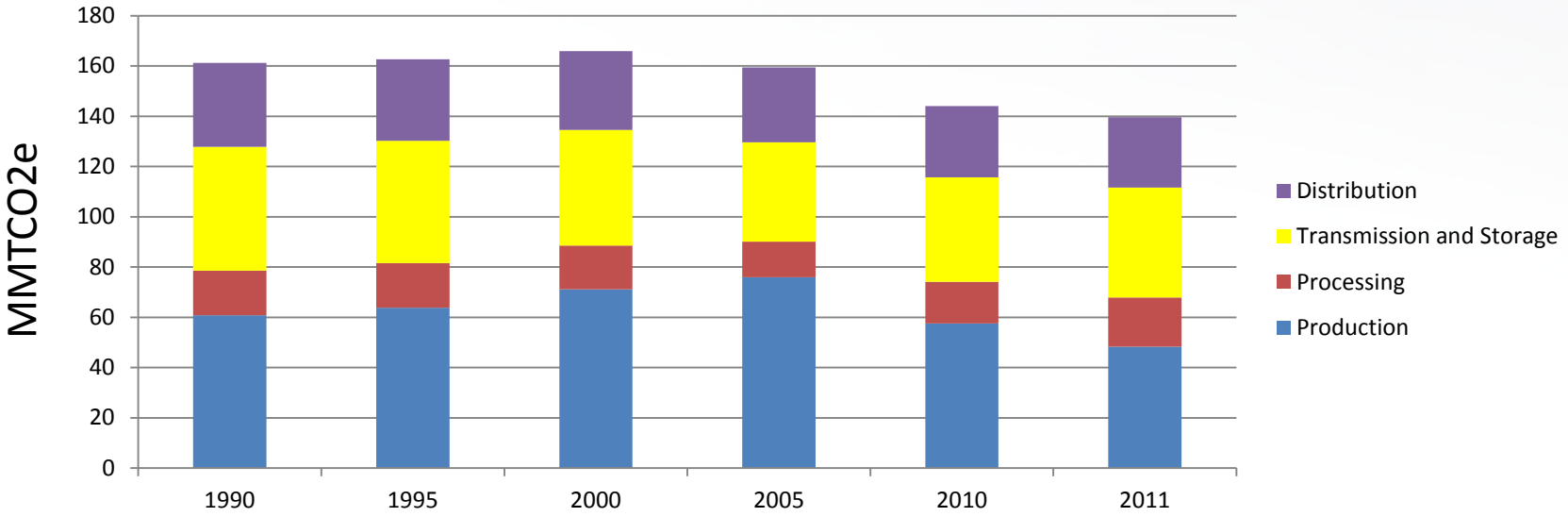
- NGS: 32 $MMTCO_2e$ CO_2
- PS: 0.4 $MMTCO_2e$ CO_2

NGS = Natural Gas Systems
PS = Petroleum Systems

- Figures above includes only process emissions
  - End-use emissions from combustion are included elsewhere (Fossil Fuel Combustion)

Natural Gas CH_4 in the GHG Inventory

- 139.6 $MMTCO_2e$ CH_4 emissions from natural gas systems
  - 48.3 from production sector
  - 19.6 from processing sector
  - 43.8 from transmission and storage sector
  - 27.9 from distribution sector
- 24% of total U.S. CH_4 emissions; 2% of total U.S. GHG emissions
- Emissions decreased 21.6 $MMTCO_2e$, or 13%, from 1990-2011
  - Key driver of decrease is reductions in transmission and storage emissions



Calculation of National Emissions

Step 1. **Calculate Potential Methane**--*Collect activity data on production and equipment in use and apply emission factors (i.e., scf gas per unit or activity)*

- 1a – Activity Data
- 1b – Emission Factor

Step 2. Compile Reductions Data--*Calculate the amount of the methane that is not emitted, using data on voluntary action and State regulations*

- 2a – Voluntary Reductions Reported to GasSTAR
- 2b – Regulatory Reductions

Step 3. Calculate Net Emissions--*Deduct methane that is not emitted from the total methane potential estimates to develop net CH_4 emissions*

Example: 2011 Emissions from pneumatic devices in transmission sector (2013 Inventory)

Activity Data (# of pneumatics)	Emission Factor (Scf/device)	Calculated Potential ($MMTCO_2e$)	Reductions ($MMTCO_2e$)	Emissions ($MMTCO_2e$)
71,173	x 162,197	= 4.7	- 0.3	= 4.4

Updates in 2013 Inventory

- EPA received new information and data related to the emissions estimates
  - Inventory preparation process
  - GHGRP data
  - Formal public notice and comment process of the proposed oil and gas NSPS for VOCs
  - September 2012 stakeholder workshop on the natural gas sector emissions estimates
- EPA carefully evaluated all relevant information provided, and has made several updates
- Results in a decrease of 76 $MMTCO_2e$ from last year's Inventory total

Emissions Source	Update	Impact
Liquids unloading (Production)	Used API/ANGA survey data to develop liquids unloading emissions factors for wells with plunger lifts, and for wells without plunger lifts for each NEMS region	Decrease in emissions
Well completions with hydraulic fracturing and refracturing (Production)	Improved coverage of completions with HF, updated information on state regs, reduced refracture rate, consistent with NSPS analysis	Increase in emissions
Well counts (activity data) (Production)	Used DI Desktop to allow for a more transparent, consistent, and reproducible methodology for obtaining well counts	Varies

GHGRP in Public Review Draft

- QC of Key Updates
  - Data from GHGRP used to check Inventory updates under consideration
    - Confirmed emissions for the sources
    - Supported direction of the changes in the Inventory
  - Considerations for comparisons between the Inventory and GHGRP
    - Coverage—(e.g., reporting categories, thresholds in GHGRP versus national coverage)
    - Methods—(e.g., use of U.S.-specific default factors in Inventory versus facility-level emission calculated with direct measurement, engineering calculations, and/or emissions factors; BAMM)

- Liquids Unloading
  - Inventory total emissions very similar to GHGRP total emissions
  - GHGRP shows more wells venting for liquids unloading than Inventory (esp. in RM region)
  - Very similar national emissions per well in GHGRP and Inventory

- Hydraulic Fracturing
  - Inventory total emissions higher than GHGRP total emissions
  - GHGRP data shows similar rate of RECs use
  - GHGRP data shows similar activity data (# of completions)
  - GHGRP data implies more flaring than Inventory

Requests for Stakeholder Feedback

- General
  - Key areas for GHGRP data integration
  - Suggested improvements to QA/QC and verification activities
  - Recommendations for additional data sources that could be used to verify information in the Inventory
  - Recommendations on GHGRP integration and time series consistency

- Liquids unloading
  - Use of regional emission factors versus national emission factors
  - Regional variability of practices, conditions, and emissions
  - Information on practices and emissions in earlier years

- Completions with HF and refracturing
  - National-level methane reductions from well completions, especially information on the prevalence of flaring
  - Calculation method

2013 Inventory Timeline

Date	Activity
February 5	•Release of GHGRP data
February 22	•Release of Public Review Draft
February 27	•Stakeholder Webinar
March 24	•Public Review comment deadline
April 15	•Submission of Final Inventory to UNFCCC

For more information on the Inventory, including instructions for submitting comments, please see http://www.epa.gov/climatechange/ghgemissions/usinventoryreport.html