

2019 GHGI PUBLIC REVIEW ESTIMATES FOR NATURAL GAS & PETROLEUM SYSTEMS

Stakeholder Webinar

February 26, 2019

OVERVIEW

- Sources with methodology updates in 2019 Public Review (PR) draft
- Natural Gas Systems update overview
- Petroleum Systems update overview
- Description of source-specific methodology updates
- Updates under consideration for 2019 Final and future GHGs

2019 PUBLIC REVIEW DRAFT

SOURCES WITH METHODOLOGY UPDATES IN 2019 PUBLIC REVIEW DRAFT

- Gathering Pipelines
 - G&B Stations – update considered but not implemented
- Transmission Pipeline Blowdowns
- LNG Storage
- LNG Import/Export Terminals
- HF Oil Well Completions & Workovers
- Added N₂O emissions for each flaring emission source calculation methodology which uses Subpart W data

NATURAL GAS SYSTEMS RECALCULATIONS

OVERVIEW

Segment	CH ₄ Emissions (MMT CO ₂ Eq.)		CO ₂ Emissions (MMT)	
	2019 PR	<i>2018 Final</i>	2019 PR	<i>2018 Final</i>
	2016 Emissions	<i>2016 Emissions</i>	2016 Emissions	<i>2016 Emissions</i>
Exploration	0.7	<i>0.8</i>	0.2	<i>0.1</i>
Production	107.0	<i>106.8</i>	3.2	<i>3.2</i>
Processing	11.4	<i>11.2</i>	21.7	<i>22.0</i>
Transmission and Storage	33.6	<i>32.8</i>	0.4	<i>0.1</i>
Distribution	12.0	<i>12.0</i>	0.0	<i>0.0</i>
Total	164.7	<i>163.5</i>	25.5	<i>25.5</i>

- Calculated CH₄ and CO₂ emissions increased in each year across the time series by an average of 0.7% due to the recalculations
- N₂O emissions average 0.005 MMT CO₂ Eq. across the time series
 - Previously these emissions were not estimated

PETROLEUM SYSTEMS RECALCULATIONS OVERVIEW

Segment	CH ₄ Emissions (MMT CO ₂ Eq.)		CO ₂ Emissions (MMT)	
	2019 PR	<i>2018 Final</i>	2019 PR	<i>2018 Final</i>
	2016 Emissions	<i>2016 Emissions</i>	2016 Emissions	<i>2016 Emissions</i>
Exploration	0.5	2.1	1.2	<0.05
Production	36.8	35.4	17.0	19.0
Refining	0.7	0.9	4.0	3.7
Total	38.2	38.6	22.2	22.8

- Calculated CH₄ emissions increased by 10% and calculated CO₂ emissions increased by 5% on average, in each year across the time series due to the recalculations
- N₂O emissions average 0.02 MMT CO₂ Eq. across the time series
 - Previously these emissions were not estimated

GATHERING PIPELINES

- Updated methodology to use Subpart W emissions and activity data for pipeline blowdowns and leaks
 - Source was first reported under subpart W for RY2016
 - Year-specific EFs were calculated, RY2016 EFs applied to prior years
- Due to the recalculation, CH₄ emissions decreased by 5% and CO₂ emissions decreased by 9% on average, in each year across the time series

Source	CH ₄ Emissions (mt)	
	2019 PR 2016 Emissions	2018 Final 2016 Emissions
Pipeline Leaks	136,776	157,798
Pipeline Blowdowns	14,713	2,513
Total	151,489	160,311

G&B STATIONS

- Retained current methodology (station-level EFs from Marchese et al. study) for 2019 PR based on stakeholder feedback
- Update considered: Subpart W-based approach, supplemented with other data for reciprocating compressor emissions and engine exhaust
 - October 2018 EPA memo presented 3 scenarios for a Subpart W-based approach:
 - CH₄ emissions equaled 40%-100% of current estimates
 - CO₂ emissions would have increased by a factor of approximately 25
- 2019 Final – EPA will consider using subpart W data to account for CO₂ emissions from flaring and AGR and N₂O emissions from flaring, which are not currently included *[discussed later in presentation]*

TRANSMISSION PIPELINE BLOWDOWNS

- Updated methodology uses Subpart W emissions to develop EFs
 - Source was first reported under subpart W for RY2016
 - EFs equal average of two years of data and are applied to all years of the time series
- Due to the recalculation, CH₄ emissions increased by 18% and CO₂ emissions increased by 14% on average, in each year across the time series

Source	CH ₄ Emissions (mt)		CO ₂ Emissions (kt)	
	2019 PR 2016 Emissions	2018 Final 2016 Emissions	2019 PR 2016 Emissions	2018 Final 2016 Emissions
Pipeline Blowdowns	215,151	183,081	6.1	5.4

LNG STORAGE FACILITIES

- Updated methodology uses EFs calculated from Subpart W data and activity (station counts) from DOE and Subpart W data
 - Previous EFs were not based on LNG-specific emissions
 - EFs equal average of three years of data and are applied to all years of the time series
- Due to the recalculation, CH₄ emissions decreased by 86% and CO₂ emissions increased by a factor of 17 on average, in each year across the time series

Source	CH ₄ Emissions (mt)		CO ₂ Emissions (kt)	
	2019 PR	2018 Final	2019 PR	2018 Final
	2016 Emissions	2016 Emissions	2016 Emissions	2016 Emissions
LNG Storage	9,967	73,124	44.4	2.4

LNG IMPORT AND EXPORT TERMINALS

- Updated methodology uses EFs calculated from Subpart W data and activity (terminal counts) from DOE and Subpart W data
 - Previous EFs were not based on LNG-specific emissions
 - Created new category for export terminals (previously not included)
 - LNG Import: EFs equal average of three years of data
 - LNG Export: year-specific EFs were calculated
- Due to the recalculation, CH₄ emissions increased by 8% and CO₂ emissions increased by a factor of 286 on average, in each year across the time series

Source	CH ₄ Emissions (mt)		CO ₂ Emissions (kt)	
	2019 PR	2018 Final	2019 PR	2018 Final
	2016 Emissions	2016 Emissions	2016 Emissions	2016 Emissions
LNG Import Terminals	14,874	10,741	73.7	0.3
LNG Export Terminals	488	N/A	97.9	N/A

HF OIL WELL COMPLETIONS & WORKOVERS

- Updated methodology uses EFs calculated from Subpart W data and activity (event counts) from DrillingInfo and Subpart W data
 - Source was first reported under subpart W for RY2016
 - Updated methodology similar to current HF gas wells completions/workovers methodology (including establishing four control categories: non-REC with venting, non-REC with flaring, REC with venting, and REC with flaring)
 - Previous methodology relied on data from analyses for 2015 NSPS OOOOa
- **Completions:** Due to the recalculation, CH₄ emissions increased by 354% and CO₂ emissions increased by a factor of 141 on average, in each year across the time series
- **Workovers:** Due to the recalculation, CH₄ emissions increased by a factor of 427 and CO₂ emissions increased by a factor of 13,250 on average, in each year across the time series

Source	CH ₄ Emissions (mt)		CO ₂ Emissions (kt)	
	2019 PR	2018 Final	2019 PR	2018 Final
	2016 Emissions	2016 Emissions	2016 Emissions	2016 Emissions
HF Oil Well Completions	15,132	78,525	1,162	4.4
HF Oil Well Workovers	5,552	78	207.4	<0.05

FLARING N₂O EMISSIONS

- For flaring sources with CH₄ and CO₂ emissions estimated in the GHGI using GHGRP data, EPA applied the current GHGI source-specific methodology used for CH₄ and CO₂ to calculate N₂O EFs from GHGRP data

Year 2017 N₂O Estimates (metric tons):

Segment	Natural Gas Systems	Petroleum Systems
Exploration	1.0	2.5
Production	3.1	42.4
Gas Processing	10.2	-
Gas Transmission and Storage	1.5	-
Crude Oil Transportation	-	Not estimated
Refining	-	36.4
Total MT	15.9	81.3
Total MMT CO₂e	0.005	0.024

IMPROVEMENTS UNDER CONSIDERATION FOR 2019 FINAL AND FUTURE GHGIs

STAKEHOLDER FEEDBACK

- EPA is seeking stakeholder feedback on:
 - Updates in the 2019 PR draft (summarized in previous slides)
 - Updates under consideration for the Final 2019 GHGI based on feedback received through 2018-2019 stakeholder process
 - Updates to consider for future GHG Inventories
- Public review draft comment deadline: March 14, 2019
 - Instructions for how to comment on last slide
 - Links to PR draft and relevant files on last slide

IMPROVEMENTS UNDER CONSIDERATION FOR 2019 FINAL

Gathering and Boosting Station CO₂ and N₂O Emissions

- For 2019 PR, maintained existing approach (Marchese et al. study for CH₄ EFs; CO₂ EFs calculated based on CO₂-to-CH₄ gas content ratio)
- For 2019 Final, EPA is considering using subpart W data to account for significant CO₂ emissions from flaring and AGR and N₂O emissions from flaring, which are not currently included
- Potential increase of ~4 MMT CO₂
- EPA seeks stakeholder feedback on whether and how to incorporate subpart W data for these CO₂ sources in the 2019 Final GHGI or future GHG Inventories

IMPROVEMENTS UNDER CONSIDERATION FOR 2019 FINAL (CONT.)

Transmission Pipeline Blowdown EFs

- For 2019 PR, average EFs for transmission pipeline blowdowns are based on data from the first two years of GHGRP reporting, 2016 and 2017, and applied to all years of the time series
- For 2019 Final, EPA seeks stakeholder feedback on: (1) whether year-specific EFs should be applied for 2016 and 2017, (2) whether the average EFs should be applied to all years of the time series or only a subset, and (3) whether the previous Inventory EFs should be applied for early years of the time series (i.e., 1990-1992)

LNG Storage and LNG Import Terminal EFs

- For 2019 PR, average EFs based on three years of GHGRP data are applied
- Note, the current averaging approach was used mainly due to the limited data for certain LNG categories available from GHGRP
- For the 2019 Final, EPA seeks stakeholder feedback on maintaining the three-year average EF versus developing year-specific EFs

IMPROVEMENTS UNDER CONSIDERATION FOR 2019 FINAL (CONT.)

Oil Pipelines Estimates

- Emissions from oil pipelines are not estimated in the GHGI
- For 2019 Final, EPA is considering applying IPCC default EFs to estimate emissions from this source
- CH₄ average of 0.2 MMT CO₂e over the time series; CO₂ average of 0.001 MMT

Uncertainty Analysis

- Will be updated for 2019 Final using year 2017 data and methodologies for each source category (natural gas systems, petroleum systems, and abandoned wells)
- No major changes expected

IMPROVEMENTS UNDER CONSIDERATION FOR FUTURE GHGIs

New and Upcoming Data

- Review of data from upcoming studies for potential updates, for example; DOE-funded work on gathering station emissions, plastic pipelines (distribution segment), industrial meters (distribution segment), and storage wells
- EPA seeks stakeholder information on other available or upcoming data sources that could be used for GHGI updates

Offshore Platforms

- EPA is performing a detailed review of the current methodology and is considering updates to EFs and activity data
- The current EFs were based on data from the 2011 BOEM dataset
- EPA is evaluating data from GHGRP and other BOEM publications to consider updating EFs and activity data

Well-related Activity Data

- EPA has recently updated the EFs for several well-related emission sources (e.g., testing, completions)
- EPA will continue to assess available data and stakeholder feedback on considerations to improve activity estimates for sources that rely on well-related activity data
- For example, EPA will seek information on other data sets that might inform estimates of non-hydraulically fractured gas well completions and workovers

COMMENTING ON PUBLIC REVIEW DRAFT

- Comment deadline: March 14, 2019
- Can submit comments online or via email
 - **Online:** Follow the online instructions for submitting comments to the Draft Inventory Report Docket at [EPA-HQ-OAR-2018-0853](https://www.epa.gov/ghgemissions/draft-inventory-us-greenhouse-gas-emissions-and-sinks-1990-2017) from the Federal Register Notice [FRL-9988-96-OAR](https://www.epa.gov/ghgemissions/draft-inventory-us-greenhouse-gas-emissions-and-sinks-1990-2017)
 - **Email:** Comments can be sent to GHGInventory@epa.gov. These comments will also be posted to the docket
- PR GHG Inventory: <https://www.epa.gov/ghgemissions/draft-inventory-us-greenhouse-gas-emissions-and-sinks-1990-2017>
- PR GHGI Energy Chapter: <https://www.epa.gov/sites/production/files/2019-02/documents/us-ghg-inventory-2019-chapter-3-energy.pdf>
 - Petroleum Systems: Pages 64-79
 - Natural Gas Systems: Pages 80-99
 - Abandoned Oil and Gas Wells: Pages 99-103
- Annex Excel files for oil and gas: <https://www.epa.gov/ghgemissions/stakeholder-process-natural-gas-and-petroleum-systems-1990-2017-inventory>