Natural Gas & Petroleum Systems: Updates Under Consideration for 2022 GHGI

Stakeholder Webinar

November 17, 2021

AGENDA

- Gas STAR / Methane Challenge Data in GHGI
- Other Activity Data
- Abandoned Well Emissions
- Wrap Up

GAS STAR / METHANE CHALLENGE DATA IN GHGI

Gas STAR and Methane Challenge Reductions – Background

- Most GHGI emission source methodologies have been updated recently to a "net" methodology – use EFs based on subpart W data or recently published methane emissions study

- Certain GHGI emission sources continue to rely on a "potential" methodology

  - Potential emissions estimated using 1996 GRI/EPA study data

  - Net emissions then estimated by subtracting voluntary reductions (i.e., Gas STAR) from potential emissions

  - 2013 inventory year Gas STAR reductions used as proxy data for 2014-2019

GAS STAR REDUCTIONS – CURRENT GHGI

2019 Production Segment Reductions (mt CH$_4$)

Source	Reductions
Gas Engines	139,167
Compressor Starts	512
Other	104,624
Total	**244,304**

2019 Transmission and Storage Segment Reductions (mt CH$_4$)

Source	Reductions
Pipeline Leaks	1,213
Dehydrator Vents	2,819
Engines	126,910
Station Venting	136,856
Total	**267,799**

GAS STAR REDUCTIONS – UPDATE CONSIDERATIONS

- Entire Gas STAR reductions data set (1990-2019) reassessed

- Assigned Gas STAR reductions for Production, Transmission and Storage, and Distribution segments to GHGI emission sources
  - Kept reductions related to GHGI sources with "potential methodology"
  - Removed all reductions related to GHGI sources with "net methodology"

- Applied short-term reductions for year of implementation only

- Applied long-term reductions in implementation year and subsequent 7 or 10 years (i.e., used sunset dates consistent with Gas STAR program) versus applying to all subsequent years (the current GHGI approach)

- Memo presents details, including Gas STAR reductions by GHGI source

Methane Challenge Reductions – Update Considerations

- Methane Challenge (MC) reductions data available for 2016-2019

- Assigned MC reductions to GHGI emission sources
  - Most MC reductions related to GHGI sources with "net methodology" and were excluded
  - MC reductions were used for two GHGI sources in the Distribution segment where a "potential methodology" is used

- Memo presents details, including MC reductions by source

GAS STAR AND METHANE CHALLENGE REDUCTIONS – PRODUCTION SEGMENT

2019 Emissions and Reductions (mt CH$_4$)

GHGI Emission Source	Current GHGI Potential Emissions	Update under Consideration: Gas STAR Reductions	Update under Consideration: GHGI Net Emissions	*Current GHGI Net Emissions*
Compressors	67,025	0	67,025	*NA*
Compressor Blowdowns	2,588	0	2,588	*NA*
Compressor Starts	5,790	1,839	3,952	*5,278*
Dehydrator Vents/ Kimray Pumps	96,321	7,104	89,217	*NA*
Engines	251,054	13,338	237,716	*111,886*
Equipment Leaks	203,137	84	203,053	*NA*
Produced Water	187,070	0	187,070	*NA*
Total	**812,985**	**22,365**	**790,620**	**568,681**

NA = Current GHGI net emissions cannot be calculated due to use of "other" reductions which are not specific to a source

GAS STAR AND METHANE CHALLENGE REDUCTIONS – TRANSMISSION AND STORAGE SEGMENT

2019 Emissions and Reductions (mt CH_4)

GHGI Emission Source	Current GHGI Potential Emissions	Update under Consideration: Gas STAR Reductions	Update under Consideration: GHGI Net Emissions	Current GHGI Net Emissions
Dehydrator Vents	2,527	1,330	1,197	-292
Engines	286,961	80,067	206,894	160,051
Pipeline Leaks	3,302	590	2,712	2,088
Station Venting	184,404	19,312	165,092	47,548
Total	**477,194**	**101,299**	**375,895**	**209,395**

GAS STAR AND METHANE CHALLENGE REDUCTIONS – DISTRIBUTION SEGMENT

2019 Emissions and Reductions (mt CH$_4$)

GHGI Emission Source	Current GHGI Potential Emissions	Update under Consideration: Gas STAR Reductions	Update under Consideration: Methane Challenge Reductions	Update under Consideration: GHGI Net Emissions	Current GHGI Net Emissions
Pressure Relief Valve Releases	1,268	0	47	1,221	*1,268*
Pipeline Blowdowns	4,445	748	192	3,505	*4,445*
Mishaps (Dig-ins)	69,287	828	0	68,459	*69,287*
Total	**75,000**	**1,576**	**239**	**73,185**	***75,000***

Gas STAR and Methane Challenge Reductions – Stakeholder Questions

EPA seeks feedback on the update under consideration discussed in the memo and the questions below:

1. Should any of the Gas STAR reduction activity assignments to GHGI emission sources be changed or adjusted?

2. Are there any Gas STAR activities identified as having a potential methodology that should be considered to have a net methodology?

3. Are there other data sources available to quantify emissions or reductions for the identified sources?

OTHER ACTIVITY DATA
- ENVERUS MIDSTREAM
- UNDERGROUND NG STORAGE WELLS

ENVERUS MIDSTREAM – BACKGROUND

- Enverus provides information on the oil and gas industry
  - Currently used in GHGI for onshore oil and gas production data
  - Also includes midstream operations [*current focus*]

- Enverus midstream reflects current operations only and cannot be used to develop estimates of activity data in previous years

- Initially reviewing the following activity data:
  - Gathering and Boosting (G&B) and Transmission
    - Compressor Stations
    - Pipeline Miles
  - NG Processing Plants

ENVERUS MIDSTREAM – G&B AND TRANSMISSION

- **G&B**: Enverus has fewer stations and more pipeline miles than GHGI

Source	G&B Stations	Gathering Pipeline Miles
Enverus	3,634	434,076
GHGI (Year 2019)	7,494	381,909

- **Transmission**: Enverus has similar # stations and more pipeline miles than GHGI

Source	Transmission Compressor Stations	Transmission Pipeline Miles
Enverus	2,212	317,904
GHGI (Year 2019)	2,196	298,909

ENVERUS MIDSTREAM – STAKEHOLDER QUESTIONS

1. EPA seeks feedback on using Enverus data to estimate the national number of G&B stations and gathering pipeline miles.

2. EPA seeks feedback on using Enverus data to estimate the national number of transmission compressor stations.

3. EPA seeks feedback on using Enverus data to estimate the national number of processing plants.

UNDERGROUND NG STORAGE WELL COUNTS

- EPA received a comment during 2021 GHGI stakeholder process recommending use of PHMSA for national storage well counts

- PHMSA provides counts, by field type, beginning in 2017

- For 2022 GHGI, EPA considering using PHMSA counts for 2017 forward

Well Count Data	2017	2018	2019
PHMSA Total	**14,268**	**14,192**	**14,084**
Depleted Field	12,424	12,340	12,244
Aquifer	1,721	1,729	1,718
Salt Dome	123	123	122
Current GHGI	*16,936*	*19,181*	*19,250*

Underground NG Storage Wells – Stakeholder Question

1. EPA seeks feedback on using PHMSA storage well counts for recent years (2017 forward), retaining the 1990-1992 well counts, and applying linear interpolation for intermediate years.

ABANDONED WELLS

ABANDONED WELLS – CURRENT GHGI METHODOLOGY

- Population of abandoned wells is estimated using Enverus and historical data (1.1 million historical abandoned wells)

- Abandoned well population is split into plugged and unplugged wells

- Region-specific plugged and unplugged EFs are applied to wells in the Appalachia region versus wells outside of Appalachia region

Abandoned Wells – Activity Data Updates Under Consideration

1. Count of abandoned oil wells versus gas wells
   a. For the 2021 GHGI, the "production type" field was used to apportion the dry well population to oil and gas wells (in addition to GOR)
   b. EPA is considering relying only on GOR to classify abandoned wells as oil and gas wells, as was done in previous GHGIs

2. Fraction of abandoned wells that are plugged versus unplugged

ABANDONED WELLS – PLUGGED VS. UNPLUGGED UPDATE CONSIDERATIONS

Available Enverus data has been restructured

EPA is considering updating two steps in its data processing to best use the restructured data:

1. Re-examine the well status codes that are assigned as plugged or unplugged
   a. There are five new well status codes and four were assigned as unplugged

2. Reconsider how we use historical wells in the calculations for fraction of wells plugged and unplugged

Dataset	% Plugged and Abandoned	% Inactive (Unplugged)
Restructured Enverus	41%	24%
Previous Enverus	20%	42%

ABANDONED WELLS – PLUGGED VS. UNPLUGGED (CONT.)

- Table compares plugged/unplugged fraction change due to historical wells consideration only (for year 2019)

Year	Treatment of Historical Wells	Plugged Fraction	Unplugged Fraction
Year 2019 (if 2020 GHGI methodology used)	Assume the same rate of plugging as in Enverus population	60%	40%
Year 2019 (2021 GHGI)	Assume all are unplugged	41%	59%

- Well status code update considerations are not shown, but would increase the unplugged fraction by ~3%

ABANDONED WELLS – STAKEHOLDER QUESTIONS

1. To estimate the population of abandoned wells from Enverus data, EPA seeks feedback on using only GOR to determine oil and gas wells (as opposed to GOR plus the "production type" field).

2. EPA seeks feedback on the plugging status assignments under consideration.

3. EPA seeks feedback on the assumption that the 1.1 million historical abandoned wells that are not captured in Enverus are unplugged wells. EPA also seeks feedback on alternative approaches and/or data sources to estimate the fraction of plugged and unplugged abandoned wells.

4. For the time series of the national fraction of plugged and unplugged wells, EPA seeks feedback on removing the fractions calculated from previous Enverus datasets for the years 2016-2018 and using only the fractions based on the restructured Enverus data (beginning in year 2019)?

WRAP-UP

PROVIDING STAKEHOLDER FEEDBACK

- EPA memos on updates are posted online and include additional details and specific stakeholder feedback requests

- https://www.epa.gov/ghgemissions/stakeholder-process-natural-gas-and-petroleum-systems-1990-2020-inventory

- Submit feedback via email: GHGInventory@epa.gov

- Public Review draft available in early 2022
  - 30 day public comment period