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BY EMAIL AND ELECTRONIC FILING

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Attn: Docket ID No. FRL- 9959-29-OAR

RE: ENVIRONMENTAL DEFENSE FUND COMMENTS ON DRAFT INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990-2015

The Environmental Defense Fund (EDF) appreciates the opportunity to comment on the Environmental Protection Agency's (EPA) Draft Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2015 (Draft 2017 GHGI).[1] EDF is a national non-profit, non-partisan organization that represents over two million members and is dedicated to protecting human health and the environment by effectively applying science, economics, and the law. Our comments on the draft inventory underscore the legal and practical importance of EPA's continued development and updating of the national inventory program, and likewise provide specific technical recommendations focued primarily on sections 3.6 Petroleum Systems and 3.7 Natural Gas Systems.

The Administration has taken recent actions—both directly and in the form of proposed budget reductions—that undermine the collection and dissemination of crucial public data. For example, EPA has recently withdrawn the Information Collection Request for the Oil and Natural Gas Industry, EPA ICR No. 2548.01, issued November 10, 2016 ("Methane ICR").[2] shielding from public view data that would have otherwise enabled deeper understanding of harmful emissions from the oil and gas sector. The Administration's proposed budget blueprint, released just yesterday, also signals a reversal of core scientific data collection efforts that EPA has long undertaken. Indeed, the proposed 31% cut to the agency's overall budget includes the wholesale elimubation of several research and data collection programs.[3] The Greenhouse Gas Inventory ("GHG Inventory" or "Inventory") is one of the agency's bedrock data collection and dissemination efforts, providing information used by federal, state, and local governments,

[1] 82 Fed. Reg. 10767 (February 15, 2017).
[2] EPA, *Notice Regarding Withdrawal of Obligation To Submit Information*, 82 Fed. Reg. 12817 (March 7, 2017).
[3] The Budget "[d]iscontinues funding for . . . climate change research and partnership programs, and related efforts." America First A Budget Blueprint to Make America Great Again, The Excutive Office of the President, Office of Management and Budget (March 16, 2017) *available at* https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/budget/fy2018/2018_blueprint.pdf

expert scientists, the public, and companies. Accordingly, we urge EPA to preserve its traditional approach to compiling and releasing the GHG Inventory—one that the agency has pursued across Republican and Democratic administrations alike, and that will further transparency and enhance accountability for the diverse array of stakeholders that rely on the inventory information.

Finally, we provide detailed technical recommendations related to the Petroleum and Natural Gas Systems portions of the inventory, and in particular, identify concerns with EPA's proposed approach for estimating methane emissions from certain sources, which likely understate emissions. We recommend several adjustments to strengthen the characterization of emissions from these sources and better align inventory estimates with real-world data.

A. EDF Strongly Supports EPA's Ongoing Efforts to Update and Improve the Inventory

Over the last twenty-five years, EPA's national Greenhouse Gas Inventory has become the most authoritative and widely-used source of information about the nature, scale, and trajectory of U.S. greenhouse gas emission sources and sinks. Developed with extensive public input and in collaboration with other federal agencies, the Inventory provides a rigorous understanding of sector-by-sector contributions to emissions of major greenhouse gases, and trends in those emissions over time, in a way that enables consistent comparisons with trends in other major emitting countries. Industry, scientific researchers, and a wide variety of other organizations utilize the data in the Inventory to identify and prioritize opportunities for emission reduction. And the Inventory serves as an invaluable tool for scientific research on climate and air quality. EDF strongly supports EPA's continued efforts to update, improve, and refine the Inventory over time, in fulfillment of the United States' obligations under the United Nations Framework Convention on Climate Change. Not only does the Inventory meet legal obligations, it also demonstrates global leadership by the U.S. EPA's commitment to submitting a highly detailed, scientifically rigorous, and continuously improved inventory that has been the gold standard internationally. The U.S. should continue to show leadership by adhering to these principles.

The Inventory is Developed Through a Transparent and Rigorous Process

EPA has prepared the Inventory on an annual basis since the early 1990s, with the assistance of other agencies, particularly the U.S. Department of Energy and the State Department. To facilitate consistent and rigorous reporting of emissions and sinks, the U.S. and other countries follow the International Panel on Climate Change (IPCC) methodological guidelines. EPA's process for preparing the Inventory is highly transparent, typically involving at least one opportunity for public comment and further opportunity for technical comment on draft Inventory estimates. EPA has also adhered to sound inventory practices by quantifying uncertainties for all source categories, implementing quality assurance and quality control, and updating new methodological approaches as needed.

Data in the Inventory has Immense Value to Industry, Scientific Researchers, and Other Entities

The data presented in the Inventory has immense value to the public, and is used in a wide variety of contexts by an array of companies, state and local governments, and other

organizations. Individual companies and trade associations, for example, utilize the Inventory to better understand and manage emissions over time, and develop voluntary emission reduction programs.[4] Similarly, scientific researchers routinely use the Inventory to inform and provide context for research into emission sources and trends.[5]

EPA's Development of the Inventory is Consistent With Long-Standing Legal Obligations

The Inventory is not merely a unique source of immensely valuable information, its continued maintenance and improvement is required under international legal instruments that require similar efforts by other major emitters of greenhouse gases. The United Nations Framework Convention on Climate Change, which was signed by President George H.W. Bush and duly ratified by the United States Congress, specifically requires parties to submit "national greenhouse gas inventories of anthropogenic emissions by sources and removals by sinks of greenhouse gases," subject to an "annual technical review process."[6] Forty-three developed countries and the European Union currently submit annual inventories under this UNFCCC obligation.[7] This international effort reflects a global consensus on the importance of consistent and rigorous monitoring and disclosure of greenhouse gas emissions.

In short, the GHG Inventory is a vital public resource that has taken decades to develop and is widely relied upon as an authoritative resource for understanding and managing greenhouse gas emissions. EDF urges EPA to maintain its long and bipartisan tradition of maintaining and updating the Inventory with a high standard of rigor and transparency.

B. TECHNICAL RECOMMENDATIONS FOR REVISIONS TO DRAFT 2017 GHGI

EDF supports EPA's efforts to continuously improve the Inventory by incorporating the best available data, but we are concerned that the lower estimate of total methane emissions from Petroleum and Natural Gas Systems in the Draft 2017 GHGI, compared to the 2016 GHGI, does not agree with recent data. Although some of the agency's revised methodologies are rigorous and well-supported, the Draft 2017 GHGI fails to fully account for superemitters. If properly accounted for, emissions from these sources would likely counteract the agency's proposed downward revisions and, result instead in total Petroleum and Natural Gas System methane emissions that are similar to or slightly higher than the 2016 GHGI estimate of 9.8 Tg CH_4.

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[4] *See. e.g.,* American Gas Association, *New Science, New Facts: Understanding Updates to the EPA Inventory of Greenhouse Gases* (April 26, 2016), 15 (noting that "Better information helps to focus attention on cost-effective opportunities identified in the data."); *See also* ONE Future Coalition, FAQs http://www.onefuture.us/faqs/ (noting that the voluntary program relies on GHGI and EPA Greenhouse Gas Reporting Program data to compile information on emissions from the natural gas industry).

[5] *See, e.g.,* A.R. Brandt et al., *Methane Leaks from North American Natural Gas Systems,* 343 Science 733, 734 (Feb. 2014) (using GHGI as a benchmark for assessing new studies of oil and gas methane emissions).

[6] United Nations FCCC, Article 4, sec. 1(a); UNFCCC COP Decision 11/CP.4, sec. 2(b).

[7] UNFCCC, National Inventory Submissions 2015, http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/8812.php.

Comments on Major Methodological Changes

In the 2016 GHGI, EPA estimated 2014 methane emissions from Petroleum and Natural Gas Systems (O&G) are 9.8 Tg CH_4.[8] In the Draft 2017 GHGI, EPA revised 2014 emission estimates to 8.3 Tg CH_4 based on several methodological changes to sources in the production and processing segments. The largest changes in emission estimates are due to two methodological revisions: 1) an updated method to estimate oil well count activity data, and 2) the use of EPA Greenhouse Gas Reporting Program (GHGRP) data to estimate processing plant emissions. As discussed in our stakeholder feedback on EPA's *Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2015: Revisions Under Consideration for Natural Gas and Petroleum Systems Production Emissions* (Production Memo),[9] we agree that the revised oil well counts are more accurate than previous estimates.

Regarding the second change, we are concerned that the current method of utilizing GHGRP data underestimates processing sector emissions. The Draft 2017 GHGI estimate of 445 Gg CH_4 is approximately 20% lower than the estimate of 546 Gg CH_4 in a 2016 study by Marchese et al.[10] We believe the Marchese et al. estimate is a more accurate estimate of national processing sector emissions because it is based on a study with industry participation that collected emissions data at 16 processing plants across the U.S. As discussed in our joint stakeholder feedback with Colorado State University on *Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2015: Updates Under Consideration for Natural Gas Systems Processing Segment Emissions* (Processing Memo),[11] we recommend a method that uses the Marchese et al. estimate of processing plant emissions to scale up GHGRP-based source-specific emission estimates so that total emissions agree with the national study while providing the detailed source breakdown of the GHGRP method currently used in the Draft 2017 GHGI.

In general, EDF supports the revised methodologies for production sector liquids unloading, storage tanks, and associated gas venting, but we have some concerns about the underlying data. As discussed in our feedback to the Production Memo, we recommend that EPA carefully quality assure the GHGRP data used in the GHGI emission estimates. Our response to the memo also addressed concerns about potential issues related to GHGRP reporting methodologies such as the use of emission factors for small tanks. In particular, EPA should evaluate the accuracy of tank control efficiencies reported to the GHGRP. As supported by the EPA compliance alert,[12] Noble Consent Decree,[13] and a national helicopter-based infrared camera survey of over 8,000

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[8] *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2014* (April, 15, 2016) *available at* https://www.epa.gov/sites/production/files/2016-04/documents/us-ghg-inventory-2016-main-text.pdf.

[9] We attached and incorporate by reference those comments here.

[10] Marchese, A.J., Vaughn, T.L., Zimmerle, D.J., Martinez, D.M., Williams, L.L., Robinson, A.L., Mitchell, A.L., Subramanian, R., Tkacik, D.S., Roscioli, J.R. and Herndon, S.C., 2015. Methane emissions from United States natural gas gathering and processing. Environmental science & technology, 49(17), 10718-10727.

[11] We attached and incorporate by reference those comments here.

[12] EPA, EPA Observes Air Emissions from Controlled Storage Vessels at Onshore Oil and Natural Gas Production Facilities, (2015) *available at*: http://www.epa.gov/sites/production/files/2015-09/documents/oilgascompliancealert.pdf

[13] Consent Decree: United States of America, and the State of Colorado v. Noble Energy, Inc. Denver, CO: United States District Court for the District of Colorado, (2015) *available at* http://www.epa.gov/sites/production/files/2015-04/documents/noble-cd.pdf

well pads in 7 U.S. basins,[14] many controlled storage tanks may have higher emissions than expected due to poor design or malfunctions of their tank control systems. If tank control issues are not reported to the GHGRP, then the Draft 2017 GHGI method will underestimate storage tank emissions.

EPA Should Avoid Double-Counting Emission Reductions

As noted in the Draft 2017 GHGI, the calculation of net emissions obviates the application of regulatory or voluntary emission reductions, which were previously applied to potential emission estimates to account for changes in equipment and practices following the development of potential emission factors. Since the Draft 2017 continues to apply Natural Gas STAR based voluntary reductions to sources that now are calculated as net emissions, some reductions will be double counted, and therefore, the GHGI will underestimate emissions. In the final 2017 GHGI, EPA should no longer apply regulatory or voluntary emission reductions to sources that are based on net emission calculations.

EPA Should Account for Recent Data on Emissions From Power Plants and Refineries

A recent paper published in the journal Environmental Science & Technology used the aircraft mass balance approach to estimate methane emissions at three refineries and three natural gas power plants (NGPP) in the U.S.[15] Measured emission rates were 21–20 and 11–90 times higher than reported to the GHGRP for NGPPs and refineries, respectively. The authors scale up emissions by throughput to estimate that these two sources contribute 610±180 Gg CH_4 in the U.S., which is about 20 times higher than the estimate in the GHGI. Although this estimate is based on a small dataset, it suggests that the GHGRP and GHGI greatly underestimate emissions from these sources. EPA should evaluate this study and other data sources to increase the accuracy of their emission estimates for refineries and NGPPs.

The Inventory Underestimates Emissions From Superemitters

Superemitters are relatively infrequent, large emission sources that result from malfunctions or abnormal process conditions. A recent meta-analysis found that superemitters are ubiquitous across the oil and gas supply chain with a general rule of the top 5% of sources accounting for 50% of total emissions.[16] The Draft 2017 GHGI partially accounts for superemitters by including emissions from the Aliso Canyon storage facility well blowout and production sector stuck separator dump valves.

Although the partial inclusion of superemitters is a step in the right direction, the current approach nonetheless greatly underestimates emissions from these sources. For instance, in addition to Aliso Canyon, there are many other superemitters in the transmission and storage sector (T&S). Zimmerle et al. estimates that T&S superemitters were responsible for 353 Gg

[14] Lyon, D.R., Alvarez, R.A., Zavala-Araiza, D., Brandt, A.R., Jackson, R.B. and Hamburg, S.P., *Aerial Surveys of Elevated Hydrocarbon Emissions from Oil and Gas Production Sites*, 50 Envtl. Sci. & Tech., 4877-4886 (2016).
[15] Lavoie, T.N., Shepson, P.B., Gore, C.A., Stirm, B.H., Kaeser, R., Wulle, B., Lyon, D.R. and Rudek, J., *Assessing the Methane Emissions from Natural Gas-Fired Power Plants and Oil Refineries*. Envtl. Sci. & Tech. (2017).
[16] A.R. Brandt et al., *Methane Leaks from North American Natural Gas Systems,* 343 Science 733, 734 (Feb. 2014) (using GHGI as a benchmark for assessing new studies of oil and gas methane emissions).

CH_4 emissions in 2012.[17] For the final 2017 GHGI, we recommend that EPA use Zimmerle et al. to estimate emissions from T&S superemitters in addition to including the emission estimate from the Aliso Canyon blowout.

For the production sector, the Draft 2017 GHGI incorporates emission estimates from stuck separator dump valves in their revised methodology for storage tank. As discussed in our feedback on the Production Memo, we have concerns that the underlying GHGRP data used to estimate stuck dump valve emissions greatly underestimates their emissions due to a flawed calculation methodology. In brief, the GHGRP method assumes that tank emissions are approximately 3–4 times higher than normal flashing emissions during stuck dump valve conditions, but in reality, emissions can be several orders of magnitude higher up to the entire natural gas production of a well. Additionally, production superemitters may include other causes such as poorly operating separators or malfunctioning pressure relief valves.

In addition to these specific sources, we generally recommend that EPA evaluate other approaches for estimating superemitter emissions, such as top-down and bottom-up comparisons of basin-level emissions. For example, a recent study estimated that one-third of site-level well pad emissions in the Barnett Shale could not be attributed to component-level emissions and were likely caused by superemitters resulting from abnormal process conditions or otherwise avoidable emissions.[18] In context, the Draft 2017 GHGI estimate of stuck dump valves only accounts for 0.2% of production emissions. For future inventories, it is critical that EPA fully account for superemitters since these sources may account for a substantial portion of total oil and gas supply chain emissions and likely counteract the downward revisions made to other sources.

Thank you for the opportunity to submit feedback on the Draft 2017 GHGI. Please feel welcome to contact me if you have any questions.

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[17] Zimmerle, D.J., Williams, L.L., Vaughn, T.L., Quinn, C., Subramanian, R., Duggan, G.P., Willson, B., Opsomer, J.D., Marchese, A.J., Martinez, D.M. and Robinson, A.L., 2015. Methane emissions from the natural gas transmission and storage system in the United States. Environmental science & technology, 49(15), pp.9374-9383.
[18] Zavala-Araiza, D., Alvarez, R.A., Lyon, D.R., Allen, D.T., Marchese, A.J., Zimmerle, D.J. and Hamburg, S.P., 2017. Super-emitters in natural gas infrastructure are caused by abnormal process conditions. Nature Communications, 8, p.14012.

January 25, 2017

Stakeholder Feedback on *Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2015: Revisions Under Consideration for Natural Gas and Petroleum Systems Production Emissions*

Environmental Defense Fund appreciates the opportunity to provide stakeholder feedback to EPA on the memo *Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2015: Revisions Under Consideration for Natural Gas and Petroleum Systems Production Emissions*. EDF supports the use of Greenhouse Gas Reporting Program (GHGRP) data to update the U.S. Greenhouse Gas Inventory (GHGI), but the proposed methods likely will underestimate methane emissions from storage tanks and super-emitters due to inaccurate GHGRP calculation methodologies. We have provided a summary of the high-level issues and may submit more detailed responses in future feedback.

In recent years, EPA has made several updates to the GHGI Natural Gas and Petroleum Systems methodologies. These updates have increased the accuracy of the GHGI by incorporating recent data sources including the GHGRP and scientifically-rigoruous research studies. For the production sector, the 2016 GHGI used GHGRP data to estimate well completion emissions and equipment activity data, but primarily relied on data from the 1990s EPA/GRI study to estimate emissions from other sources. EDF supports the use of GHGRP data to estimate emissions from storage tanks, associated gas venting and flaring, and liquids unloading, but we are concerned that underlying issues in GHGRP data will lead to inaccurate emission estimates from some sources. In particular, the proposed methods for storage tanks likely will underestimate emissions from small tanks and fail to fully account for super-emitters and ineffective tank controls.

The GHGRP requires operators to estimate emissions from tanks with greater than 10 barrels per day of oil or condensate throughput by using either process models or assuming all methane in the liquid is emitted. For controlled tanks, emissions are assumed to be controlled at 98% or an operator reported control efficiency. In general, the large tank method should be accurate if the inputs are correct. However, there is strong evidence that many controlled storage tanks have poor control effectiveness due to design flaws or malfunctions of control systems, such as undersized vapor recovery units or unlit flares.[1,2,3] EPA should evaluate exisiting information to determine if GHGRP reported control efficiencies can be adjusted based on empirical data; if sufficient data are not available for an accurate adjustment, then it would be beneficial for EPA to collect new data on the capture and control efficiency of tank control systems to assure that tank controls are accurately reflected in the GHGI.

For tanks with less than 10 barrels per day of oil or condensate throughput, the GHGRP requires operators to use a default emission factor (EF) based on the number of small tanks. This method has much lower accuracy than required for large tanks because it fails to account for the actual throughput and process parameters of individual tanks. The throughput-based EFs reported in Tables 7 and 8 of the memo show that the GHGRP-based small tank EFs for uncontrolled tanks is higher than large tanks for condensate and lower for more prevalent oil tanks. Throughput-based EFs of uncontrolled small and large tanks may diverge slighltly due to differences in average parameters such as separator pressure, but the ~3X difference in the EFs calculated from GHGRP data suggests that the underlying GHGRP EFs are inaccurate. As an alternative methodology, EPA could apply the throughput-based potential EFs based on GHGRP large tanks (based on either uncontrolled tank net EFs or all tank potential EFs derived from captured methane and flared carbon dioxide). After estimating small tank potential emissions using small tanks throughput and large tank potential EFs, net emissions can be calculated using the GHGRP small tank control efficiency. As noted for large tanks, the accuracy of this method depends on verification of reported control efficiencies.

In addition to calculating normal flashing emissions, the GHGRP requires large tanks to report emissions from stuck separator dump valves. The calculation methodology assumes that stuck dump valve emissions are equal to calculated flashing emissions during the period of a stuck valve, adjusted upward by 2.87 for oil tanks and 4.37 for condensate tanks. The underlying data of these adjustment factors is very limited and likely is not representative of stuck dump valves, which have the potential of releasing a well's entire gas production. Although GHGRP data may be valuable for estimating stuck dump valve activity data, it is not sufficient for estimating emissions from stuck dump valves or other malfunctions that may cause super-emitter emission rates. EPA should evaluate other approaches for estimating super-emitter emissions, such as top-down and bottom-up comparisons of basin-level emissions. For example, a recent study estimated that one-third of site-level well pad emissions in the Barnett Shale could not be attributed to component-level emissions and were likely caused by super-emitters resulting from abnormal process conditions or otherwise avoidable emissions.[4]

The accuracy of GHGI emission estimates developed with GHGRP data depends on the accuracy of reported data. We have performed a preliminary analysis comparing oil and gas production and well counts of reporting facilities based on GHGRP reported activity data and the Drillinginfo production database. The aggregate 2015 GHGRP gas production is different than Drillinginfo by over an order of magnitude due to several facilities reporting gas production to GHGRP in incorrect units. For oil production and well count, the aggregate difference is approximately 10%. Reporting errors could affect the accuracy of GHGRP-based estimates; for example, errors in reported oil production would affect the percent of production sent to tanks in the tank throughput option. GHGRP data should be quality assured to minimize potential errors. In particular, anomalously low and high reported values should be investigated to determine if they are due to reporting errors such as incorrect units.

In summary, EDF supports updating the GHGI to incorporate more GHGRP data, but methods should account for limitations of GHGRP data to assure accurate emission estimates. For the production sector, it is critical that methods utilize accurate tank control efficiencies and fully account for super-emitters. EPA should evaluate exisiting and forthcoming studies to determine how both GHGRP and GHGI methodologies can be updated to more accurately estimate emissions from super-emitters and other sources.

Thank you for the opportunity to submit feedback on *Inventory of U.S. Greenhouse Gas Emissions and Sinks: Revisions under Consideration for Natural Gas and Petroleum Production Emissions*. Please feel welcome to contact me if you have any questions.

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February 1, 2017

Stakeholder Feedback on *Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2015: Updates Under Consideration for Natural Gas Systems Processing Segment Emissions*

Environmental Defense Fund (EDF) and Colorado State University (CSU) appreciate the opportunity to provide stakeholder feedback to EPA on the memo *Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2015: Revisions Under Consideration for Natural Gas Systems Processing Segment Emissions*. We have concerns that the proposed methods using Greenhouse Gas Reporting Program (GHGRP) data will underestimate emissions due to inaccurate GHGRP calculation methodologies. We describe am alternative method that use both GHGRP and Marchese et al. (2015) data to more accurately estimate site-level emissions with a best approximation of the allocation of emissions among source categories.

In recent years, EPA has made several updates to the GHGI Natural Gas Systems methodologies. These updates have increased the accuracy of the GHGI by incorporating recent data sources including the GHGRP and scientifically-rigorous research studies. The 2016 GHGI updates included a substantial revision in the gathering compressor stations source category. Specifically, previous estimates for large compressor stations and large compressors based on data from the 1990s GRI/EPA study were replaced with a single estimate for gathering stations based on site-level measurements published in Mitchell et al. (2015) and Marchese et al. (2015). In addition to measuring facility-level emissions from 114 gathering stations, these recent studies quantified facility-level emissions from 16 processing plants, which exceeds the sample size of the 11 plants measured in GRI/EPA 1996. Marchese et al. estimated national emissions by using a Monte Carlo simulation of Mitchell et al. data to account for differences in the throughput of the sampled and national processing plant populations. The estimated national processing plant emissions from Marchese et al, 546 Gg, is 38% lower than the previous GHGI estimate of 892 Gg. The authors attribute this decrease to changing facility design and operational practices since the 1990s, particularly the replacement of small reciprocating compressors with fewer, large centrifugal compressors.

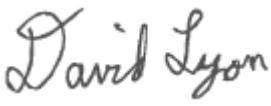
Although Marchese et al. indicates that processing plant emissions are lower than reported in the 2016 GHGI, the paper also states that GHGRP reported emissions only account for approximately one-third of modeled emissions. This discrepancy is likely due to the exclusion of some sources and inaccurate emissions factors required by GHGRP reporting methods and emissions from non-reporting processing plants. Even though EPA's proposed plant-based and throughput-based GHGRP methods partially account for these GHGRP limitations by extrapolating non-reporter

emissions and using more accurate GHGI emission factor for some sources like compressor exhaust, the resulting estimates are 308 – 429 Gg, or 27 – 44% lower than the empirically based estimates from Marchese et al. Therefore, the proposed GHGRP methods would underestimate emissions and should not be used to update the GHGI.

The proposed Marchese et al. option would more accurately estimate emissions from processing plants than the GHGRP methods, but the site-level measurements do not allow emissions to be allocated among sources. One option would be to report emissions at the plant level, similar to gathering station emissions. An alternative option would be to use Marchese et al. to estimate plant-level total emissions, but other data sources to allocate emissions among sources. For example, emissions by source category could be estimated using the GHGRP throughput-based approach, and then emissions for each source could be adjusted upward by the ratio of the Marchese et al. and GHGRP plant-level estimates. This approach would combine the higher accuracy of the empirically-based Marchese et al. plant-level estimates with a reasonable assumption about how emissions are allocated among sources. As new component-level measurement data become available, future inventories could be updated to more accurately reflect source apportionment. EPA should also evaluate future studies comparing component-level emissions quantified by direct measurements and GHGRP methods so that the GHGRP rule can be updated to increase the accuracy of reported emissions.

In summary, the proposed GHGRP throughput-basis and plant-basis approaches will not accurately estimate emissions due to issues with GHGRP reporting methods. We recommend that EPA should use the more accurate, site-level estimates from Marchese et al. to estimate total emissions, and possibly GHGRP data to allocate emissions among sources.

Thank you for the opportunity to submit feedback on *Inventory of U.S. Greenhouse Gas Emissions and Sinks: Revisions under Consideration for Natural Gas Processing Sector Emissions*. Please feel welcome to contact us if you have any questions.



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