

Response to anonymous referee #2 comments on "High potential for CH₄ emission mitigation from oil infrastructure in one of EU's major production regions"

We thank the anonymous referee for the valuable feedback and comments, which have helped to improve our manuscript. Responses to individual referee comments are below. This document is organized as follows: the Referee's comments are in plain text, our responses are in [blue](#), and all the revisions in the manuscript are shown in [blue italic](#). Line numbers refer to the updated WORD manuscript with tracked changes.

Anonymous Referee #2

general comments

The work reported in this paper is from a co-ordinated field campaign conducted between many groups, measuring CH₄ from oil production sites across Romania using four different approaches. The scientific question is firmly within ACP's remit, and contains well established methods and statistical analyses to interrogate the results. The report is laid out clearly, with assumptions and methods presented well. Much of the detail of the methodologies is in the SI. I note that another reviewer has recommended to bring some of this into the main text. I would support this, although I think this is somewhat down to personal preference, as I did not see any guidance on this from the journal itself.

Substantial conclusions are reached, showing that methane emissions from these sources are over twice as high as currently reported, thus highlighting the inadequacy of the methods used to report emissions in this sector and the potential for mitigation by stopping the leaks.

[We express our gratitude to the reviewer for acknowledging the important findings presented in our work and for providing positive feedback. Based on the recommendations from both reviewers, we have revised our manuscript and we have incorporated additional details and information from the supplementary material into the main text.](#)

specific comments

1. L422 and elsewhere: open-ended lines is a term which is used, and is somewhat self explanatory, however it would help to define it for those not within this field. e.g. it is not clear whether these lines are designed like this, or if they should have a cap on the end but for some reason the cap has been left off.

Response. [The definition of an open-ended line is now included in the text.](#)

[Lines 423-425: "An open-ended line refers to a pipe or tubing that is not sealed at one end, and therefore remains open to the atmosphere, allowing all gas to be vented to the atmosphere".](#)

2. L554 and 577: what are the Tier 1 EFs for developing and developed countries? Presumably the currently used EFs for reporting are quite different to what you have derived. This value would be useful to compare with the EF you have derived, eg in the conclusion as a comparison (and earlier when you discuss the IPCC methodology).

Response. Based on the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, the TIER 1 EF for fugitive emissions from the onshore conventional oil production are 1.5×10^{-6} to 3.6×10^{-3} and 1.5×10^{-6} to 6.0×10^{-2} Gg per 10^3 m³ conventional oil production for developed and developing countries, respectively. However, our estimates only cover emissions from oil production sites and these IPCC factors include emissions from the entire upstream segment thus a direct comparison is not feasible. Therefore, to avoid confusion, we have chosen not to include these specific numerical figures in our discussion.

technical corrections

3. L67 and later: % symbol should not have a space before it, i.e. it should be 25% and not 25 %

Response. This is now corrected throughout the text.

4. L75 L80: Is Global Methane Tracker 2022, 2022 correctly referenced? Just checking, as it looks odd with 2022 appearing twice

Response. Thank you for pointing this out. We have updated the reference.