I read manuscript titled: **Methodology and uncertainty estimation for measurements of methane leakage in a manufactured house,** with great interest. First of all, I have to send my appreciation to the authors for their thinkings related to the details during the measurements and evaluation. The authors performed measurements in a manufactured house using control release experiment of two tracers quantified quiescent emissions from the house during a 3.5-month study. I recommend this manuscript to be published after addressing the following comments.

General comments:

- When comparing with other studies and inventories please make sure that you compare gas leaks to gas leaks and / or unburnt emissions to unburnt emissions.
- More details are required to clarify the methods and instruments used.
- It would be great also to have statistics about US residence living in a single household and in a complex.
- Possibly further statistics can be added to the manuscript understanding impact of e.g. wind speed on the Air Change Rates (ACRs) and error related to emission quantifications.

Detailed comment:

L27 – As methane reduction is meant to slow down global warming at shorter period of time, it is recommended to write global warming potential of more than 80 times relative to CO_2 over 20-year time horizon.

L43 – This long-tail has been observed in almost all studies resulting that few emitting sources contribute significantly to the total emissions. I am wondering how many houses do you need to measure to possibly see this long-tail and how this differs from a state to another? What sampling strategy do you think can address this concern?

L43 – In the calculation of the 15% contribution to total methane emission in California, unburnt methane from pilot is included. According to the Fischer et al. (2018) emissions from pilots contribute 30% to the household emissions. As it is written here, it reads that the quiescent emissions contribute 15% to total, please clarify. On another note, I assume pilots were off in your studies, is that right?

L74 – It is great that the study was conducted over relatively long period, however I am wondering how quiescent emissions can show seasonal variability. Maybe temperature could be a reason but then my question is: is it possible that leaks are emitting higher in warmer season due to possible thermal expansion?

L87 - As I search over the net and compared ACRs, it seems that manufactured house is among house which are air-tight. Is it possible to apply your method to houses with bigger ACR? Possibly those houses are among bigger quiescent emitters due to older/aged technology within the natural gas piping?

L90:92 – Please provide details about manufacturers of the instruments you used in your study.

L126 – Please add details about the flowmeter, see the comment above.

L135 – Please add ‘to’ after ‘in order’.

L185 – Please see the comment for Figure 2.

L240 – If possible, could you please elaborate how it would be possible to capture those possible emissions? I am wondering how significant those emissions are relative to total emissions.

L257 – I don't see an analysis over impact of wind speed and ACR in your manuscript. Would it be possible to see how wind speed impact the ACR and/or favourable wind speed in which it is recommended to perform the emission measurements? Maybe you can look at the error during the injection period and check the results against wind speed logs. It's not clear to me where you possibly have access to the wind speed logs, the stations in Arlington, Virginia (Karion et al., 2020) is abit far though for this analysis.

L320 – This is right, please elaborate, see comment related to L240.

L361 – This ACR falls into the range for the tight-air houses, how representative this range can be for the normal houses in use? On another note, can you use this method for the high rise buildings If possible, please elaborate in the manuscript accordingly.

L365 – Please see Figure 7 from this link for these link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5369024/

Figures:

Figure 1 – It seems like that the injection and sampling points are relatively close to each other compared to the size of the house. How did you ensure that the tracers are well-mixed during in the volume of the house during sampling? Could you please add information about strength of the fan used for the indoor circulation?

Figure 2 – Just out of curiosity, what are those spikes in the outdoor raw measurements happening around midnight on both days?

Figure 6 – (similar to the comment for L310:313) the triangle dots show that while natural gas furnaces are active, total emissions from the house is higher, this can be investigated further to understand methane emissions from active furnaces including incomplete combustion.

Note 1: Would it be possible to leave the manufactured house in one state over long time and see if the house's gas meter change over time indicating amount of quiescent emissions over a long time to drive daily emissions? I assume the quiescent emissions per day is small enough not to be observed by a gas meter.

Note 2: How often the gas-related pipelines and utilities in this manufactured house go under maintenance? Is it similar to the maintenance frequency of normal houses?

Note 3: Further research efforts are required to complete the indoor household emissions to achieve representative sample size for different types of houses including different natural gas-related infrastructure.

Reference:

Fischer, M. L., Chan, W. R., Delp, W., Jeong, S., Rapp, V., and Zhu, Z.: An Estimate of Natural Gas Methane Emissions from California Homes, Environmental Science & Technology, 52, 10205-10213, https://doi.org/10.1021/acs.est.8b03217, 2018.

Karion, A., Callahan, W., Stock, M., Prinzivalli, S., Verhulst, K. R., Kim, J., Salameh, P. K., Lopez-Coto, I., and Whetstone, J.: Greenhouse gas observations from the Northeast Corridor tower network, Earth Syst. Sci. Data, 12, 699-717, https://doi.org/10.5194/essd-12-699-2020, 2020