

Review of ESSD-2019-127:

**A global gridded (0.1° x 0.1°) inventory of methane emissions from oil, gas, and coal exploitation based on national reports to the United Nations Framework Convention on Climate Change**

This paper presents a new gridded inventory of methane emissions from the oil, gas and coal sectors for 2016. This paper does not present large scientific developments but rather acts as a companion to the emissions dataset, which is publicly available. The paper and dataset represent a significant advance for bottom up inventories and prior model emission estimates, and as such this is ideal for publication in Earth System Science Data. The manuscript is well written and clear, and figures are high quality. I recommend publication following minor revisions as described below.

**Comments:**

- P2 L17-20: You list these other gridded CH<sub>4</sub> inventories here but do not seem to compare to them later. I would like to see a comparison to at least some of them added, since at the moment you only compare to EDGAR, which is not sectorally resolved.
- P3 L19: Why did you choose the year 2016? Comment on 2016 emissions in the context of interannual emission trends in emissions eg. was it a particularly low/high/normal year? Can you add a figure showing interannual emissions from these sectors and perhaps subsectors also for a relevant time range eg. 2000-2019?
- P4 L3-5 seems to relate to P3 L30 with other information in between – this paragraph could be restructured to present the information more clearly.
- P4 L27-31: You say “notably” to one or two countries for each case here. Are these the only countries for each case? Or the only countries with emissions above a certain level? If the latter, what cut off level did you use to define “notably”?
- P5 L10-11: How old were the estimates in the US inventory? Is the balance between sectors likely to have changed eg. as the energy landscape has changed? Did you need to account for this at all?
- P5 L18-19: DrillingInfo.com is now enverus.com. Change in your reference list so that the link continues to be valid but add info also relevant to when you accessed it.
- P6 L3-4: Again you use “notably” – please state more clearly how you defined this, eg. “the top five emitters in this category were...” or similar.
- Section 2.3: This is not my area of expertise but forms an important part of this paper. If the second reviewer is also not expert in this area I would consider getting the opinion of a third reviewer on error treatment within this dataset.
- P8 L25-26: similar...to
- P8 L28: Why would the Global Carbon Project bottom up estimates be so much higher than your estimate? What differences are there in the calculation approach that would cause this?
- P10 L19: How valid is this assumption, ie. what do you mean by “slowly”? Can you give a time and error range? Perhaps using activity data for 2013 emissions is fine but 1990 or 2030 emission spatial distribution may not be similar.

- Figure 1: It would be nice if you could combine in this a schematic image of each sector, to give a visual representation of the different stages contributing emissions.
- Figure 3: Add the cumulative % of emissions for each sector to this figure.
- Figure 4 and 5: The grey background makes the figure harder to interpret; please change to a white background like Figure 2.