

## ***Interactive comment on “Concurrent variation in oil and gas methane emissions and oil price during the COVID-19 pandemic” by David R. Lyon et al.***

### **Anonymous Referee #1**

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**General remarks** This is an interesting paper, and likely a precursor of a heavily populated suite of studies to come, looking at the many profound impacts of the pandemic. The paper strives to show that methane emissions from the US Permian Basin are closely linked to the oil price and hence to major economic factors such as the impact of Covid.

I have a general comment and some very minor specific notes listed below. The general comment is that the paper links emissions to oil price, not to gas price. Yes, I agree that gas emissions from oil production are important, but surely the obvious first link will be gas price rather than oil price? There is a gnomic remark in the abstract:

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"a state of overcapacity in which...production exceeds midstream capacity and leads to high methane emissions". This then leads to the statement in L 407 "consequence of associated gas production increasing at a faster rate than midstream infrastructure capacity, which leads to extensive flaring and anomalous conditions related to excess gas throughput (e.g. pressure relief venting)." I'm not wholly clear here. Does that mean that more oil is being produced (because the oil price has gone up) and because the associated gas cannot go down the over-stuffed pipe, it is then vented? OK, might be so, but that hypothesis appears out of nowhere...Maybe explain this a bit more?

The paper has been rapidly done, but the findings appear soundly based and very interesting indeed. Publish with minor revisions.

### Specific Comments

Page 2 Line 35 maybe an extra line to explain further this huge discrepancy? P2 L38. Paragraph break before 'The Permian Basin...?' P5 Fig 2 caption needs to give the sources of data for this plot. P6 L115 "used 'the' Weather..." P7 L134 and also L136. Delaware sub-basin? P7 L143 the emissions magnitude....are not. Trivial comment but the subject - 'magnitude' - is singular! Maybe say magnitudeS...(apologies – too much zoom frizzles the brain) P9 L183 – likewise – timeS....are adjusted P10 L215 – dramatic rechange??? What does that mean? P10 L224 – remove 5 days - this is a bit obscure: I'm not sure what is meant here. Explain further? Is this simply excluding 3-sigma outliers? What's the impact of leaving them in? – in gasfield leaks the outliers can be significant. P14 L274 and also L288 – is there a connection between weather (i.e. clouds) and emissions? Is the prevalence of cloudy days in any way linked to the amount of gas pumped (and vented)? – or is the market so far away that distant gas demand and local weather are wholly disconnected. I'd assume most demand is from electric power needs (and heating) in Texas and nearby states? Is that correct? P21 L368-370. "Pandemic-related oil price crash" – yes, but this remark needs to be buttressed by a reference or other factual proof. A casual concurrence is not necessarily proof of a causal connection. Also this is oil price. All this discussion

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has its focus on oil price, not gas. ...How about Henry Hub gas price?- surely that is the parameter to postulate as the controlling factor, not oil price? – although I'd agree that contractual gas prices tend to be ratio-ed to oil price. P20 and 21 "G&P" – acronym soup – I know this is defined in L 378 but why not say 'gathering and processing'. It's not much longer and saves a lot of misery. O&G is another, especially as the paper conflates gas price into oil price.

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