

## ***Interactive comment on “Timely estimates of India’s annual and monthly fossil CO<sub>2</sub> emissions”*** **by Robbie M. Andrew**

**Anonymous Referee #2**

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General comments: The paper addresses an extremely important aspect of the timeliness of India’s GHG inventory reporting. Several data limitations and inconsistencies are rightly identified and an effort has been made to solve these, e.g. the differences in reporting intervals of coal production. The dataset provided here is extremely useful not just as activity data for CO<sub>2</sub> emissions but also for other GHGs. Overall, the author has put in a great deal of effort into the paper and the supplement, which must be appreciated.

Specific comments: Attending to some of the concerns below, to the extent possible, might further enhance the usability of this dataset:

1. Page 1, Lines 27-31 note the role of renewable growth towards the stabilizing trend in CO<sub>2</sub> emissions. It is also useful to point out here the opinion of some experts from

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the literature that the shortage in coal production has taken due to a combination of complicated factors (land rights, political issues etc.). The following case study makes an excellent assessment of this, and I recommend 1-2 lines on such factors:

Carl, J. (2015). 4 The causes and implications of India’s coal production shortfall. *The Global Coal Market: Supplying the Major Fuel for Emerging Economies*, 123-163.

2. In Page 1, Lines 38-40, it might be useful to point out (if applicable), that the third-party reporting through agencies by IEA might not be open-access and that adds to the utility of this dataset.

3. Page 3, Lines 3-9: I appreciate the explicitness in mentioning the difference in accounting only for combustion based emissions and overall oxidation. In the same vein, a line could be added here (or later) that future inventories could add additional emissions such as CO<sub>2</sub> emissions due to spontaneous emissions from coal mines; see following the reference and the recent 2019 IPCC Refinements:

Carras, J. N., Day, S. J., Saghafi, A., & Williams, D. J. (2009). Greenhouse gas emissions from low-temperature oxidation and spontaneous combustion at open-cut coal mines in Australia. *International Journal of Coal Geology*, 78(2), 161-168.

Singh, A. K. (2019). Better accounting of greenhouse gas emissions from Indian coal mining activities – A field perspective. *Environmental Practice*, 21(1), 36-40.

4. Page 3, Line 41 of main manuscript and section 6 of the Supplement: The authors note using the 2006 IPCC Guidelines default emission factors. However, Indian experts have developed national emission factors which have been vetted and included in the IPCC Emission Factor Database. I recommend using these emission factors either directly or at least for a sensitivity analysis to look at the difference between default and country-specific emission factor.

5. With respect to Figures 12-14 of the supplement, is it possible to decompose the coal production further into surface- and underground-mined coal (either directly or

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through % estimates from other sources)? That would make the dataset immediately usable for other applications such as methane estimation studies or life-cycle GHG studies.

6. In Page 5, line 4: Why does the author apportion the peaking of natural gas emission rise to use as peaking plants? I understand that the use of word “perhaps” conveys uncertainty but I welcome the author to convey the reason for their speculation.

7. Page 5, Lines 10-14 make important observations about variation of CO<sub>2</sub> emissions per year. The Government of India’s INDC mentions its target as reduction of the GHG intensity (or GHG/GDP) by 33-35%. Therefore, in addition to comparing the GHG emissions, it might be useful to compare the CO<sub>2</sub> emissions per unit GDP as well to gauge consistency with the above goal.

8. Page 7, Lines 1-2 note the local peak due to KG-D6 basin. Additionally, do the authors have reason to believe that some emissions in the gas sector might have been due to the increase in coalbed methane production as well?

9. Page 7, Lines 3-4 mention stranded assets and it might also be useful to mention additional literature discussing potential stranded assets as climate restrictions come into force:

Malik, A., Bertram, C., Després, J., Emmerling, J., Fujimori, S., Garg, A., ... & Shekhar, S. (2020). Reducing stranded assets through early action in the Indian power sector. *Environmental Research Letters*, <https://doi.org/10.1088/1748-9326/ab8033>.

10. In Page 9, Lines 12-21 where authors point out the COVID-19 effects, it could also be mentioned that this dataset could be used as a correlation to the top-down effects on air pollution reported for Indian studies. This, in my view, further enforces the need for such a dataset.

11. Page 10, Lines 2-4 make an interesting point about imported urea use. Is it fair to assume that this is another reason why the emissions data in the paper track with the

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government data as it is also the case for the UNFCCC data reporting practices?

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