

Interactive comment on “CO₂ emissions inventory of Chinese cities” by Yuli Shan et al.

Anonymous Referee #2

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Comment on “CO₂ Emission Inventory of Chinese Cities” by Shan et al. In this manuscript, the authors tried to develop “consistent” methods to estimate the CO₂ emission in 20 Chinese cities. Different methods are used to compile the CO₂ emission inventory based on the availability of energy consumption and production data. Although I can see the efforts they made to improve the estimation of CO₂ emission at the city level, I don't see the scientific significance of this manuscript. Here are my general comments regarding the quality of the manuscript:

1. Overall, the manuscript is not well structured. For example, section “4.1 City choice” can be introduced earlier in the methodology section. The Introduction and Literature Review sections are connected to each other, and it is more appropriate to combine them into one. The Discussion section is totally missing from the manuscript. The tables/figures are not well ordered (e.g., the table S5 is mentioned before table S2, S3, S4).

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2. The originality/novelty of the manuscript is not clear based on the Introduction and Literature Review sections. As displayed in the literature review, the city-level CO₂ emissions are already studied in some previous research. The authors suggested that, in the past research, “Above all, there is no unified and consistent compilation method for Chinese cities’ CO₂ emission inventory;”. However, I don’t see the consistency of the methods used in this research either. Different methods are used to estimate the CO₂ emission in different cases, and there is no calibration to verify the consistency of the results based on these different methods. The authors need to clarify what is the originality of their research compared to the past studies.

3. The whole discussion section is missing in the manuscript. The authors simply listed the results in the manuscript, with little interpretation. What do you find from these results, and how do you explain these findings?

4. In the conclusion section, the authors reached two major conclusions: 1) “The first path is reducing the coal share in the energy mix and replacing by low-emission energy types, such as nature gas.” 2) “The other way to control CO₂ emissions in Chinese cities is reforming the industrial structure with less heavy emission intensity manufacturing industries and more service sectors.” These conclusions are universally true for the whole world. Do you really need the city-specific research to get these two general and well-known conclusions? The difficulty is how to replace coal with natural gas, and how to reform the sectors? The authors should make more specific conclusions that are related to their research and based on the interpretation of the result.

Here is a list of specific comments that may help the authors to improve the quality of the manuscript:

1. L28: It is too arbitrary to say this. Some climate policy/goals may not rely on the emission sources, for example, urban planning and land uses.

2. L34: These numbers are questionable. The world’s total population is only 220

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million / 0.13 = 1.7 Billion in 1990? This is too small.

3. L52: "table" should be "tables"

4. L66-84: The tense is not consistent in the review of past research. The present tense and past tense are messed up.

5. L67: "sectors set" should be "sector sets"?

6. L70-72: Is it for one city, or multiple cities, or for the whole world?

7. L72-75: This sentence is confusing. It seems "their" sometimes refers to the "researchers", and sometimes refers to the "factors". Also, the subject is missing in the second part of the sentence. "Who" analyse their influence?

8. L88: What is scope 1 and 2? Please explain.

9. L93: "to" seems redundant here.

10. L93: it is not clear how the authors concluded "there is no unified and consistent compilation method....." based on the above paragraph that discusses the CO2 emission inventories in China. The compilation methods are not discussed clearly. Are they inconsistent within each individual study or between studies?

11. L103: You already mention "it is difficult to define a city's boundary because....." in line 99. It is redundant to mention "This leads to a great challenge in defining a city's boundary" again.

12. L103-105: These two sentences express kind of the same meanings.

13. L106: You can just list the sources here. No need to repeat "data from" again and again. For example, data from city statistical documents, remote sensing images, governmental officials, and reports and literature.

14. L110: It is not necessary to list this sentence as a single paragraph here. You can refer to it where you mention it the first time.

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15. L115: "emissions refer" or "emission refers"
16. L129: Please write out the full words ("SI") the first time you mention it.
17. L130: Why it jumps from Table S1 to Table S5? Table S2, S3, and S4 are not referred to yet. It is best to refer to the tables/figures in sequence.
18. L133: This corresponds to the exclusion of "electricity". What is the reason to exclude "heat consumption"?
19. L143: what does "sj" mean here?
20. L145-158: It is not clear what "The table" means in the whole section 3.2.1. It seems sometimes "the table" refers to the EBT in general, but sometimes it refers to a specific table (e.g., table 2). Please clarify this.
21. L145: What are primary and secondary energy flows? Please explain.
22. L147: You already abbreviated Energy Balance Table as "EBT". It may be better to use it. 23. L150: Table 2 is confusing. It says Table 2 is constructed in four parts in line 150, but the table lists 31 items. The "four parts" are mixed with all other items?
24. L150-158: The explanation of the four parts is confusing. The "four parts" should be defined more clearly and consistently. It is not clear why energy burning consumption equals to "Final consumption" + "Transformation - thermal power / heating supply" – "Loss" – "Non-energy use", what does "Transformation - thermal power / heating supply" represents? Does the "Loss" only represents the "loss during the utilization"?
25. L153: How about the loss during other process, such as production, transportation, and transformation?
26. L161: what does "s" represent here?
27. L168: please explain this formula. What is i , and what are the two numbers here?
28. L174: What is "AD"?

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29. L76: why it starts from 2?

30. L280: the whole section "4.1. City choice" is more appropriate to put in the "Methodology" section.

31. L288: Where is the discussion? It seems the whole discussion section is missing in the paper.

32. L386: What do you mean by "consistent" here? Different methods are used to estimate the CO₂ emission in this paper, and I don't see the consistence here.

33. L388: understanding

34. What do you mean by "most developed"? You need to support your statement when you mention it.

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