

Reviewer 2

In this work, Wang et al. reviewed the current control measures of air pollutants in East Asia, estimated the emission trends of these pollutants for the period 2005-2010, and projected the emissions to 2030 on the basis of two/six emission scenarios/strategies.

The technical part is clearly described and of good quality and the manuscript is well organized. However, there are a number of format issues and numerous grammatical errors. The reviewer suggests a grammar-checking by native English speaker, and recommends the revised manuscript for publication in ACP.

Response: We thank the reviewer for supporting the publication of our manuscript. We also appreciate his or her comments which help us improve the quality of our manuscript. We address the reviewer's comments below. The original comments are in blue and our responses are in black. In response to the reviewer's comments about the grammatical errors, we took special care to assure correct spelling and grammar when revising the manuscript. In addition, we have invited Dr. Michael B. McElroy and Dr. Chris P. Nielsen, co-authors of the manuscript, to help us edit the language of the whole manuscript.

Specific comment:

The reviewer is wondering whether it is possible to add a section discussing the uncertainties of emission inventories compiled in this study.

Response: We thank the reviewer for this comment. In the revised manuscript we have performed a Monte Carlo uncertainty analysis of the historical emission inventories, and added a section to discuss the results (Sect. 2.4 and Table S5 in the revised manuscript). The added text is shown as follows:

A Monte Carlo uncertainty analysis was performed on the emission inventories of East Asia during 2005-2010, following the methodology described in Bo et al. (2008) and Wei et al. (2008). Table R1 (Table S5 in the revised manuscript) shows the calculated uncertainties by sector.

During 2005-2010, the average 90% confidence interval of the total NO_x emissions is [-31%, 44%]. The coefficient of variation (CV) is $\pm 25\%$ on average. The uncertainties of emissions vary with emission sectors (see Table R1), attributable to the different magnitudes of uncertainties associated with activity levels and emission factors. Biomass open burning has the largest CV ($\pm 177\%$) because both the activity levels and the emission factors are quite uncertain. The transportation sector has the second highest uncertainty (CV= $\pm 66\%$), as its fuel consumption is calculated from vehicle population, annual average mileage travelled, and

1 fuel economy, rather than the energy statistics.

2 The average 90% confidence interval and CV of the total SO₂ emissions are [-29%, 45%] and
3 $\pm 28\%$, respectively, during 2005-2010. Similar to that of NO_x emissions, the SO₂ emissions
4 from biomass open burning have the highest uncertainty (CV= $\pm 179\%$). The uncertainties of
5 the industrial, residential, and transportation sectors are quite close to each other, with CVs at
6 a range of $\pm 48\%$ - $\pm 51\%$.

7 During 2005-2010, the average 90% confidence interval and CV of the total PM_{2.5} emissions
8 are [-39%, 49%] and $\pm 39\%$, respectively. Biomass open burning is the sector subject to the
9 highest uncertainty (CV= $\pm 216\%$). The residential sector has the second highest uncertainty
10 due to the relatively fewer emission factor measurements for coal stoves and biomass stoves,
11 the dominant PM_{2.5} emission sources of this sector.

12 The average 90% confidence interval and CV of the total NMVOC emissions are [-42%, 67%]
13 and $\pm 42\%$, respectively. The “other sectors”, which include biomass open burning, waste
14 treatment, cooking, and smoking, with biomass open burning contributing over 80% of
15 NMVOC emissions, have the highest uncertainty (CV= $\pm 184\%$), followed by solvent use
16 (CV= $\pm 78\%$), for which the activity levels are not directly available from statistics and the
17 emission factor measurements are lacking. The CVs for the industrial, residential, and
18 transportation sectors are all within the range of $\pm 57\%$ - $\pm 65\%$.

19 It can be seen that NMVOC is the pollutant subject to the highest uncertainty, followed by
20 PM_{2.5}. The high uncertainty of NMVOC emissions is mainly attributable to the lack of local
21 measurements for many industrial and solvent use sources. The higher uncertainties of PM_{2.5}
22 emissions compared with NO_x and SO₂ result from the larger uncertainties in the emission
23 factors (e.g., uncertainties in the emission factors of industrial fugitive dust, uncertainties in
24 removal efficiencies of dust collectors), and a relatively larger share of emissions from
25 small-scale emission sources (e.g., coal stoves, biomass stoves).

26 27 References:

- 28 Bo, Y., Cai, H., and Xie, S. D.: Spatial and temporal variation of historical anthropogenic
29 NMVOCs emission inventories in China, *Atmos. Chem. Phys.*, 8, 7297–7316, 2008.
30 Wei, W., Wang, S. X., Chatani, S., Klimont, Z., Cofala, J., and Hao, J. M.: Emission and
31 speciation of non-methane volatile organic compounds from anthropogenic sources in
32 China, *Atmos. Environ.*, 42, 4976–4988, 2008.

Table R1. Results of the uncertainty analysis of the emissions in East Asia during 2005-2010. The numbers in the table except the last line are the coefficients of variation (CVs). The last line shows the average 90% confidence intervals of the total emissions during 2005-2010. This table is consistent with Table S5 in the revised manuscript.

		NO _x	SO ₂	PM _{2.5}	NMVOC
power plants	range of CVs during 2005-2010	± 33% - ± 35%	± 29% - ± 31%	± 30% - ± 32%	--
	average CV	± 34%	± 30%	± 31%	--
industrial sector	range of CVs during 2005-2010	± 39% - ± 44%	± 47% - ± 51%	± 49% - ± 57%	± 62% - ± 64%
	average CV	± 41%	± 49%	± 53%	± 63%
residential sector	range of CVs during 2005-2010	± 55% - ± 56%	± 49% - ± 53%	± 67% - ± 69%	± 61% - ± 69%
	average CV	± 55%	± 51%	± 68%	± 65%
transportation sector	range of CVs during 2005-2010	± 63% - ± 70%	± 47% - ± 49%	± 52% - ± 53%	± 53% - ± 60%
	average CV	± 66%	± 48%	± 52%	± 57%
solvent use sector	range of CVs during 2005-2010	--	--	--	± 74% - ± 81%
	average CV	--	--	--	± 78%
other sectors (mainly biomass open burning) ^a	range of CVs during 2005-2010	± 172% - ± 183%	± 163% - ± 196%	± 212% - ± 220%	± 183% - ± 186%
	average CV	± 177%	± 179%	± 216%	± 184%
total emissions	range of CVs during 2005-2010	± 23% - ± 26%	± 25% - ± 30%	± 37% - ± 40%	± 41% - ± 43%
	average CV	± 25%	± 28%	± 39%	± 42%
	average 90% confidence interval	[-31%, 44%]	[-29%, 45%]	[-39%, 49%]	[-42%, 67%]

^a "Other sectors" represent biomass open burning for NO_x, SO₂, and PM_{2.5}; for NMVOC, they include biomass open burning, waste treatment, cooking, and smoking, with biomass open burning contributing over 80% of the total NMVOC emissions from these sources.

Format issues:

According to the style of the ACP, tables “should be numbered sequentially”. However, in the main text, Table 2 occurs earlier than Table 1; Table 6 occurs earlier than Table 5; and Table 8 occurs earlier than Table 7.

Response: We appreciate the reviewer’s careful check. We have revised either the sequence of the tables or the citations in the main text to assure that all the tables are numbered sequentially.

Page 2602, line 10. “FGD” should be defined at first occurrence.

Response: We have added the full name of “FGD” (flue gas desulfurization) at its first occurrence. (Page 1, Line 24 of the revised manuscript)

Page 2604, line 9. Page 2609, line 4. Page 2639, line 12. Page 2640, line 24. Zhao et al. (2013d) is not in the reference list or “d” is not added to the last literature of the References.

Response: We appreciate the reviewer’s comment. We did include Zhao et al. (2013d) in the manuscript but it was dropped during the typesetting process. We apologize for this. We will make sure it is modified before the final revised paper is published.

Page 2609, line 27. Page 2610, line 22. UNEP (2010) is not listed in the References. The reviewer did not see NDRC (2007) was cited in the main text.

Response: We have deleted NDRC (2007) and added UNEP (2010) in the reference list. United Nations Environment Programme (UNEP): Overview of the Republic of Korea's National Strategy for Green Growth, United Nations Environment Programme, Geneva, Switzerland, 54 pp., 2010.

Caption of Fig. 1. Add “in China” after “standards”.

Response: Revision has been made.

Page 2 of the SI. “(c) PM” should be “(3) PM”.

Response: Revision has been made.

Some examples of grammatical errors in the first 27 pages:

Page 2602, line 21. Add commas before and after “respectively”. Correct it throughout the

- 1 manuscript.
- 2 Page 2603, line 5. Change “reports” to “reported”. Change “contribute” to “contributes”.
- 3 Page 2603, line 8. Change “calculation” to “calculations”.
- 4 Page 2603, line 10. Change “rate” to “rates”.
- 5 Page 2603, line 25. Add “the” before “Kyoto”
- 6 Page 2604, line 5. Change “estimation” to “estimations”.
- 7 Page 2604, line 24. Add a comma after “Hence”.
- 8 Page 2605, line 5. Change “incorporate” to “incorporated
- 9 Page 2605, line 6. Add “a” before “full”.
- 10 Page 2605, line 8. Add “the” before “annual”. Change “reduction” to “reductions”.
- 11 Page 2605, line 25. Add “the” before “model”.
- 12 Page 2606, line 13. Add “a” before “special”.
- 13 Page 2607, line 12. Add “the” before “rapid”.
- 14 Page 2607, line 13. Add “the” before “lower”.
- 15 Page 2607, line 18. Add “the” before “rapid”.
- 16 Page 2608, line 12. Add “of” before “coal-fired”.
- 17 Page 2608, line 18. Change “share” to “shares”.
- 18 Page 2609, line 9. Add commas before and after “respectively”.
- 19 Page 2609, line 14. Change “inspection” to “inspections”.
- 20 Page 2609, line 17. Add commas before and after “respectively”.
- 21 Page 2609, line 23. Add “the” before “energy”.
- 22 Page 2609, line 26. Add “the” after “through”.
- 23 Page 2610, line 5. Add “the” before “stable”.
- 24 Page 2611, line 27. Add commas before and after “respectively”.
- 25 Page 2612, line 18. Add “the” before “large”.
- 26 Page 2612, line 25. Add “the” before “commercial”.
- 27 Page 2613, line 25. Add “a” before “small”.
- 28 Page 2614, line 8. Change “requires” to “require”.
- 29 Page 2614, line 21. Change 3 “furnace” to “furnaces”.
- 30 Page 2615, line 9. Add commas before and after “respectively”.
- 31 Page 2615, line 20. Change “Previous” to “A previous”.
- 32 Page 2615, line 22. Change “accounted” to “accounting”.
- 33 Page 2616, line 4. Change “is” to “are”. Add “the” before “national”.

- 1 Page 2616, line 5. Add a comma before “respectively”. Correct it throughout the manuscript.
- 2 Page 2618, line 3. Add “the” before “agreement” and “development”.
- 3 Page 2618, line 16. Add “the” before “estimation” and “vehicle”.
- 4 Page 2618, line 17. Change “regulations” to “regulation”.
- 5 Page 2618, line 28. Add “in” after “installed”.
- 6 Page 2619, line 22. Change “standard” to “standards”.
- 7 Page 2620, line 3. Change “accounts” to “account”.
- 8 Page 2620, line 21. Change “/” to “and”.
- 9 Page 2621, line 2. Add “the” before “transportation”.
- 10 Page 2621, line 5. Add “the” before “industrial”.
- 11 Page 2621, line 8. Change “emission” to “emissions”.
- 12 Page 2621, line 12. Change “improving” to “improved”.
- 13 Page 2622, line 12. Add “the” before “slower”.
- 14 Page 2622, line 18. Add “the” before “transportation”.
- 15 Page 2623, line 20. Change “scenarios consistent” to “scenarios which are consistent with”.
- 16 Page 2623, line 27. Add “the” before “urbanization”.
- 17 Page 2624, line 1. Add “the” before “PC” and “BAU”. Correct it throughout the manuscript.
- 18 Page 2624, line 1. Change “scenarios” to “scenario than”.
- 19 Page 2624, line 3. Change the comma before “therefore” to a semicolon.
- 20 Page 2624, line 10. Add “the” before “residential”.
- 21 Page 2624, line 11. Add “the” before “urban” and “rural”.
- 22 Page 2624, line 13. Add “the” before “implementation”.
- 23 Page 2624, line 26. Change “larger” to “higher”.
- 24 Page 2625, line 19. Add “the” before “slow”.
- 25 Page 2625, line 23. Add “the” before “transportation”.
- 26 Page 2626, line 6. Add “the” before “maximum”.
- 27 Page 2626, line 12. Add “and” before “the progressive”.
- 28 Page 2626, line 23. Add “a” before “total”.
- 29 Page 2627, line 25. Add a comma after “i.e.”. Correct it throughout the manuscript.
- 30 Caption of Table 2. Add “the” before “power”.
- 31 There are more: : :
- 32 Response: We sincerely appreciate the reviewer’s detailed comments. We have revised all the
- 33 grammatical errors listed above. For such errors like “Add commas before and after

1 'respectively'", we have corrected it throughout the manuscript. Besides, while revising the
2 manuscript we took special care to assure correct spelling. Finally, we have invited Dr.
3 Michael B. McElroy and Dr. Chris P. Nielsen, co-authors of the manuscript, to help us edit
4 the language of the whole manuscript.
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