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Atmospheric Chemistry and Physics Discussions



# *Interactive comment on* "Projecting future HFC-23 emissions" *by* B. R. Miller and L. J. M. Kuijpers

**Anonymous Referee #2**

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In this paper, Miller et al. provide three scenarios for HFC-23 emissions and concentrations from co-production of HCFC-22, up to 2035. The authors estimate that without additional mitigation policies, emissions in 2035 would be 24 ktonnes/year (in the reference scenario) or 0.35 GtonCO2-eq, and HFC-23 concentration would be 50ppt. This work's novelty includes the use of a bottom-up approach for HCF-23 emissions accounting and future pathways, using dispersive and feedstock sources in developed and developing countries, and under several scenarios for incineration of HFC-23 formed as a co-product in HCFC-22 manufacture. The other important aspect is the incorporation of the impact of the 2007 changes in the Montreal Protocol.

The assumptions and method are well described and clear, and the authors do include a comparison of their scenarios with previous work. However, the contribution to the literature from this work is incremental and by no means groundbreaking. I recommend the authors consider the inclusion of the issues outlined below.



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In page 3, Line 1, the authors state that “Due to the fact that if finds little industrial use, HFC-23 is often overlooked [. . .] or relegated to a relatively trivial role [. . .] in projections of climate change”. Currently, US annual CO2eq emissions alone are in the order of 7,200 million metric ton CO2 eq. (and world’s emissions something in the order of 30,000). In the authors’ worst-case scenario, or what they call the “less mitigation scenario”, by 2035, emissions of HFC-23 would be 350 million metric ton CO2 eq (or 5% of US annual emissions today, or 1% of global emissions today). Therefore, it strikes me that the relegated role is more due to the low importance that HFC-23 plays in the grant scheme of things. Setting the stage for the relevance of these estimates in global scenarios should be part of the introduction of this piece.

In page 3, Line 15 onwards, the authors state “HCF-23 is produced within the confine of a relatively small number of manufacturing facilities, where it may be destroyed efficiently through high temperature incineration. Thus, the anticipated inseparability of industrial growth and HCFC-22 manufacture suggests that mitigation of HFC-23 coproduction will be an important focus of policy makers seeking cost effective means of reducing GHG emissions [. . .]”. While the small number of manufacturing facilities might lead to a lower cost of abatement, can you expand the text and provide figures on the costs of high T incineration? Is that in fact cheap, therefore making this a cost-effective strategy?

The authors assume that HCFC-22 production (from feedstock use) is extrapolated based on GDP growth (as did Ottinger Schaefer et al., 2006). Due to that, HFC-23 emissions from feedstock form developing countries (and therefore the authors’ assumptions about China’s GDP growth) seem to be the key assumption driving the growth trend in HCFC-22 global emissions (see for example Figure S2), so I would like to see how sensitive are your projections to that single assumption.

Still regarding the use of GDP as a proxy for HCFC-22 production, this reviewer would like to see the regression and fit between GDP and HCFC-22 production. Is using GDP as a proxy a good assumption?



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Regarding Figure 3: What is the best regression fit for the historical data over time, and what would happen if you used that very simple regression as a projection? How would that differ for your reference scenario? My guess is that it wouldn't be too different from these elaborate scenarios; given your summary of results in page 11, line 5.

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Interactive comment on Atmos. Chem. Phys. Discuss., 11, 23081, 2011.



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Interactive Comment