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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Global emissions of fluorinated greenhouse gases 2005–2050 with abatement potentials and costs" *by* Pallav Purohit and Lena Höglund-Isaksson

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General Comments From a study of the paper and its supplement on the analysis of emissions sources, abatement costs, and specific cost figures, the approach is in principle very much OK. However, there is one issue. The authors say that this publication builds further on other publications and they often refer to a small number of specific publications in the field, where there are many more, in my perception. Some questions therefore remain whether this publication brings the knowledge needed to a higher level, whether the overall conclusions are the right ones to draw for both developed and developing countries, emitting HFCs, PFC and SF6, whether there is not more quantitative to say on what could not be done (and how it could be done in fu-

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ture), and where that leaves us, or rather, what the authors perceive as the status to build further upon.

Approaches, ways of conducting the study Of course, it is interesting to include in the analysis all kinds of HFCs, PFCs but also HCFCs. However, HCFCs are almost being phased out in developed countries, are being phased out in developing countries with strict guidelines for funding HCFC conversions. The inclusiveness of the HCFCs here, in this study, is still a bit beyond my understanding, in so far, what it exactly leads to in the analysis. Furthermore, one question here, is it known to the authors what is actually the case concerning how HCFCs are dealt with under the MP? Table S3 on page 17 (supplement) mentions that there are HCFC emission schedules as compliance issues. There are none, it is pure the consumption and production that is MP controlled (and is compliance oriented) and from which emissions have to be derived, which is (as noted by the authors) a very difficult task for the developing countries.

Going to the conclusions, it mentions percentages for all kind of sectors, HFCs in RAC (HP?), foams, aerosols etc. But also HFC-23 and PFC and SF6. Where PFC-SF6 sectors are well reported to the UNFCCC, and certain reasonable estimates can be made for PFC emissions in developing countries in the so called baseline scenario defined here, there is another important issue. It is not the reporting of emissions from certain uses in the developed countries, but the lack of reporting by the developing countries where one states that there will be a growth of a factor of 5 or more in 40 years. In fact, of the non PFC-SF6 and non-HFC-23 part so to say, RAC (and MAC) form 80% of the total consumption (and emissions?), definitely so in the developing countries. One can do a lot of precise analysis and apply all kinds of methods to derive abatement costs, but with these big unknowns, what is the overall (global) value of the conclusions? In fact this is already stated in section 2.2., activity data, where the references are limited that are related to UNEP, and in my opinion they are not always the most appropriate or up-to-date ones.

Detailed comments One comment, on the issue of the separation in regions, it is ac-

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tually less important to have the regions very specific in the developed world (apart from maybe 3-5 regions), but they should be specific for the developing country world (not much of a detailed analysis). Efforts have been done by (Velders, 2015), but that activity is still ongoing. Lacking here is a much more specific analysis to regional approaches via bottom up calculation methods for R/AC such as in Ademe's RIEP model (by Clodic et al. in France), or in the USEPA vintaging model.

On the issue of the RAC and MAC sector, and the alternatives, and costs - Table S6 gives alternatives, but seems to be supported by a limited number of technical sources that deal with these, and does not present (in my opinion) a full scale of all options as should be presented in 2016 - Table S6 should be more underpinned with the references and the sort of statements made in those, in this way it has limited value - As an example also, the text as given on page 6, lines 5-15 on application of ammonia is a bit simplistic, too straightforward, there are many more issues involved, not only toxicity which seems to play no role - I also notice that a number of UNEP assessment and UNEP TEAP reports 2008-2016 are missing. Once one (1) reference (page 13, line 24) is made to a TEAP report (UNEP, 2009), but I cannot find that reference in the list, and there have been numerous (TEAP) reports after 2009, by the way - Most questions are raised by Table S2 on page 4 of the supplement. It is not the issue that the GWP of HFC-134a in AR5 is NOT 1550 (but 1300), it also raises issues whether other GWPs have been used correctly (which are not always specified). No, it is in fact that for specific application sectors, the shares of certain (HCFC?) HFC refrigerants (say the share of certain sub-types of products) are assumed via a simple statement. Is this all coming from one reference source, is that enough, is that source up to date, do these values apply to developed and developing countries, are these values taken from one year, and will these be valid during the entire period up to 2050 ?

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