

“Forty years of improvements in European air quality: the role of EU policy-industry interplay” by M. Crippa et al., ACPD 15, C5896-C5899, 2015

The authors are grateful to Referee #1 (R. Maas) for the interest and comments on the paper. In this author comment we outline how we will address in our revised manuscript his major remarks.

Referee #1 discusses the difference between a decomposition analysis (as in Rafaj et al., 2013), and our analysis framework. His main criticism is about the STAG-FUEL scenario (fuel consumption and fuel mix remain constant from 1970-2010), and suggests that it implicitly assumes additional energy policy measures that would compensate for increased fuel use to match the growth of GDP.

We agree with the interpretation of Referee #1 of the scenarios as “hindsight” scenarios, but would also like to stress that we did not perform a causality analysis of emissions and its potential drivers. For further reference in the climate-energy framework, we refer to the publication of Paruolo et al. (2014), or work performed by the EEA. Instead the results are based on reported changes in human activities (energy- or agriculture-related) and are not a model result of a projection based on population or GDP. For this reason we choose to use 2010 as reference and not 1970.

Our paper does not follow the decomposition approach of Rafaj et al. (2013), but we agree that a better comparison is needed, highlighting where the paper confirms the results of Rafaj and what additional messages are resulting from our analysis. In summary, our paper aims at assessing the impacts of the European emission reductions (and as such policies in general) on health and crop production, not only in Europe, but also globally and goes beyond the evaluation of different emissions scenarios.

The authors fully agree with Reviewer #1 (and Reviewer #2) that there is a need to separate the effect of the energy demand (in TJ) and the effect of the fuel shifts. Indeed STAG_FUEL considers a composite of these effects. Therefore in our revised manuscript we propose to evaluate it with the energy consumption of 2010 compared to 1970 keeping the fuel mix equal to 2010. This scenario is however not so interesting and we propose to shift it to the supplementary. We however propose to retain the STAG_FUEL scenario for two reasons: 1) the scenario has meanwhile been used by a number of climate modelers in the PEGASOS project, and needs to be documented 2) the comparison of the STAG_EFFICIENCY (described below) and the STAG_FUEL allows the assessment of the importance of the different fuel mixes in 2010 and 1970.

We propose to add an additional scenario where we analyse the effect of the energy efficiency in a STAG_EFFICIENCY scenario, which analyses the energy efficiency improvement partially due to climate policy measures, partially to the development of machines with lower fuel consumption. The comparison of the STAG_EFFICIENCY and the REF_2010 allows the observation of the benefits of reduced fuel consumption (per kWh electricity generation or per vehicle’s km driven) with the 2010 technology.

References

Paruolo Paolo; Murphy Ben, Janssens-Maenhout Greet, 2015, Do emissions and income have a common trend? A country-specific, time-series, global analysis, 1970-2008, Stochastic Environmental Research and Risk Assessment, vol. 29 no. 1 p. 93-107, doi:10.1007/s00477-014-0929-9.