

Interactive comment on “EDGAR v4.3.2 Global Atlas of the three major Greenhouse Gas Emissions for the period 1970–2012” by Greet Janssens-Maenhout et al.

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Dear Dr. Andrew (dear Robbie),

We would like to thank you for the positive and constructive review. We reply here underneath to the comments you raised point by point.

Regarding the comments raised: Page 4, lines 19-25: The authors agree to include a simple opening sentence and propose: "Annual country-specific emissions are calculated using international activity data and emission factors, updated according latest scientific knowledge and following IPCC (2006) methods." The next sentence starts

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then with: "Emissions (EM) . . ." (PS: We do distinguish between the term "national = made within the country" and "country-specific = representing the country-territory". This terminology was agreed with the European Commission Directorate-general Climate Action: for which the national inventories are only received by the countries, whereas EDGARv4 is providing country-specific inventories, estimated with international statistics and emission factors, representative for a given territory".)

Page 4, line 29: "Uncontrolled" means: without end-of-pipe abatement. Formula (1) is the standard formula for the emission calculation of any gas, GHG or air pollutant, in EDGAR. While for GHG there are no end-of-pipe abatements active. for air pollutants the end-of-pipe abatement is significant (e.g. filters, catalysts, etc.). In EDGAR the abatement measures as well as the emission recovery (e.g. coalbed CH₄ recovery) is calculated explicitly. This provides our policy makers information on the effectiveness of emission reduction measures.

Page 5, lines 7-8: The authors agree to remove the sentence.

Page 5, line 14: The authors agree that "latitudinal region" should be replaced by "latitudinal band".

Page 5, line 18: The authors prefer to keep "energy-related" sectors. These include also the non-energy use of fuel, the petrochemical sector and the manufacturing industry (in particular iron and steel). While the energy sector is managed by the European Commission's Directorate General (DG) Energy, the non-energy industry is also managed by other DGs, such as DG Internal market, Industry, Entrepreneurship and SMEs.

Page 5, line 18: Table 1a: The authors agree to introduce also this table as follows: "Table 1a provides a structured overview of all the emission sources included in the EDGARv4 database."

Page 6, line 35: The 1996 codes were still used, because the national GHG inventories were still reported in 2014 (for the time series 1990-2012) using the 1996 codes. Only

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after the reporting of the first Kyoto Protocol period the codes were changed into the 2006 codes.

Page 8, line 6: The project name has been corrected to "CO2 Human Emissions".

Page 8, line 13: The sentences have been rephrased with "the 24 member countries of the OECD in 1990 (24OECD90) and 16 countries with Economies in Transition of 1990 (16EIT90)".

Page 8, line 24: The authors indeed mean: that it is difficult to estimate reliable biofuel combustion activity data and so CO2 emissions. Although the article of Denier van der Gon et al. (2015) does not focus on CO2 but on PM, the energy statistics (fuel wood used) are provided in Table 2, and are directly proportional to the CO2 emissions. Denier van der Gon et al. (2015) concluded "that the wood-burning emissions are much higher than could be accounted for with the emission inventory available at the time". Moreover he indicates that "this is only partly related to emission factor measurements", but that underreporting (of activity data) has been noted, also by EEA collecting national inventories for Europe. The authors agree to rephrase the sentence as follows: "While Denier van der Gon et al. (2015) indicate that biofuel combustion activity (and corresponding short cycle carbon CO2) is difficult to estimate for the different countries in Europe, Tian et al. (2015) estimate the large uncertainties in CH4 and N2O budgets."

Concerning Elvidge et al. (2009): The reference for the EDGARv4.2 flaring, Elvidge et al. (2009), has been replaced with the new reference that is used in EDGARv4.3.2: NOAA – NGDC (2015). We did also consult Elvidge et al. (2016) for the quantification of the venting and flaring trend in the last decade.

Comparison with the IEA emission estimates: This comparison is indeed done with the old (2014) edition of the IEA dataset (as given in the reference), because EDGARv4.3.2 is also based on that and most national GHG inventories time-series till the first Kyoto Protocol period were based on that too. The difference in the calculation for IEA and

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EDGAR are indeed the old carbon factors of IPCC (1996) that was used by IEA, while EDGAR has been using always IPCC (2006) carbon factors, but there are also other differences. EDGARv4 supplements the charcoal production activity with fuelwood data of FAO, the venting and flaring activity with satellite data, and the fossil fuel mine gas recovery with UNFCCC data. In addition EDGARv4 calculates the transformation losses which IEA neglects. The authors agree to include a clarifying note to Table 3 on the update of the IEA carbon factors that meanwhile happened.

Concerning the description of the paper as "full, transparent and inclusive documentation": Although the EDGARv4 emission data set with calculation method is - to the extent possible - provided in a transparent and inclusive manner, the underlying activity data and spatial proxy data sets cannot be released due to property rights. Moreover the EDGARv4.3.2 is the result of iterative improvements over almost a decade, which makes it more difficult to keep full transparency. While the EDGARv4.3.2 gridmaps remain replicable within the EDGARv4 database, this can not be said for EDGARv4.2 and EDGARv4.1, because of the large updates and expansion of the proxy datasets (from 114 datasets for v4.2 to 297 for v4.3.2). However, this article should lay the foundation from which further updates document the newer releases of EDGAR. In order not to keep away from false expectations, we propose to end the sentence slightly rephrased as "complete documentation of the EDGARv4 products that has been compiled in the most transparent way possible."

References used: NOAA – NGDC: Image and Data processing by NOAA's National Geophysical Data Center, https://www.ngdc.noaa.gov/eog/viirs/download_viirs_flares_only.html, latest access 2015.

Elvidge, C.D., Zhizhin, M., Baugh, B., Hsu, T/-C., Ghosh, T.: Methods for Global Survey of Natural Gas Flaring from Visible Infrared Imaging Radiometer Suite Data. *Energies*, Vol. 9 (1), p. 14, doi:10.3390/en9010014

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We are finalising the revision of the paper and will upload this tomorrow, after a final check that all comments are included. In addition, I would like to raise that we will update the formula on the uncertainty with the comment you raised by email, in order to avoid any misunderstanding with the absolute uncertainty (in CO₂eq). The Table 2 of relative uncertainties remain unchanged.

Thanks very much for your interest and continued feedback. Best regards, Greet.

Please also note the supplement to this comment:

<https://www.earth-syst-sci-data-discuss.net/essd-2018-164/essd-2018-164-AC3-supplement.pdf>

Interactive comment on Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2018-164>, 2019.