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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Projected change in atmospheric nitrogen deposition to the Baltic Sea towards 2020" *by* C. Geels et al.

Anonymous Referee #2

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Dear authors,

Thank you for this manuscript. In general it is a rather straight forward study, showing the results of a modelling excercise with the well documented DEHM model. Overall, the paper is well written, in clear English. However, there are some remarks to be made: make sure you use the proper tense of English in a consistent way (you have a tendency to mix them in different occasions). Properly introduce acronyms/component names/etc once you use them for the first time. Another English thing: sometimes the structure of a sentence looks more Danish than English - for some of the cases I will show them, put perhaps you could check the manuscript for others.

Specific comments: p 21534 l 4: although it is rather clear what you mean, there is a mixture of terms used for almost the same thing - new National Emission Ceilings

directive (NEC-II), directive on national emission ceilings (NEC). Be consistent in the way you define things p 21538 l 5-6: sometimes you explain the 'smallest' things, but here everybody is supposed to know what the continuity equation is. Probably that is also the case, but make sure that you explain terms of which you cannot be sure that everybody knows them p 21538 l 6-??: in fact, most of this text is rather 'boring' to read. It looks like textbook material and I wonder if this cannot be condensed in some way. p 21538 l 23: this is one of those examples of a 'funny' sentence - I would rather write 'Specific dry deposition velocities in DEHM are calculated for the ' or 'In DEHM, specific dry deposition velocities are calculated for the '. p 21539 : again, a lot of textbook material. p 21540 l 2: 'the applied chemistry module and the dry deposition module have been updated through the years in order to improve the model' (again one of those sentences). p 21541: strange to have a representative year being picked out of a period that doesn't include the actual year for which you calculate the deposition p 21542 l1-3: in the first three sentences you have three times 'best possible quality and resolution'. perhaps consider dropping a few. p 21542 l10: another sentence: 'In this study emissions for 2007 were chosen to ' p 21542 l17-22: you describe that for Denmark you used high resolution data. There is however no indication of the what the consequence of this is when comparing this with other (coarser) emission for other regions. To what extent do you introduce specific difference for Denmark by having this difference in emission resolution? p 21543 l17: 'Nh3 emissions differ more ' - than what? p 21543 l22: 'the total N emission is, as a result (of what?), projected ' p 21544 l4: 'In the same period, air concentrations and wet depositions ...' p 21544 l18: ' 275 km2' - wasn't this higher resolution data? p 21544 l24: the DEHM model was validated against two marine sites, and based on that it is assumed that it is representative for the entire Baltic. How valid is such an assumption? p 21545 l18: ' ..., indicating that, in the current study, we might be ..' p 21552 l 2: 'In this study we focus on the change in deposition towards 2020, solely due to changes in anthropogenic emissions'. And here's another one of those sentences. Please note that I stopped writing them down for the previous pages, so please check it yourself.

Table 4: To what extent was nitrogen deposition included when the BSAP Targets were determined. If not, is it fair to make this comparison. If so, would be nice to know the separation between deposition and direct input through water fluxes. Table 4: does a reduction of -2.94 kt in comparison with the required 6.97 kt reduction mean that the first is -42% of the BSAP reduction? Don't think so. Figure 1: typo in caption - appropriate Figure 2 / 3: 'common unit' ? Figure 4: 'divided'?

Supplementary material: Table S1/S2: I have the feeling that the summation is wrong. For total loads this would work, but not for the loads in kg/km2 for the different basins/sub-basins. In that case you should use the areas for these basins/sub-basins for calculating the actual deposition to the Baltic Sea.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 21533, 2011.