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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Low Carbon Energy Generates Public Health Savings in California" *by* Christina B. Zapata et al.

Anonymous Referee #1

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This paper discusses the air quality benefits of reducing greenhouse gas emissions 80% by 2050 in California. It also analyzes the cost of transition. The paper adds to the body of literature on the health benefits of transitioning from fossil fuels. Results depend highly on the scenario chosen and costs, so I will focus on these issues.

Abstract. Please state exactly what the percent reduction in emissions you are simulating between today at 2050 for some major health-affecting chemicals. The health benefits are not useful unless this information is provided side-by-side.

Health cost estimates account only for mortality. The literature suggests that morbidities and non-health damage are responsible for additional costs and that today's VSL will increase by 2050 (e.g., Jacobson et al., 2015 (cited in the MS), Section 8). The authors should account for these three factors since using VSL alone from today without

morbidity costs, non-health costs, or cost changes over time is an oversimplification. Further, low, medium, and high estimates should be used.

The authors cite a paper to claim that "recent analysis suggests that incorporating a broader range of technologies are more realistic." Aside from the fact that that paper is a criticism of another paper, so the authors, at a minimum should cite the response as well (Jacobson et al., 2017), the response contradicts the claim that a broader range is more realistic, quoting, for example, IPCC which states, "Without support from governments, investments in new nuclear power plants are currently generally not economically attractive within liberalized markets." Clearly, the use of an "economically-unattractive" resource such as nuclear is not "more realistic."

Further, California has no plans to build a new nuclear power plant or to implement coal-CCS and in fact has plans to shutter its last nuclear power plant. To the contrary, California has a proposed law (SB100) that has passed the State Senate that proposes that 60% of all electric power in the state by from approved renewable energy sources (which exclude large-scale hydro) by 2030 and the rest, by 2045, from either approved renewable energy resources or large-scale hydro (referred to in the bill as zero-carbon energy resources), not nuclear, which is being shut down in the state. The authors should clarify the situation in California, since otherwise, the results will be dated and less useful.

Along these lines, the scenarios are a bit unclear. If they are for 80% reductions in GHGs below 1990 levels by 2050, please provide a table of the emissions of relevant chemicals today and in 2050 to get a better indication of the actual reductions by chemical. Also, are you reducing only GHGs or also non-GHG air pollutants (NOx, SOx, ROGs, CO, BC, POC, other aerosol components) or are changes in GHGs affecting these pollutants only indirectly? Section 2.1 indicates that PM2.5 is being reduced only 4%, which suggests that it's emissions are not directly being controlled and that an 80% reduction in GHGs does not mean a transformation of transportation to electric vehicles or industry from combustion to electricity. How reasonable is this assumption,

particularly given CARB's intention to ratchet down emissions significantly in the next 10 years? Also, how would SB100 change electric sector emissions (thus impact your results)?

The air quality modeling appears solid.

Reference Jacobson, M.Z., M.A. Delucchi, M.A. Cameron, and B.A. Frew, The United States can keep the grid stable at low cost with 100% clean, renewable energy in all sectors despite inaccurate claims, Proc. National Acad. Sci., 114, ES021-ES023, doi:10.1073/pnas.1708069114, 2017.

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