**Referee Report**

I enjoyed reading the paper and think it is an excellent overview over the problems involved and challenges to be tackled to improve the estimates for the social cost of carbon (SCC). I think it tackles this question extraordinarily comprehensively and is very well structured and written. The paper starts with a fine summary of the corner stones underlying the current US estimate of the SCC. It then discusses in detail problems that arise because of the particular procedures imposed for the underlying calculations as well as critical short-comings of the employed integrated assessment models. Then, it moves on to survey the more general challenges in establishing improved estimates of the SCC that the scientific community.
The focus is on the ingredients and short-comings of integrated assessment models, including the scientific and economic modules as well as the underlying welfare frameworks. I highly recommend publication of the paper.

I also would like to express my regret that it took so long to assess this very nice piece of work.