

***Interactive comment on “The influence of constrained fossil fuel emissions scenarios on climate and water resource projections” by J. D. Ward et al.***

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We thank Mikael Höök for his very positive comments and constructive advice regarding references.

Höök recommends that we discuss “risk” more formally, citing Jones (2001) as an appropriate reference. We concur, and as he suggests, we will attempt to add several sentences early in the paper, explaining that the proper treatment of risk requires consideration not only of the consequence of a hazard, but also the probability of a hazard occurring. It should be noted that the publication by Jones in 2001 was very soon

after the release of the IPCC's Special Report on Emissions Scenarios (SRES), and at the time, the accepted approach was to treat all 40 emission scenario as having equal probability of occurrence. This approach has led to emissions scenarios being effectively neglected in climate change risk assessment, wherein the conventional approach has been to conduct the whole analysis within an assumed future emissions pathway (e.g. assessing the likelihood of a 50% reduction in catchment streamflow under the A1FI scenario). We would contend that a more complete risk assessment should in fact sit above the emission pathways, and should include an assessment of the likelihood of each scenario occurring, followed by the specific impacts of interest under each scenario. Within such a framework, it would be possible to downgrade impacts that have been projected under emissions scenarios that are of low probability of occurrence. For instance, suppose the A1FI (high) scenario is deemed unrealistic, as we have suggested it is (due to fossil fuel constraints): then impacts simulated under that emissions scenario are multiplied by a probability of approximately zero. Meanwhile, impacts simulated under the B1 or A1T scenarios (low emissions) are multiplied by higher probabilities. This should provide those involved in climate change adaptation with more solid risk assessments for long-term planning. There are limits to how detailed we can make this discussion in the present paper; an entire separate paper could most likely be written that purely looks at the likelihood of the various emissions scenarios and resultant adjustments to perceived climate change risks.

The rest of Höök's review consists of generous suggestions for improving our literature review through the inclusion of several extra papers (Höök et al., 2010; Sorrell et al., 2010a,b; Anderson & Conder, 2011) and the "toning down" of the discussion of the multi-Hubbert analysis by Patzek & Croft (2010). We will gratefully take these suggestions on board and cite his recommended references, as they will serve to strengthen the case that the recent published literature is pointing more and more towards a near-term peak and decline in fossil fuel production.

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