

Interactive comment on “Long-term projections of global water use for electricity generation under the Shared Socioeconomic Pathways and climate mitigation scenarios” by Nozomi Ando et al.

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Received and published: 2 June 2017

Long-term projections of global water use for electricity generation under the Shared Socioeconomic Pathways and climate mitigation scenarios by Nozomi Ando, Sayaka Yoshikawa, Shinichiro Fujimori, and Shinjiro Kanae

An additional comment by the associate editor

In addition to the comments made by the two anonymous reviewers, with which I agree, I would like to add one additional comment, namely on hydropower. I invite the authors to take this additional comment into consideration when revising the manuscript.

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Lines 184-187 The first sentence of this paragraph formulates the water consumption of hydropower too simplistically and incorrectly. It assumes that this consumption is to be equated with “the water that evaporates from dams”. This is not correct. First, it should refer to the net evaporation (evaporation from the surface area of the reservoir minus the rainfall on it; so this could be, theoretically as well as in some real cases, a negative value!). Second it should refer to the additional net evaporation compared to the situation without the reservoir (background net evaporation). Third, it should also, and herein lies the complexity, estimate the impact that the change in the timing of water releases from the reservoir due to electricity generation has on the water demands of users located downstream of the dam, including the water demands of aquatic ecosystems.

Although in the literature there is an on-going debate (please provide some key references, e.g. Grubert, 2016; Spang et al., 2014; Scherer and Pfister, 2016, etc.), the issue is in fact quite straightforward and in my view not “controversial” (line 184). What is true is that, given the above, it is not a trivial exercise to accurately estimate the water consumption of hydropower, and most likely requires not only a multidisciplinary approach, but also a basin-wide approach. I do not know whether this is a sufficient argument for the authors to (happily?) decide to leave water consumed for hydropower out of the assessment, which is stated in the second and last sentence of this paragraph.

Section 4.5 (lines 406-414) Given the above it remains unclear how Figure 8 has been constructed. How has water consumption with hydropower been estimated? I have my doubts whether indeed “water consumption with hydropower was more than two times greater than without hydropower” (lines 407-408). So my guess is that it will be less, but very likely still a significant proportion of all water consumed.

If it is indeed a significant water consumer, then was it a defensible choice to leave hydropower out of the analysis? I think not. And why leave it out if, in the end you nevertheless present results that include this important water user?

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I invite the authors to carefully consider the reviews by the two anonymous reviewers, as well as the above point on hydropower, a point not raised by them.

Pieter van der Zaag

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2017-27>, 2017.

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