Review of: "Water-Energy Nexus in Power Systems: A Review"

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Potential competing interests: No potential competing interests to declare.

The purpose of the paper is to review the complex water-energy nexus and highlight the need for research in this area. This is a topic of interest for the Journal. However, the paper, in its present form, does not fully satisfy this target and would require some changes before it can be taken into account for publication.

First, check the order and numbering of the citations. The first three seem not to be cited in the right order. This also seems to happen for other citations, and a proper check needs to be done throughout the paper.

As a general comment, the paper does not present quantitative information nor report the main technological and methodological elements that are present in the literature. From this point of view, the aim of the paper is only partially fulfilled and would need to be further addressed.

Some specific comments follow:

Page 4: “Water usage for energy generation has enormous environmental impacts, such as altering aquatic ecosystems and reducing water availability for other purposes.” Consider also the renewable nature of hydroelectric energy generation and the limited consumption of water in the cooling of thermal power plants (for which environmental thermal pollution may be foreseen). I suggest that this statement be further explained.

Page 4: “In addition, the impact of climate change on water availability for energy generation is also critical to the water-energy nexus.” I think this statement introduces the resiliency problem and should probably be better connected to the following period.

I think the entire paragraph, ‘Energy Generation and Water Use,' would benefit from reorganizing the different topics analyzed. Efficiency in power generation, resiliency, weather influence, water production from ambient humidity, and cooling towers are mixed together and should be specifically addressed.

Page 5: “Water plays a fundamental role in these systems, as a coolant for the engines and turbines, to prevent overheating and ensure efficient energy conversion [20]. Additionally, water is used for steam generation to drive the turbine and generate electricity.” In my opinion, this message may be misleading as the two quantities cannot be compared in terms of order of magnitude.

“Heat boilers represent yet another type of energy converter that generates steam by heating water. Steam is then used

to drive turbines and generate electricity”; this water flows in a closed circuit and cannot be considered consumption.

There is a strong focus on existing and traditional power generation. Most of these technologies are expected to be substituted for sources with low CO2 emissions. This element is mentioned when talking about P2G. I strongly believe that the paper would benefit from a more detailed analysis of new-generation technologies.

The “Water Treatment and Distribution” paragraph has very few references and does provide only a partial view of this fundamental aspect of the energy-water nexus.

Pag. 6: “The largest consumption of energy is associated with pumping operations, while the energy intensity of the water treatment units remains relatively low.” It is necessary to describe the water treatment plant in more detail, as this statement strongly depends on the technology used.

The conclusion contains different elements that are not treated in the rest of the paper (e.g., Water-Energy Nexus for Urban Areas). These points should be discussed in the main text.