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

Steve Pueppke[1]

1 Michigan State University

Potential competing interests: No potential competing interests to declare.

This manuscript, which covers a lot of ground, tends to be wordy and repetitive. It provides general summaries of a number of primary research publications, but details are almost always missing. The biggest shortcoming is the almost complete lack of critical analysis. The authors do arrive at conclusions, but they are mostly generic and have been stated previously.

In revising the manuscript, I advise the authors to provide more details and to analyze and integrate the information from earlier publications (instead of just summarizing it, publication by publication). The authors should approach the primary research publications critically. What are the current gaps in our knowledge? What are the important issues that have eluded past attempts to clarify? What are the priority issues that should be examined in the future, and what approaches should be used? Specific comments are below.

I think the first word of the Introduction is intended to be THE, but I only see HE. Please insert the letter T or otherwise change the sentence, so that it is easily understood.

Introduction, first paragraph. Take the United States, for example, where thermoelectric….

Introduction, paragraph 2. Consider softening and perhaps expanding your statement about biofuels and water usage. Biocrops such as maize may require enormous amounts of irrigation water as inputs, but this is not the case when wood is used as a biofuel.

Same paragraph. Remove the word Meanwhile, which is unnecessary.

Same paragraph. This is a nuance, but although many modern, large-scale irrigation systems require energy to move water against the force of gravity, there are other systems (many small scale and sometimes considered primitive) that rely solely on gravity to move water.

Next paragraph. Droughts limit water availability

Next paragraph. Reducing water consumption (not consumptions). See also the first paragraph in Section V and also Section VI, Subsection C.

Next to last paragraph of this section. This comprehensive literature review…..

Last paragraph of the Introduction Section. I think you should delete this paragraph. It is fine to let the reader discover the contents of future sections as he/she encounters them. There is no need to explain all of this here.

Section 2, para 1. This paragraph can also be deleted. The information in it has either already been stated or again tells the reader what to expect. The title of subsection A, etc. is sufficient.

Subsection A, first paragraph. Here, and throughout the manuscript, please avoid repetitive information. Here (for the second time), you give the reader a statistic about freshwater withdrawals for cooling thermoelectric power plants. The wording is slightly different (nearly 45% vs. approximately 40%), but the message is the same. The next sentence about water usage for other forms of energy generation also duplicates what is given in the Introduction.

Next paragraph. Hydropower is not an emerging renewable energy source—it has been around for a very long time. Later in this paragraph, make it: Coal plants appear to be more sensitive…. And then, toward the end of this paragraph, there is the phrase "Two semi length fin configurations." It is unclear what this phrase means. Are you referring to the length of two semi trucks? It might be better to simply state as the length in meters.

Next paragraph. Middle East region, which encompasses the

Same paragraph. In describing the use of wastewater in Portugal, the issue is not so much the size of the areas as it is the application of treated wastewater as greywater for irrigation. The next sentence is unclear. This paragraph would also be improved if it were more specific. Simply telling the reader that the analysis was in-depth, that the degree of treatment varied, and that advantages and disadvantages were discussed provides no insight at all into the contributions of Matos et al. Try to avoid superficial and uninformative statements such as this. Add some detail and your interpretation.

Subsection B, paragraph 2. Why does the life cycle greenhouse gas emission reduction drop to 65-70% at a 90% capture rate? This important point is unclear.

Same paragraph. Total life cycle cost is only $18.01?? There must be some mistake.

Same paragraph. This is an exceptionally lengthy paragraph that considers several distinct issues. It should be broken into several shorter paragraphs, each considering a coherent set of issues.

Subsection C. This section is disappointing. There are a lot of words about the factors that go into the various modeling exercises. We read about models dealing with an unnamed remote island and the North Marin (California??) water network, but there is little detail and almost no integration or analysis. Without detail, it is difficult to draw conclusions from or assign value to statements such as: "Simulation results validate the overall model's utilities."

Section V, first para. Although you state that exemplary policies are reviewed and analyzed in this section, the content is just a compilation of different countries and policies. I could not find any analysis at all in this section.

Section V, Subsection B. The first sentence here in the subsection is almost identical to the first sentence in the section.

Section VI, Subsection B. It is not correct to issue a blanket statement that urban areas face unique challenges because

of high population density and limited access to freshwater resources. Population density—yes; but many large cities (Chicago is an example) have ready access to bountiful nearby freshwater resources.

Subsection C, first sentence, critical area that deserves….

Subsection D. Is the Water-Energy-X concept your own creation, or has it appeared in the literature? Please clarify. I am not sure that I agree with your concept of the water-energy-carbon nexus. Carbon (especially from fossil fuels) is integral to the energy component and, I would argue, not a separate and distinct component of the nexus, as is proposed here.