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Comment on wes-2022-29

Jethro Browell (Referee)

Referee comment on "Grand challenges in the digitalisation of wind energy" by Andrew Clifton et al., Wind Energ. Sci. Discuss., https://doi.org/10.5194/wes-2022-29-RC1, 2022

Thank you for the opportunity to read this interesting and well-conceived article. I agree with the premise that identifying such Grand Challenges for digitalisation in the wind industry is a valuable exercise and think the authors have done an excellent job of not only reviewing published literature, but reaching out and interviewing individuals, and drawing comparisons to other industries.

My first of my two main comments relates to the Grand Challenges. Their importance is based on the assumption that there is substantial value in digitalisation. Several arguments are made throughout the paper that this is the case, e.g. by comparing to other industries, but as the authors highlight, many digitalisation technologies have existed for some time but are not widely deployed in the wind industry. Is the industry confident that the potential value of digitalisation is large enough to warrant large investments in digitalisation? Do the authors see establishing strong business cases/value propositions for digitalisation as a challenge? Perhaps the value is known to be large enough, in which case this doesn't come across strongly in the paper, but if not, I think the Grand Challenges should reflect this issue.

My second main comment regards the structure of the paper. It is very long compared to other "Grand Challenge" type articles, and the challenges themselves are not introduced until page 30 (other than in the abstract). I think the stated target audience, policy advisers and funding agencies in particular, would more easily digest this work if a shorter exposition of the challenges was presented first, followed by details which they can delve into if desired. I worry that not many would make it to page 30 and miss out on the main outcome of this substantial piece of work.

I also have the following minor comments:

- Line 80: The comments around frequency regulation are a little loose. Thermal plant (I

think synchronous is more appropriate here) contribute both inertia (through an intrinsic electro-mechanical process) and frequency regulation (through control, e.g. governors). Wind turbines can certainly do the latter and have done so in several power systems for many years, and can provide a response similar to inertia albeit with some delay. I feel that the present phrasing of these issues isn't entirely representative of the present situation. The data need here could be clearer.

- Also ~Line 80: I might also argue that forecasting and ancillary services are distinct issues and might warrant separating here but I agree they both fall broadly system integration.
- Line 85: Is this the same issue as the first bullet in the list?
- Line 195: Weird sentence – rephrase?
- Line 261-262: Another odd sentence as I read it, perhaps rephrase.
- Line 272-274: Four hyphens make this sentence difficult to read.
- Line 280: SCADA systems certainly simplify data collection, but I think data access depends largely on how the collected data are stored. I've certainly had plenty of experiences where accessing SCADA has been far from simple because of how it has been stored.
- Line 285: "Lack of access" by whom? Perhaps worth clarifying how different actors have differing abilities regarding access.
- Licenses for open data are discussed later but may be worth introducing them around line 425.
- Line 456: Usually there is a trade-off between privacy and accuracy in federated learning which I suggest mentioning here.
- Line 462: related to my first main comment above, what is this "tremendous value"? Is it there in all cases? This statement should be qualified or supported by some strong sources/citations.
- I don't recognise the term ROM in the context of energy forecasting, perhaps some forecasters use ROMs but they are not that common, or you would call the type of power-curve model forecasters use a ROM. In any case, it is worth noting that some forecasters are moving towards use of high-performance computing to run ever higher resolution atmospheric models for real-time applications rather than scaling back on complexity.
- "Virtuous upward spiral". Thank you for introducing me to this fun term. I had to look it up and presume that here your intended meaning is along the lines of "a cycle of compounding successes". Can the claim in this sentence be supported by a citation?
- Line 501: "One challenge with digitalisation is that there is an adoption process." Surely the challenge is due to some properties of the adoption process, not the existence of one.
- Line 618: According to the data in the link, $318bn revenue was generated by smartphone apps in 2020, not 582. Online sources should be properly referenced with a date of access. The same applies to footnotes 6 and 7, which are also not aligned with information currently at the end of those links.
- Section 5.1.1: Is the use of subsubsection necessary? They are only used under subsection 5.1, I think.
- Line 693: I don't think the meaning of this bullet is clear.
- Line 703: Please check the definition of "diversity".
- Line 711: What is "the population"?
- Line 882: Should this be FAIR data frameworks rather than "reusable"?
- The interview and survey data should be FAIR and attached to this article if at all possible.