

## ***Interactive comment on “Can Limits to Growth in the Renewable Energy Sector be Inferred by Curve Fitting to Historical Data?” by Kristoffer Rypdal***

**Anonymous Referee #3**

Received and published: 28 November 2017

This manuscript revisits an earlier assumption that the projected growth in the renewable energy sector can be inferred from global historical solar and wind power. By way of a step-wise statistical primer into the underlying decisions regarding model selection, this manuscript concludes that it is not presently possible to determine if the logistic or exponential model best describes the future.

Overall, I find the core scientific results to be robust. My difficulty and concern in reviewing this manuscript relates to the more non-technical details and how these are presented. The manuscript continually attacks one study and often uses a writing style that, I think, undermines rather than inspires confidence in your results and conclusions.

My recommendation to the Editor – scientific issues need to be addressed before pub-

C1

lication. An optional but not-required suggestion: the manuscript would greatly benefit from heavy editing by the author – add more scientific relevance and applicability to future studies, and remove inflammatory remarks.

Response is therefore broken into 2 parts:

Scientific major issues:

1. Why are only 4 of the 19 points independent (p.14 line 21 and elsewhere); Is this related to the text on p.8 line 21-24?
2. Possibly related to above, how would the random exclusion of data points inform the error estimation and associated model selection
3. Question relevant to your conclusion – what would be inferred if only the first or second 10 year data series of Fig. 1 was utilized – see p.10 line 9

Scientific minor issues:

4. Consumption being preferable to installed capacity (Sec. 3.2)? I don't understand the relevance, as 2015 consumption of renewables is a very small fraction ( $\sim 0.1$  of 18 TW total primary;  $\sim 0.1$  of 2.0 TW of electricity consumption; Fig. 4A). "These results [based on consumption rather than installed capacity] are particularly interesting because they are at odds with the assertion that the main limiting factor for future growth is not the installed power, but the limitation of consumption due to the intermittent nature of these renewables" (p.11 line 25). Without a suitable reference to support this claim, my assumption is that the proportion is so small that even a highly variable generation source could generally be incorporated into the system and may only prove challenging as this proportion grows to 10s of percent.

5. Please add an isolated Conclusion paragraph for clarity; Page 2 line 19-22 is also relevant; Page 11 line 1-3 would help inform the reader about what the author's point of the article is.

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6. Associated data and code (as markup), descriptive comments, and estimates from the calculation (inline in the code) should be provided in the Supplement
7. Fig. 3 color selection – red and green difficult to distinguish by those that are color blind
8. Fig. 4B does not have an orange curve (p.12 line 2)
9. Add additional references: "...profound ethical issues" p.2 line 10; "...but their growth potential is almost exhausted" p.2 line 23; "...the intermittent nature of these renewables" p.11 line 27

Writing major issues:

10. I think that several parts of the text are inflammatory to even the casual reader. Examples include: "This type of scientific controversy is rooted in intellectual bias and/or lack of knowledge," (p.2 line 18); "...led some authors to search for signs of stagnating growing in historical data," (p.2 line 33); "...since nobody believes that solar+wind will grow by more than two orders of magnitude during the next two decades" (p.11 line 22); "...will embrace "results" like those presented in Hansen et al. (2017) and accept them as proven scientific facts" (p.13 line 33) – these should be softened or edited
11. focus on attacking one study: The inability to contest the results of a review article are appreciated here. Rather than continually attacking Hansen et al. (2017) though, why not take the standpoint of how to improve forthcoming projections or estimates. Otherwise the scientific knowledge it contributes is very limited in scope, as the projection by Hansen et al. (2017) could be right for the wrong reasons. I would much rather see how others can be taught to not to make this same mistake in model selection in the future.

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Interactive comment on Earth Syst. Dynam. Discuss., <https://doi.org/10.5194/esd-2017-93>, 2017.