WIND ENERGY SCIENCE DISCUSSIONS
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Interactive comment on "Feasibility of small wind turbines in Ontario: Integrating power curves with wind trends" *by* M. Ashtine et al.

Anonymous Referee #3

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General comments:

The power production of two chosen wind turbines installed on a wind field test site (Kortrick site) during 6 month was used to calibrate the power curve in real working configurations. Then, using the dataset from the North American Regional Reanalysis (NARR) over Ontario at two heights (10m and 30m), the production from the chosen wind turbines was estimated over 33 years. The analyses were performed using 33year monthly averages and seasonal means, allowing an historical power generating potential for the chosen wind turbines.

The work is interesting and indeed very important for improving the use of small wind turbines. From what I understood, the originality of the present work is to use on-site calibrations of the wind turbine power curve to adjust the power output to real working

conditions of wind turbines.

I recommend the publication of this interesting work with however a major revision that includes:

- A more focused objective that will lead to a much clearer introduction. I would focus on the winter season for the NARR dataset as it corresponds to the calibrated power curve. Also, I would analyze the NARR dataset with a month by month variations of the calibrated power curve versus the power curve given by manufacturers.

- An additional bibliography on the use of reanalyzed data for power output estimation, using power curves from manufacturers. This will emphasize the originality of your work.

Detailed of major issues:

The introduction is really unclear. You can find three examples bellow:

p3 L61: "no formal standardized testing regulations for their calibration and power regulation". From what I understood, you are introducing your study as a potential way to improve standardization. However, it is not clear on how your study will contribute to this aspect. Can you please develop and clarify more this point ?

P3 L65:"The Kortright Center . . . has been at the forefront of renewable energy initiative in Toronto" It is unclear here on how the Krotrick center serves the target of your article: a first step to standardization of small wind turbine. For instance, a standardized field measurement could provide typical roughness that can encounter a Small Wind Turbine such as typical roughness in cities . . . On what aspects the Kortrick measurement site is interesting for standardizing field data ?

P3 L62 Are you targeting standardization or on global warming problems ? The following sentence raises that doubt: "It is difficult to develop a small-scale diversified electrical generation strategy under a changing wind field caused by global warming"

A more focused analysis is needed for the reasons detailed below:

- Ashtine et al (2016) have performed a seasonal and long-term trends of the same NARR dataset. The present study only includes a non-linear filter on the NARR from the on-site calibrated power curve. We are therefore not surprised to have "trends in the electrical output that closely represent wind speed trends" (p8 L176).

- The on-site calibrated power curve corresponds to the winter season which, from the analysis performed by the author (p10 L223-224), is the greatest turbine output and thus overestimate the production for other seasons.

From my point of view, the originality of your work is the use of electrical power output from existing wind turbines. However, theses wind turbines are only used to calibrate the power curve using a much shorter dataset (6 month) than the reanalyzed database available (33years). We don't have variation of the power curve calibration during the seasonal cycle for instance. I guess you are targeting that objective and this work is a first approach with the available 6 month dataset ?

As the calibration power curve represents at least on season (winter), I would focus on that season for the analysis of the NARR dataset over 33years.

An additional bibliography is needed:

p3L54-56: The dataset used in this study exist since 1980. Also, I know that before choosing and installing a wind turbine site, this type of dataset is used (at least for a big wind turbine farm). Therefore I'm surprised of the poor literature you describe. By quickly looking for related articles on google I found these articles: "A review on the young history of the wind power short-term prediction", Renewable and Sustainable Energy Reviews Volume 12, Issue 6, August 2008, Pages 1725–1744 "Wind speed climatology and trends for Australia, 1975–2006: Capturing the stilling phenomenon and comparison with near-surface reanalysis output" Geophysical Research letters, VOL. 35, L20403, 2008

Their work are using power curves from manufacturers (from a very quick read of these studies . . .). These studies (or other found by the authors) would help to enhance the need to use on-site power curved.

Minor issues:

p3 L76: define, at least once, the acronym NARR and maybe give an URL.

p4L85-86: Where are located the field measurements for the reanalysis ? Are they available at both height (10m and 30m) ? How many spatial points over the region targeted ?

p4 L89: please put the URL in a footnote for readability

p5 and later P6 L134: The power curve of the Skystream wind turbine is not necessary as no analysis based on this turbine is shown later.

p6 L135: " . . . power curve demonstrated electrical output ..." I would attenuate the world "demonstrated" by using "predict" (or another chosen by the authors) as the work is based on a reanalyzed dataset (i.e. using modeling).

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