Scenario comparison between version 1 and version-2: for 36 solar and 115 wind assets

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ABSTRACT

1 comparison of simulation between version-1 and version-2

We calculate the energy score and percentiles running $run-script.py$ using the scenario folder, which were generated by Glen's data directly from the Scoville server. We use the version 2 data, released on 2022/04/27. These are currently done on a zonal level. In this notebook the analysis is being shown for 36 solar and 115 wind assets and comapared with the previous version-1. We thus have 'Coast','Far West', 'North', 'North Central', 'South','South Central', 'West' zones for solar assets and 'Far West', 'North', 'North Central', 'South', 'West' zones for wind assets.

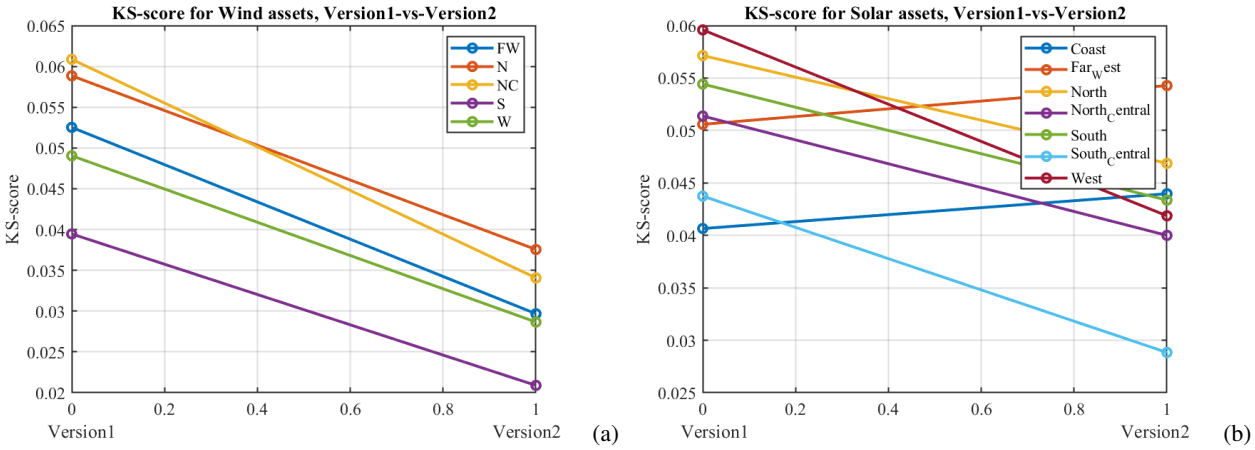

Figure 1. KS score fore both version 1 and version 2 are shown for both (a) wind , (b) solar assets.

The percentile for different zones, how much they are connected to the uniform distribution is checked using the K-S score. The K-S score values for the version-1 and version-2 for both wind and solar scenarios are shown in Fig. 1

1. For wind, KS score for all five zones and the aggregated all assets are low in case of the version 2. The less the KS score means, the distribution are more connected to the uniform distribution and better the results are. So, for version-2 , the wind scenarios works better than version 1.

2. For solar, Coast and East, the KS score increases and for other five zones, the KS scores decreases in version2. KS score for the aggregated assets decreases for version2.

KS score for percentiles of all the assets are shown as distribution and KS scores for the five zones (seven zones in case of solar data) are shown with five red points in Fig. 2(a) and Fig. 2(b) for wind and solar respectively. In

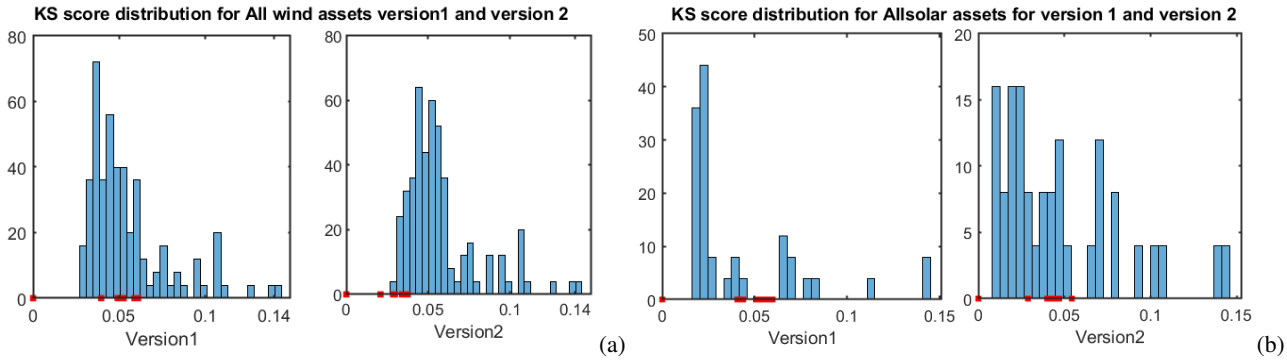

Figure 2. KS score for the assets are shown in distribution and the KS scores for the five zones are shown with red color. (a) wind, (b) solar.

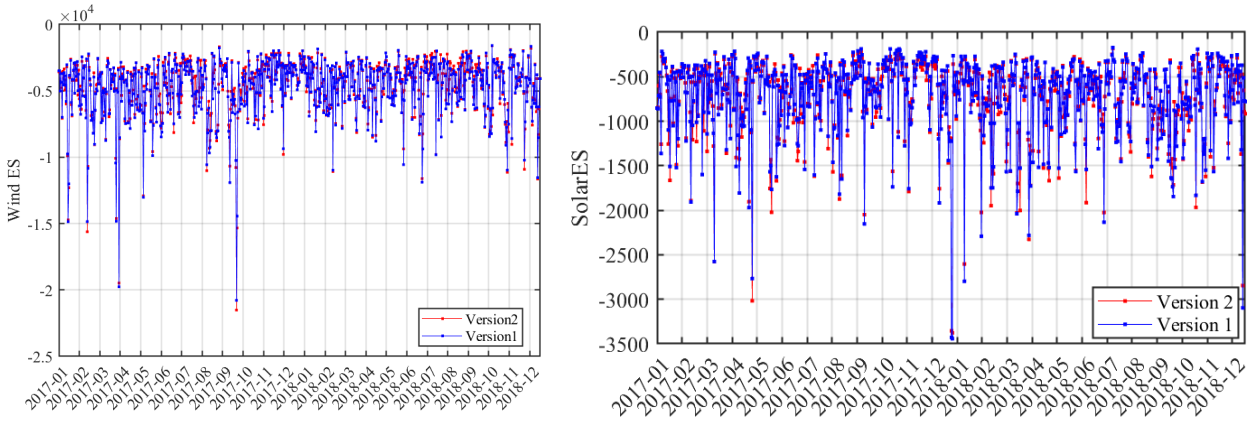

Figure 3. Version1: $ES^{Solar}_{Mean} = -716.1267$, $ES^{Wind}_{Mean} = -4724$.
Version2: $ES^{Solar}_{Mean} = -719.3949$, $ES^{Wind}_{Mean} = -4596$

version 2, the distribution looks more uniformly distributed and the red points lie in the more left side of the tail of the distribution.

For wind and solar data (Fig. 3(a) and Fig. 3(b) respectively), the energy score for the version-1 and version-2 data are shown in the same figure with blue and red color.

1. During these two years, the extreme days are same for both version-1 and version-2. The mean of energy score is less in version-2 compared to version-1 which implies for wind data, version 2 works better whereas in solar data mean value is of the same order. For solar data, the range of the energy score are of the order 1000. The mean of energy score for version-1 is -716.1267 and for version-2 the mean of energy score is -719.3949. So, the change in mean of energy score in the two versions are negligible compared to the range of the energy score, it has increased by 0.3%. In the case of wind, the range of energy score is of the order 10000 and the mean of energy score in version -1 is -4724 and version 2 is -4596. The mean of energy score has decreased by 1.2%.

2. For the extreme days, a cut off has been chosen (in case of wind 10000 is chosen as cut off) to define the extreme days. For those days, there is sharp drop in the energy score. version2 has higher drop than the version 1 (for 9 days, version 2 works better and for 10 days version 1 works better). For solar asset (2000 is chosen as cut off), we get version1 has higher drop than version 2 (for 4 days version1 works better and for 8 days version 2 works better)

3. Wind energy score for version 2 works better than version 1 (115 wind assets) for 64.25% of the days in two

years.

Solar energy score for version 2 is better than version 1 (36 solar assets) for 44.65% days out of two years.

2 Comparison between subset assets (36+115) and all the assets (226+264) for the version 2 data (2022/04/27)

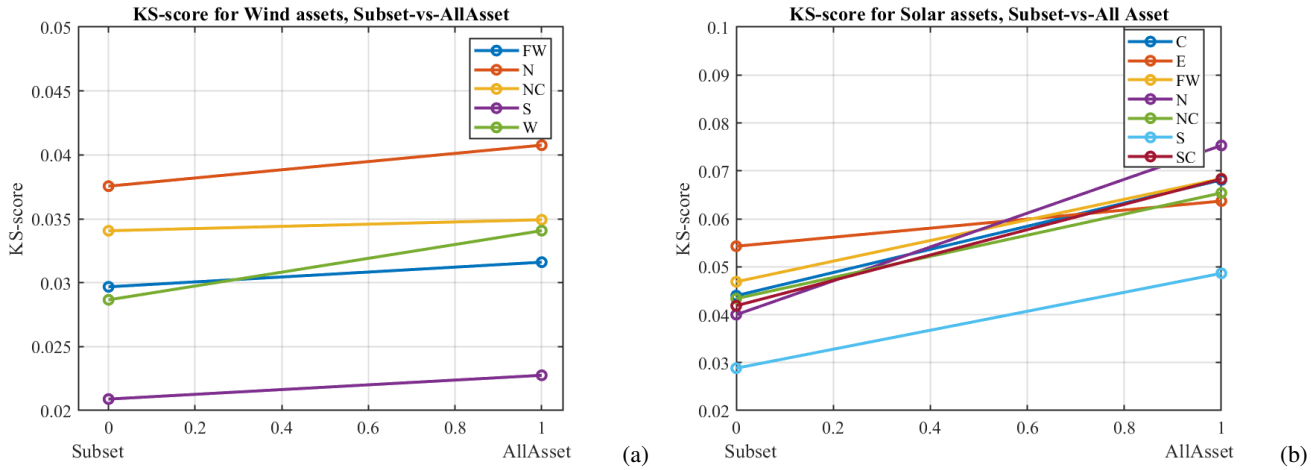

Figure 4. KS score fore both version 1 and version 2 are shown for both (a) wind , (b) solar assets.

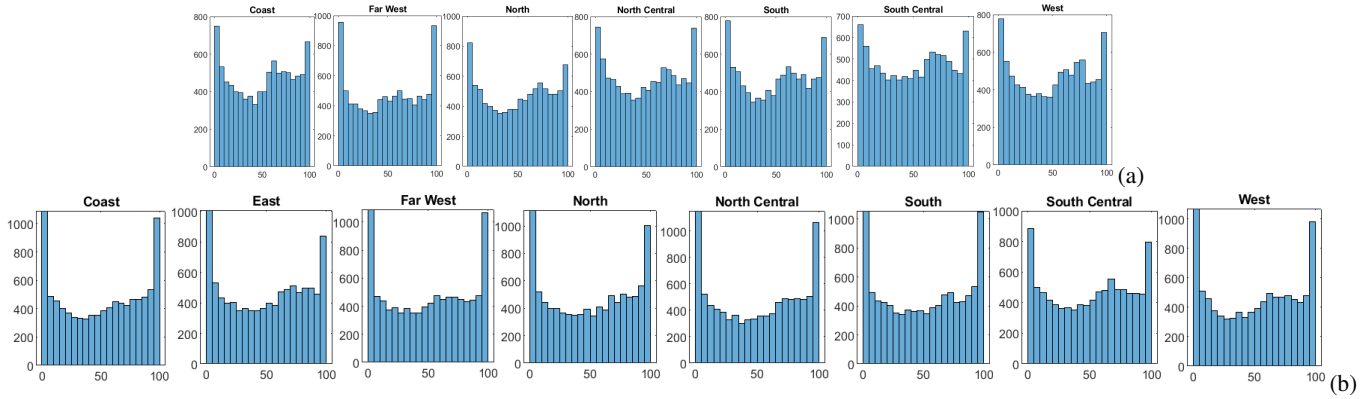

Figure 5. PIT histograms for Solar assets, (a) seven zones for 36 solar assets, (b) eight zones for 226 solar assets

1. Low KS score implies the PIT histograms are more uniform. In case of wind data, moving from 115 assets to 264 assets does not effect much on the KS score. KS score does not increase much with the data size. The change in KS-score is not more than 0.01. In case of solar data as we move from 36 assets to 226 assets, the KS score increases significantly with data size, it increases more than 0.01 for all the zones. see Fig. 4

2. PIT histograms for 36 solar assets and 226 assets are sown in Fig. 5 (a) and (b). For 226 solar assets the PIT histograms become less uniform and more U-shaped. The extra assets those are added after the 36 assets are causing the PIT histograms more U-shaped.

3. Fig. 6 PIT histograms for 115 wind assets and 264 assets are sown in Fig. 6 (a) and (b). For 264 Wind assets the uniformity of the PIT histograms remains more or less the same, it does not change significantly.

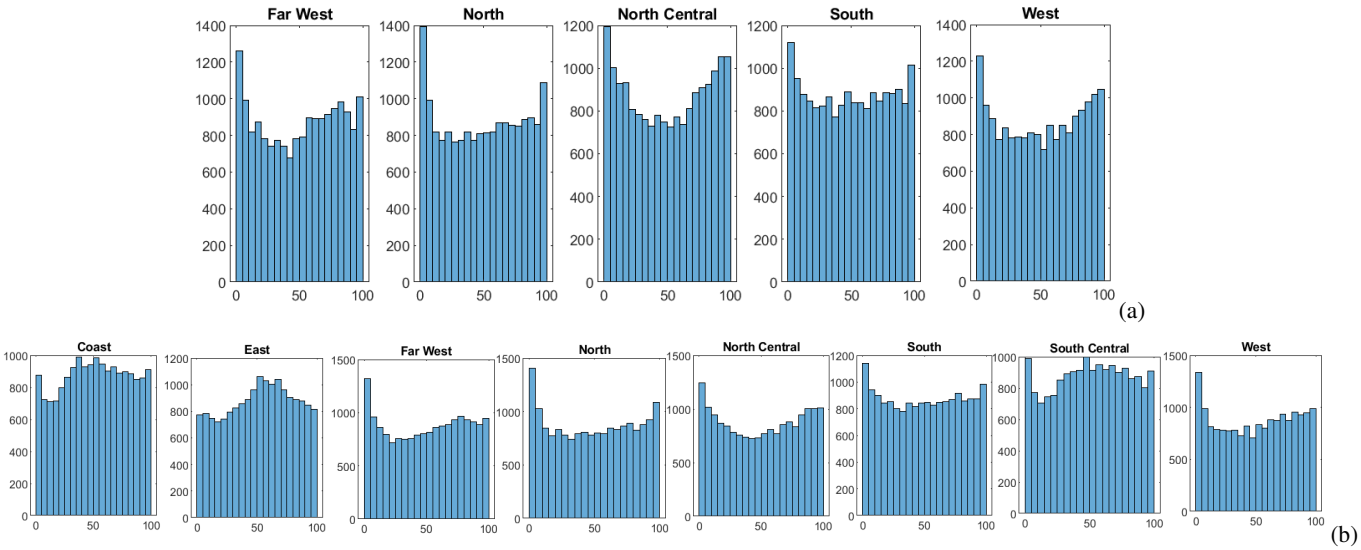

Figure 6. PIT histograms for Wind assets, (a) five zones for 115 wind assets, (b) eight zones for 264 wind assets

4. A Brier Score can take on any value between 0 and 1, with 0 being the best score achievable and 1 being the worst score achievable. The lower the Brier Score, the more accurate the prediction(s). The Brier score increases in Version-2 (2022/04/27). The distribution of Brier scores for the event-zero wind generation are shown for (a) 115 wind assets with the version-1 data, (b) 264 wind assets-version-2 data are shown in Fig. 7. For the version-2 data with 264 wind assets, the Brier score becomes significantly higher, almost double in number.

5. Having congested or empty space in the coverage plot is not desired. In case of wind, as we go from the 115 assets to 264 assets, the coverage plot becomes evenly distributed and in case of solar when we move from 36 solar assets to 226 solar assets, the coverage plot does not become more uniformly distributed.

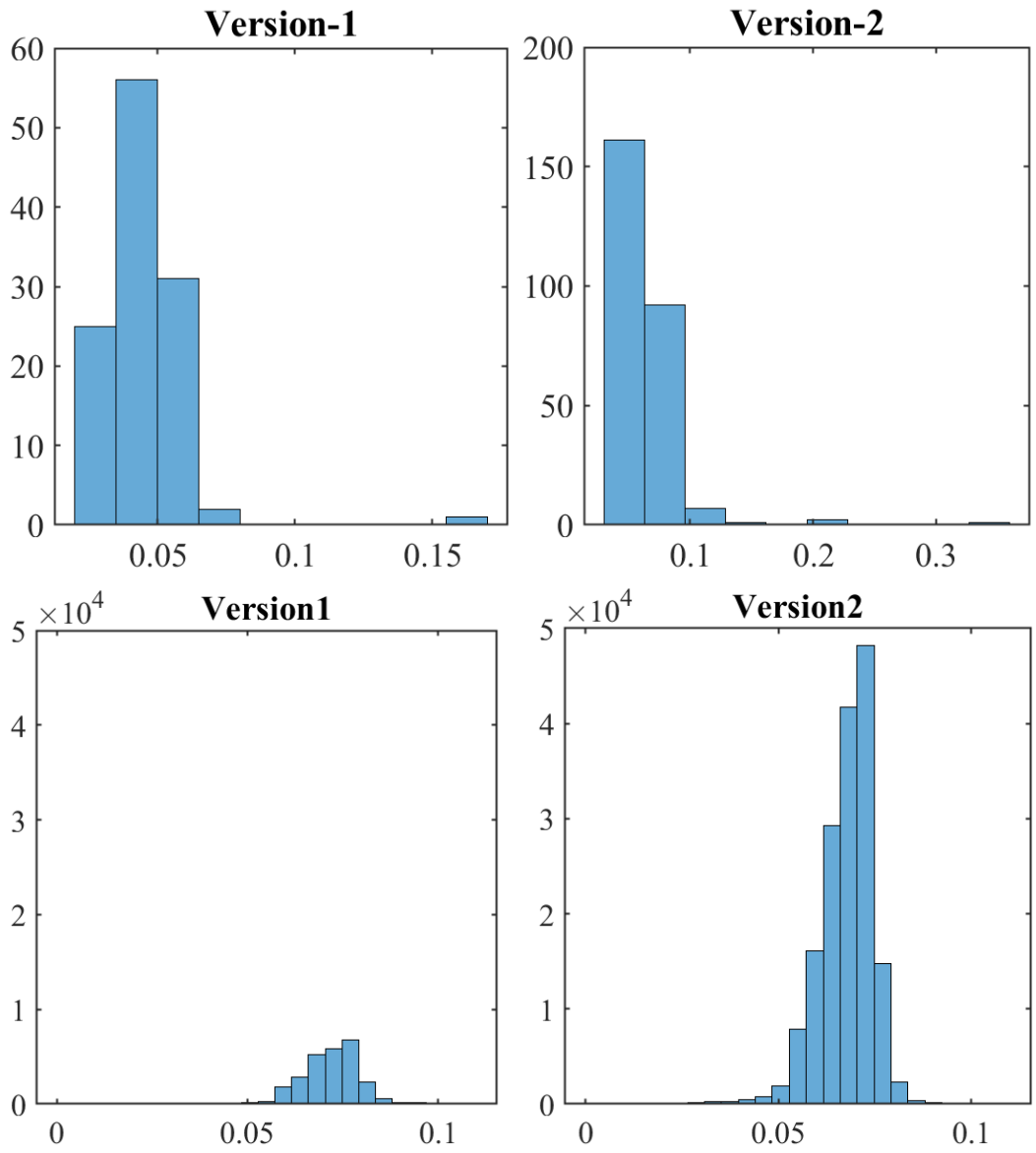

Figure 7. 1st row: Distribution of the Brier score for the zero wind generation for (a) Version 1 data, for 115 wind assets, (b) version 2 for eight zones for 264 wind assets. 2nd row: Distribution of the Brier score for the Max solar generation for (a) Version 1 data, for 36 solar assets, (b) version 2 for eight zones for 226 solar assets.

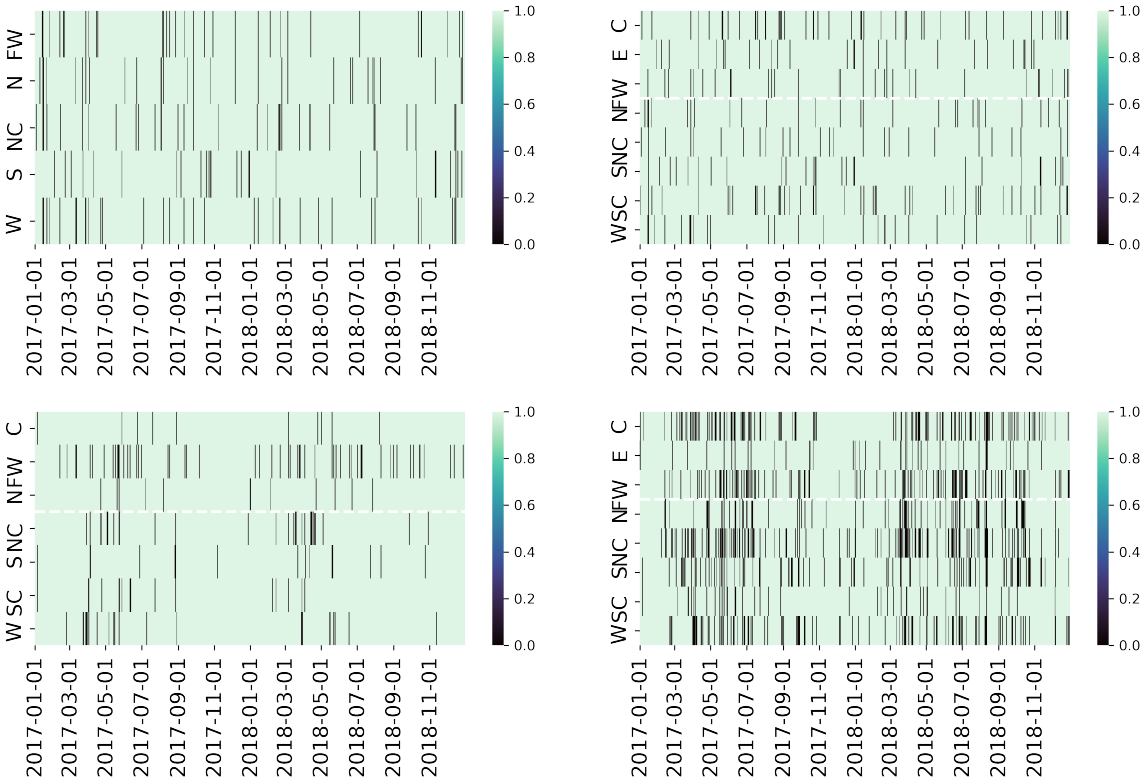

Figure 8. Coverage for wind data (a) 115 assets, (b) 264 assets. Coverage for solar data (a) 36 assets, (b) 226 assets.