Response to reviewers: Open access energy demand data for South and Southeast Asia

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We thank both reviewers for their constructive comments. Reviewer comments are retained in black; our responses are in red; and new or revised manuscript text is shown in blue.

Reviewer 1

General comment 1

Reviewer comment

> Fig 1 presents mean electricity demand (including per capita values), but the definition of the averaging period requires clarification. The authors should explicitly state the exact time range used to compute the mean for each country, and whether a consistent temporal window is applied across all countries. This is particularly important given the strong upward trends in electricity demand associated with economic growth across many SASEA countries. If the averaging periods differ between countries (e.g., due to data availability), the resulting means may not be directly comparable and could introduce systematic biases. The authors are therefore encouraged to (i) clarify the temporal coverage used in this figure, and (ii) discuss how differences in data availability and temporal trends may affect cross-country comparability. If applicable, it would be helpful to consider using a common overlapping period or otherwise justify the chosen approach.

Response

Addressed. We regenerated Figure 1 and added a new table listing the exact start date, end date, number of valid positive-demand days, mean demand, and mean per-capita demand for every country. We did not use a common overlapping period because no such period covers all twelve records: Oman ends in 2022, while Sri Lanka and Bhutan begin in 2023. We now explicitly state that Figure 1 is descriptive and should not be interpreted as an equal-period cross-sectional comparison.

New or changed manuscript text

> **Caption of Figure 1:** Average grid-level electricity demand across the twelve countries covered in our dataset. (a) Mean demand per capita (W per capita), computed from daily records in the harmonised daily aggregate dataset (`daily_agg_overall_demand.csv`) over the country-specific periods listed in Table 1. The inset shows Singapore. (b) Mean

national/regional electricity demand (GW; logarithmic scale), shown for the same periods and ordered approximately west-to-east. Country codes in panel (b) are defined in Table 1.

Main text: No single common overlapping period covers all twelve countries since Oman ends in 2022, whereas the Sri Lanka and Bhutan records start in 2023. We therefore show full-record means in Fig. 1 and provide the corresponding averaging windows in Table 1. These values are useful as descriptive diagnostics, but given their non-overlapping periods should not be compared directly.

General comment 2

Reviewer comment

Section 4.5 uses Ember electricity data as an independent validation source. The authors should clarify the underlying data sources of Ember and assess whether there is any overlap with the sources used in this study. If substantial overlap exists (e.g., IEA data), the validation cannot be considered fully independent and this limitation should be explicitly acknowledged and discussed.

Response

Addressed. We have changed the language from independent validation to external comparison. We added a citation to Ember's methodology document and now explicitly state that Ember combines direct demand, generation, and net-import information from national and international sources depending on availability. We also acknowledge that data source overlap may exist, especially for IEA-derived series.

New or changed manuscript text

Mean and median monthly demands were compared against Ember electricity demand data for 10 of the 12 countries in the dataset (Nepal and Bhutan are not covered by Ember), as shown in Fig. 10. Ember's electricity-data methodology combines direct demand, generation, and net-import information from national and international sources depending on data availability. This comparison should therefore be taken as an external consistency check rather than a fully independent validation, as some overlap in data sources may exist. Ember definitions may also differ from ours, for example by including net imports or by using different boundaries for behind-the-meter solar, losses, or balancing areas. Offsets therefore do not necessarily imply errors.

General comment 3

Reviewer comment

Section 7.2, the description of data quality control could be strengthened. The authors are encouraged to provide a more systematic account of QC procedures (e.g., treatment of missing values, outlier detection, and consistency checks), as well as guidance for users on data reliability and appropriate use.

Response

Addressed. We have further expanded the quality-control section to make the workflow as explicit as possible. This includes source-specific standardisation, local-day aggregation checks, completeness

diagnostics, outlier flagging, and monthly comparison with Ember. We also expanded the discussion section with explicit guidance on how the dataset should and shouldn't be used.

New or changed manuscript text

> We implement quality control as a multi-stage pipeline. Firstly, we use country-specific scripts to standardise units, time zones, calendars, column names, and remove duplicate records. Second, we check daily records for valid dates, non-negative values, and consistent local-day aggregation. Thirdly, we compute completeness diagnostics over each source-specific reporting period, separating true missing values and reported zeros. Fourthly, we use short-gap filling for rolling-statistic calculations and then flag outliers using three different methods. Finally, we compare monthly aggregates with Ember where available. The released data preserve the original reported values alongside flags that users can either filter, retain, or use as event indicators depending on the application.

General comment 4

Reviewer comment

> The manuscript would benefit from a clearer discussion of the potential applications of this dataset, in order to better highlight its value to the research community.

Response

Addressed. We now better highlight potential applications in the abstract, introduction, and discussion.

New or changed manuscript text

> **Example text from discussion:** The dataset is designed to support applications where consistent daily demand records are required across one or multiple countries. This could include (i) identifying relationships between weather and electricity demand, e.g., using reanalysis data to train models that predict demand as a function of meteorological variables (e.g., Hunt and Bloomfield, 2025a); (ii) climate-impact analysis, e.g., linking unusual demand behaviour to tropical cyclones, heatwaves, floods, holidays, or other disruption events (e.g., Hunt and Bloomfield, 2025b); (iii) planning and benchmarking studies that require comparable daily load statistics; (iv) economic, development, or policy studies where electricity demand can serve as a proxy for, e.g., service quality; and (v) methodological studies of imputation, anomaly detection, and forecasting in data-sparse electricity systems.

Specific comment 1

Reviewer comment

> On page 4 Fig 1: Abbreviations (e.g., OMN, IND, LKA) are not defined at first occurrence. Please ensure that all abbreviations are clearly defined when first introduced in the text or figures.

Response

Addressed. We added a table (Table 1) that defines all three-letter labels at first occurrence as well as the dataset periods.

Specific comment 2

Reviewer comment

> On page 5 Table 1: The use of the term "country" may not be strictly appropriate in all cases (e.g., Taiwan). The authors are encouraged to revise the terminology throughout the manuscript accordingly.

Response

We have retained the term "country" because it is a natural shorthand for the territorial electricity-system aggregates analysed here. To avoid overstatement, the revised manuscript now explicitly says that this terminology is not intended to imply any position on sovereignty or diplomatic recognition.

New or changed manuscript text

> We use the term "country" as a common geographical and statistical shorthand for the territorial electricity-system aggregates analysed here. This terminology is not intended to imply any position on sovereignty or diplomatic recognition.

Specific comment 3

Reviewer comment

> On page 7 Table 2: Table 2 should be relocated to Section 3.3, rather than being placed in Section 4.

Response

Addressed. This was a quirk of the LaTeX typesetting. We have forced its float placement so it appears with the relevant text.

Specific comment 4

Reviewer comment

> On page 9 Fig. 2: The current UpSet plot is not easy to interpret. The authors are encouraged to improve the figure design or consider an alternative visualization that more clearly communicates the overlap between outlier detection methods.

Response

Addressed. We have replaced the UpSet plot with a clearer two-panel horizontal bar chart.

Specific comment 5

Reviewer comment

> On page 18 Fig. 9: It is recommended that the colors in the legend be consistent with those of the corresponding curves in the Fig. 9.

Response

Addressed. These now match. Because of the new daily time-series figure, this is now Figure 10 in the revised manuscript.

Reviewer 2

General comment 1

Reviewer comment

> L96: "Generation was taken as a proxy for demand because grid-scale electricity storage remains minimal across SASEA." This assumption needs to be explained in more detail. In particular, the authors should discuss the possible impacts of electricity storage, imports/exports, transmission losses, and different reporting boundaries across countries. This issue is also relevant to the comparison with Ember, where the authors mention that discrepancies may be caused by different definitions or boundaries. For example, the MAPE for Malaysia reaches 29.6%, which seems quite high, but the manuscript does not provide a detailed explanation. A country-by-country clarification of what each original series represents would be very helpful.

Response

Addressed. We have added a new country-by-country table (Table 3) describing what each harmonised series represents and what its main caveats are. We also expanded the Ember comparison to explain why Malaysia and Taiwan have relatively high MAPE despite high correlations, and to emphasise that these are likely scale offsets rather than timing errors.

New or changed manuscript text

> **On the demand = generation assumption:** Where the source reported demand or energy met, that variable was used directly. Where the source reported generation or dispatch rather than demand (Myanmar and Sri Lanka), generation/dispatch was used as a proxy for grid-level demand because large-scale electricity storage remains limited across the region. This is not a perfect assumption because imports and exports, transmission and distribution losses, behind-the-meter generation, curtailment, and unmet demand can all cause differences between generation, grid demand, and final consumption. We therefore describe the harmonised variable as `demand_MWh`, but users should interpret it as a daily grid-level demand or demand-proxy series whose precise boundary is source-specific.

> **On the differences between our dataset and Ember:** The largest differences are for Malaysia (MAPE = 29.6%) and Taiwan (MAPE = 20.6%). In both cases, however, the correlation remains high ($R = 0.97$ and $R = 0.87$, respectively), indicating that differences are mainly scale or offset differences rather than errors in timing or recording. For Malaysia, the near-parallel series suggest a persistent definitional offset between the daily IEA-derived series used here and Ember's monthly demand estimate.

General comment 2

Reviewer comment

L124: “Daily values deviating more than ±0 standard deviations...” Please check this statement. If “±0 standard deviations” is not a typo, the outlier detection method would be difficult to understand.

Response

Addressed. This was a typographical error. The intended threshold was ±3.0 standard deviations, which is now stated explicitly.

General comment 3

Reviewer comment

Figure 9. The final subplot in Figure 9 is unclear for me.

Response

Addressed. We have remade the Ember comparison figure. The final panel is now an explicit legend panel, with matching colours and line styles, a clearer title, and additional spacing from the Malaysia panel.

General comment 4

Reviewer comment

The daily resolution is one of the main strengths of this study, but the manuscript does not clearly show daily time-series curves. Most current analyses are based on monthly, seasonal, or weekly averages. I suggest adding representative daily demand curves for the countries, which would help readers assess whether the data is reasonable and how missing values, outliers, holidays, and special events appear in the dataset.

In addition, the authors could consider adding more daily-scale analysis, for example highlighting holiday periods or the COVID-19 period. For a large country such as India, it may also be interesting to compare the daily demand series with other independent daily activity indicators, such as Carbon Monitor daily emissions, if appropriate.

Response

We have added new figure (Figure 6) and accompanying discussion. We added a daily time-series panel for all twelve countries, showing reported positive daily values, a 31-day centred rolling mean, flagged outliers, missing/non-positive gaps, and an indicative early COVID-19 period. We have not added the additional suggested analyses as they are out of scope for a dataset description paper. However, we encourage the dataset to be used in this way in future studies!

General comment 5

Reviewer comment

The patterns in Figure 8 deserve further discussion. Some countries seem to show their lowest demand during the middle of the week, which is somewhat counterintuitive. The authors should examine whether this pattern is related to holidays, missing data, reporting conventions, or other country-specific factors.

For the monthly patterns, the authors could also consider using ERA5 or other meteorological data to explore the relationship between electricity demand and temperature. This would strengthen the climate–energy relevance of the dataset.

Response

Addressed. We have expanded the discussion of weekly demand structure (see below). The relationship between ERA5 2-m temperature and electricity demand was already covered in Fig. 11 (now Fig. 12).

New or changed manuscript text

The weekly structure (Figure 9(b)) shows that weekend patterns vary across the region. In predominantly Islamic countries, namely Oman and Bangladesh, demand is reduced on Friday and/or Saturday. For most of the remainder, demand is reduced on Saturday and Sunday (as these are generally non-working days). Of interest are Nepal, where only Saturday has a substantial decrease in electricity demand; Bhutan, where Monday and Thursday have; and Thailand, where Sunday and Monday have. For Nepal, this is explained as their conventional weekend (working days are traditionally Sunday to Friday). For Bhutan and Thailand, the reason is unclear – although many public holidays in Thailand fall on Mondays.

General comment 6

Reviewer comment

Please discuss whether and how this dataset will be updated in the future. For example, India appears to be updated only until 2024, while other countries have more recent records. It would be useful to clarify whether this is due to source availability, data-access limitations, or the current processing workflow.

Response

Addressed. We added a future-work paragraph explaining that the release is versioned, and that future updates, should they happen, will depend on website/API availability.

New or changed manuscript text

This dataset is intended as a foundation that can be extended. The current release is versioned through Zenodo and reflects source-specific availability at the time the processing workflow was run. Future versions should aim to rerun the retrieval and harmonisation workflow, subject to source availability, website/API stability, and manual review of changed formats. Further extensions could include additional countries, sub-national series where available, and more automated near-real-time updates.

Specific comment 1

Reviewer comment

Some figures need further improvement. In some cases, the font size is too large (Figure 2), while in others the text is too close to the axes. Please improve the readability and consistency of the figures.

Response

Addressed. We have remade most of our figures with more reasonably sized and spaced text.

Specific comment 2

Reviewer comment

> Since Taiwan is included in the dataset, I suggest using a more neutral term such as "countries/regions" rather than referring to all study units simply as "countries".

Response

We have retained the term "country" because it is a natural shorthand for the territorial electricity-system aggregates analysed here. To avoid overstatement, the revised manuscript now explicitly says that this terminology is not intended to imply any position on sovereignty or diplomatic recognition.

New or changed manuscript text

> We use the term "country" as a common geographical and statistical shorthand for the territorial electricity-system aggregates analysed here. This terminology is not intended to imply any position on sovereignty or diplomatic recognition.

References

Hunt, K. M. and Bloomfield, H. C.: Building and explaining data-driven energy demand models for Indian states, Environmental Research: Energy, 2, 025 003, 2025a.

Hunt, K. M. R. and Bloomfield, H.: Landfalling tropical cyclones significantly reduce Bangladesh's energy security, Authorea Preprints, 2025b.