# Brasilia specific energy storage applications

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In contrast, energy system models for developing countries use opaque and, in most cases, inaccessible datasets. Using those datasets makes it difficult for global energy models to represent emerging nations accurately. Language barriers may further hinder researchers who belong to a different language region from utilizing available energy data.

In this context, our contribution is to make the existing energy data of Brazil better applicable for energy systems modelling. By providing the first publicly available, spatially explicit, harmonized, and English version of Brazil"s energy data, we enable researchers to replicate the Brazilian energy system and/or to improve the integration into global energy models starting from a common basis.

The assembled dataset comprises the following subcategories as detailed in the Methods: (i) geospatial data for Brazil, (ii) aggregated grid network topology, (iii) vRES potentials-profile and installable generation capacity, (iv) geographically installable capacity of biomass thermal plants, (v) hydropower plants inflow, (vi) existing and planned power generators with their capacity, (vii) electricity load profile, (viii) scenarios of sectoral energy demand and (ix) cross-border electricity exchanges. This dataset is resolved geographically by Brazilian federal states, and time series data are resolved by hours, spanning 2012-2020.

In this way, the presented dataset provides the essential information and foundation for the operational and expansion planning studies necessary to explore Brazil"s highly decarbonized energy future. For example, the dataset was used in the PyPSA-Brazil model8 to assess the impact of transmission grid expansion in the Brazilian power system. The dataset published in this paper has been updated and includes more years of data than the version used8.

This work aims to create consolidated open energy data for Brazil based on open and accessible original datasets.

Supplementary TableS1 summarizes the sources and licenses of the raw data used for each subcategory of the dataset in this paper. The following subsections elaborate on knowledge of energy data in the Brazilian context, how we obtain each dataset from its sources, and assumptions made in processing and constructing

the datasets.

Brazil has five macroeconomic regions, four electric regions, 27 federal levels (26 states and one federal district-Bras?lia), and 5572 municipalities.

The spatial resolution of the dataset we provide is at ISO 3166-2 level9 and comprises 27 defined regions, i.e., federal level, illustrated in Fig.1.

27 regions defined according to ISO 3166-2-Brazilian federal states-used in this study.

Even though there are several map sources, the original dataset used is from the Brazilian Institute of Geography and Statistics (Portuguese: Instituto Brasileiro de Geografia e Estat?stica, IBGE)10. This choice is not only motivated by the licensing but also because IBGE is Brazil"s official map source and is considered the most credible source for the country"s borders and topography. The shapefile"s Coordinate Reference System (CRS) is SIRGAS 2000 (commonly known as EPSG:4674).