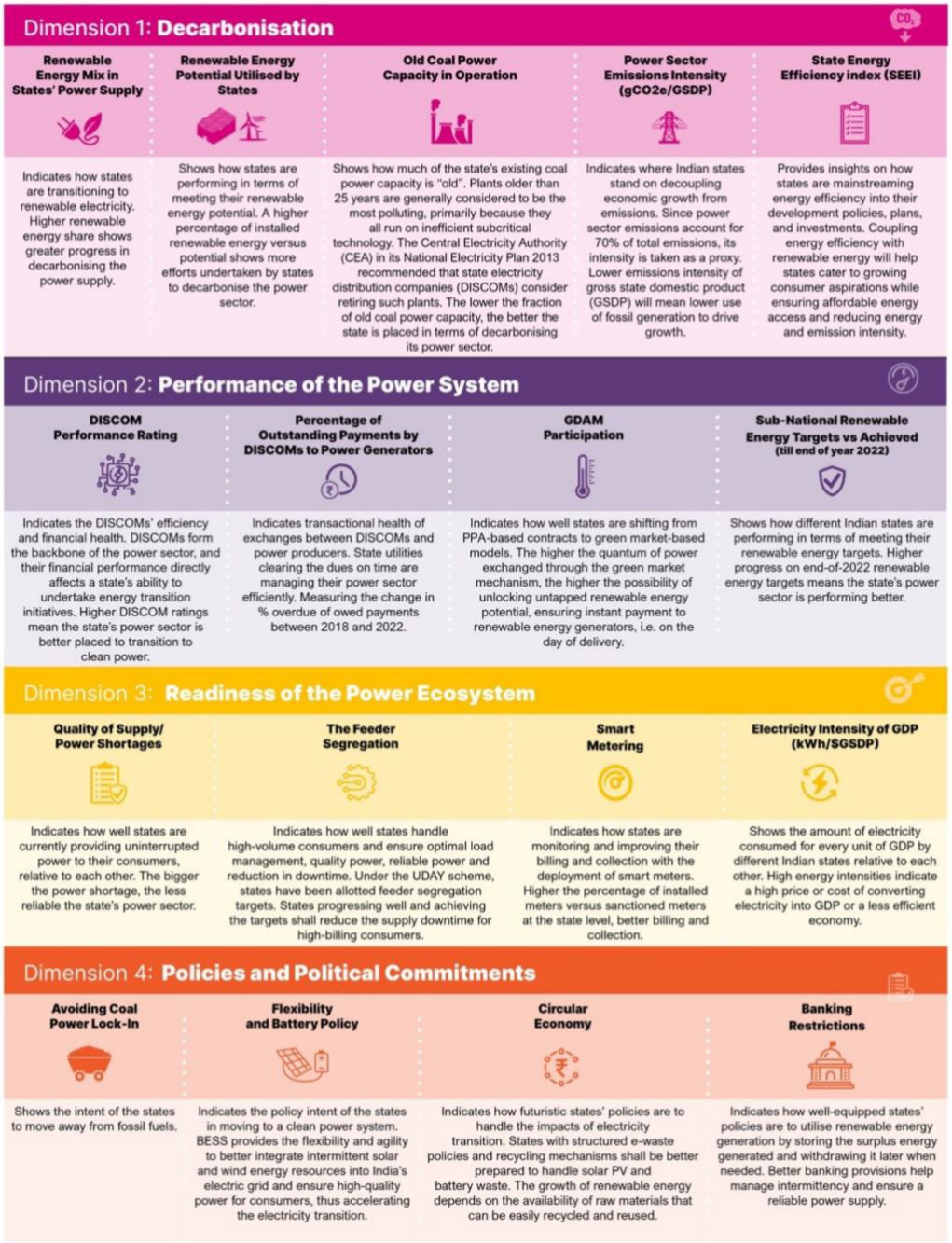
Methodology

The backbone of the SET scores is the data dimensions selected, along with the sub-parameters. As stated above, there are four broad dimensions. These dimensions have seventeen parameters in total. A rationale for selection and a mode of measurement backs each of these parameters.

Figure 2: Dimensions, Parameters and Rationale



Source: IEEFA & Ember Analysis

Selection of Parameters

We selected the parameters under each dimension based on two main criteria: a) relevance to the four dimensions of India's clean electricity transition and b) availability of data from reliable sources.

We consulted several sectoral experts to finalise the parameters. We followed an iterative method and held follow-up discussions with the experts. The experts consulted in the process were from different organisations, including but not limited to Tata Power, Power System Operators, CEEW, Vasudha Foundation, Wood-Mackenzie, and Ember.

Selection of States

India's clean electricity transition requires all states and Union Territories to transform their power sectors. More specifically, progress in states with high power demand is not only crucial but also urgent for India's power sector to achieve a clean electricity transition.

Therefore, to have structured boundaries for analysis, the report focuses on 16 states whose combined electricity demand constituted about 90% of India's annual power requirement in the last three financial years. We calculated the power demand based on power supply position reports published by the Central Electricity Authority (CEA).[1]

We shortlisted Delhi, Maharashtra, Uttar Pradesh, Gujarat, Chhattisgarh, Tamil Nadu, Rajasthan, Madhya Pradesh, Karnataka, Telangana, Andhra Pradesh, Punjab, Haryana, West Bengal, Odisha, Bihar for this analysis.

Data Collection

The report is a data-intensive study that required data collection, cleaning and validation for all 17 parameters for the selected 16 states. We used official government sources wherever possible. We used private data sources for parameters where data was unavailable from official sources. We provide the details of each parameter in **Figure 3**.

We rely on qualitative data for the fourth dimension, Policies and Political Commitments. Therefore, we have created data rubrics to capture the qualitative data in the best way possible. We provide the rubrics on a downloadable data sheet available on request.

To ensure uniformity in analysis, we used data for the financial year (FY) 2021-22 wherever possible. In cases where data for FY2022 was unavailable, we used the latest available data for all the parameters. Sectoral experts vetted the data used in this report.

Data Processing

In this analysis, we first calculated the performance of states on the various parameters based on their respective metrics. To do so, we normalised the parameters to a standard scale. We then consulted experts to give weightage to each parameter. We then estimated each dimension's state-wise score as the weighted average of all the normalised parameter scores.

1 CEA. Power Supply Reports. FY 22

We provide the metrics used for different parameters, the type of the indicator, the weightages and the data sources for each parameter in Figure 3. We provide a detailed description of how we did the scoring in **Annexure 1**: Methodology Details.

Figure 3: Parameters, Weightages and Data Sources

DIMENSIONS	WEIGHTAGES	INDICATOR TYPE	MODE of MEASUREMENT	SOURCES
Dimension 1: Decarbonisation				
Renewable Energy Mix in State's Power Supply	30	Progressive	Total generation (GWh) / Renewable energy generation (including large hydro) (GWh)	CEA
Renewable Energy Potential Utilised by the States	15	Progressive	Renewable energy installed capacity (as of Sep 2022) / Renewable energy potential as estimated on 31 March 2021	Ministry of New and Renewable Energy (MNRE) Physical Progress Data Ministry of Statistics and Programme Implementation (MOSPI) Energy Statistics 2022
Old Coal Power Capacity in Operation	20	Regressive	Current coal capacity / Current coal capacity above 25yrs of age	Global Energy Monitor Coal power plant tracker
Power Sector Emissions Intensity (gCO2e/GSDP)	20	Regressive	FY2022 emissions (kgCO2eq) / FY2022 GSDP (Rs in trillion)	Renewable Energy Generation Data Non-Renewable Energy Generation Data Emission Intensity Factors Reserve Bank of India (RBI) Handbook of Statistics
State Energy Efficiency Index (SEEI)	15	Progressive	SEEI Scores	The State Energy Efficiency Index 2020
Dimension 2: Performance of the Power System				
DISCOM Performance Rating	30	Progressive	NITI Aayog SECI Score	NITI Aayog
Percentage of Outstanding Payments of DICOMs to Power Generators	25	Progressive	Change in 'overdue / owed payment' from March 2018 to March 2022	Payment Ratification And Analysis in Power procurement for bringing in Transparency in Invoicing (PRAAPTI) Portal
GDAM Participation	20	Progressive	Total Volumes through GDAM till April 2022 (BUY+ SELL) / Total net short term till April 2022	Central Electricity Regulatory Commission (CERC) Market Monitoring Report
Sub-National Renewable Energy Targets vs Achieved (Till the end of 2022)	25	Progressive	Installed capacity (MW) / State-level renewable energy targets till De 2022 (GW)	MNRE
Dimension 3: Readiness of the Power Ecosystem				
Quality of Supply / Power Shortages	30	Regressive	Shortage in power supply (MU)/ power requirement (MU)	Power System Operation Corporation (POSOCO)
Feeder Segregation	20	Progressive	In-house data rubric with weightages given to data availability and % progress achieved against UDAY targets. Detailed split captured in the data file.	UDAY Portal
Smart Metering	20	Progressive	% Installed smart meters vs sanctioned under UDAY	National Smart Grid Mission
Electricity intensity of GDP (kWh/$GSDP)	30	Regressive	Power Requirement in FY 2022 (MU)/FY 2022 GSDP (Rs in trillion)	POSOCO
Dimension 4: Policies and Political Commitments				
Avoiding Coal Power Lock-In	30	Progressive	In-house data rubric captured in data files	Global Energy Monitor Coal power plant tracker
Flexibility and Battery Policy	20	Progressive	In-house data rubric captured in data files	JMK Research and IEEFA Report Peak Demand (April 2021- March 2022)
Circular Economy	20	Progressive	In-house data rubric captured in data files	List of Dismantlers / Recyclers List of Registered Recyclers of Used Lead Acid Batteries & Lead Wastes / Scraps Population (2022 estimate)
Banking Restrictions	30	Progressive	In-house data rubric captured in data files	Banking Restrictions on Renewable Energy Projects in India

Source: IEEFA & Ember Analysis

Data-related challenges

For a few states, data was unavailable for some of the parameters, and it was challenging to source this from any alternate and reliable source. We present the reasonable assumptions that we made in **Annexure 2**: Data-related Challenges and Assumptions. We assigned an average value of the score for all states where data was available. We also give details about the data-related challenges in **Annexure 2**: Data-related Challenges and Assumptions.

State-level data analysis on coal gasification, use of carbon capture, usage and storage (CCUS) technology, captive power plants, round-the-clock power supply and other flexibility options is crucial. Therefore, we plan to expand the study and include more parameters in the next phase.