February 2026

Institute for Energy Economics and Financial Analysis

EMBER

Indian States' Electricity Transition (SET) 2026

Data-driven analysis of electricity transition performance across 21 Indian states

Assessment year - FY2025

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Key findings

SET 2026 underscores that progress in individual dimensions does not automatically translate into a system-wide electricity transition. However, across the 21 states assessed, advancements have been made on multiple fronts, even as the pace and focus vary across key areas of evaluation.

Karnataka, Himachal Pradesh and Kerala showcase consistent leadership in the decarbonisation dimension of the SET 2026 evaluation, emerging as strong performers. This dimension assesses states' progress in shifting to renewable electricity, improving energy efficiency, and decoupling growth from emissions. Tamil Nadu, Maharashtra and Rajasthan also show progress through energy efficiency interventions.

Delhi and Haryana continue to perform strongly in terms of how prepared and well-functioning their power ecosystems are, driven by factors such as robust distributed solar adoption, reliable power supply, and relatively sound DISCOM performance. Chhattisgarh and Bihar stand out due to improvements in their DISCOM performance.

Andhra Pradesh, Uttar Pradesh, and Rajasthan do well under market enablers, regulatory initiatives that accelerate renewable energy adoption, such as up-to-date policies, adoption of green tariffs and green open access mechanism, and progress on solar-hour-aligned time-of-day (ToD) tariffs. Bihar and Assam, too, stand out in this dimension, driven by improvement in their electric vehicle ecosystem, availability of attractive green tariffs, introduction of solar-hour-aligned ToD tariffs and updates to their renewable energy policies in 2025.

Executive summary

India's electricity demand continues to rise rapidly, driven by sustained economic growth, urbanisation and the electrification of transport, industry and emerging digital infrastructure. With the power sector accounting for nearly half of India's total carbon dioxide emissions,[1] accelerating the transition to clean electricity is critical to achieving the climate objectives laid out in India's National Determined Contribution (NDCs). Beyond emissions reduction, this transition will also offer other benefits, such as increased affordability and energy security. And while national policies set the overall direction, state governments ultimately shape outcomes through power procurement choices, performance of distribution companies (DISCOMs), market enablers and grid preparedness.

The transition, however, is unfolding differently across states, shaped by variations in resource endowments, development pathways, and institutional capacities. While some states are already leading in renewable energy deployment and grid readiness, others are building momentum, presenting significant opportunities for accelerated progress through targeted, state-specific policy interventions.

This third edition of the State Electricity Transition (SET) 2026 report evaluates 21 Indian states across three key dimensions: 'Decarbonisation'; 'readiness and performance of the power ecosystem'; and 'market enablers'.

Dimension 1, decarbonisation, assesses states' progress in shifting to renewable electricity and decoupling economic growth from emissions. The second dimension looks at the readiness and performance of states' power ecosystem, examining factors such as the uptake of distributed solar, the reliability of power supply, and the health of DISCOMs. The third dimension, market enablers, evaluates state-level initiatives that facilitate the adoption of electric vehicles (EV) and green hydrogen, as well as measures such as green tariffs, green energy open access, energy storage deployment, and solar-hour-aligned time-of-day (ToD) tariffs to accelerate the transition to renewable energy.

Building on the 2023[2] and 2024[3] editions, the 2026 assessment incorporates recent developments, emerging trends, and stakeholder consultations to reflect on-ground realities. The report does not consider socio-economic or Just Transition considerations such as livelihoods, fiscal dependence, or workforce impacts, which fall beyond the scope of this edition. Table 1 in the methodology section outlines the rationale for the selected dimensions and parameters, while Figure 2 presents the macro performance of states based on their dimension-level performance.

A dimension-level analysis highlights states that have demonstrated consistent progress, as well as those facing structural challenges in advancing the electricity transition. A cross-dimensional analysis

[1] Business Standard. Power sector CO2 emissions down for only second time in half a century. 17 September 2025
[2] IEEFA. Indian States' Electricity Transition (SET). 26 February 2023
[3] IEEFA. Indian States' Electricity Transition (SET): 2024. 23 April 2024

further shows that progress in one area does not automatically translate into a comprehensive, system-wide transition. While all 21 states assessed have made progress across multiple fronts, the pace and depth vary significantly across dimensions. The sections below highlight key insights emerging from both dimension-wise and cross-dimensional assessment.

Dimension-level insights:

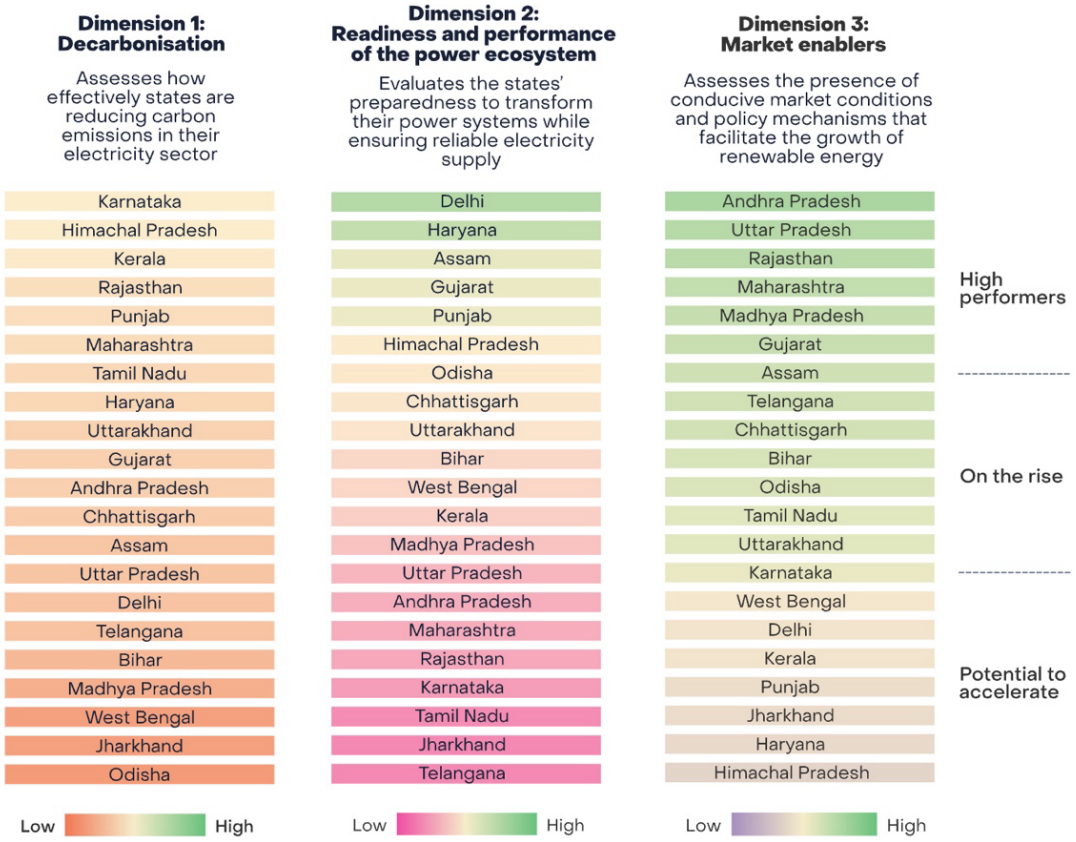
- **Decarbonisation:** Karnataka, Himachal Pradesh and Kerala have showcased consistent leadership in the decarbonisation dimension of the SET 2026 and SET 2024 analysis, emerging as strong performers. Karnataka continued to lead, supported by relatively lower power sector emissions intensity and a renewable energy share of around 37% in its power procurement mix. Hydropower-dominated Himachal Pradesh recorded the highest renewable share (~65%) and the lowest emissions intensity, though utilisation of its renewable potential remained moderate and energy efficiency performance presented scope for strengthening. Kerala's performance was driven by low emissions intensity and steady renewable potential utilisation. Tamil Nadu, Maharashtra and Rajasthan also showed progress, particularly through strengthened energy efficiency interventions.

- **Readiness and performance of the power ecosystem:** Delhi and Haryana continued to perform strongly in terms of their preparedness and overall well-functioning power ecosystems. The states' progress was supported by robust distributed solar adoption (76% and 73%, respectively, of total renewable installed capacity), alongside reliable power supply and relatively sound DISCOM performance. Chhattisgarh and Bihar stood out due to improvements in their DISCOM performance since the SET 2024 analysis, reflecting strengthened operational efficiency in the distribution segment.

- **Market enablers:** Andhra Pradesh, Uttar Pradesh and Rajasthan did well under market enablers, reflecting regulatory initiatives that accelerated renewable energy adoption. Their performance was supported by updated renewable energy policies, adoption of green tariffs and green open access mechanisms, and progress on solar-hour-aligned ToD tariffs. Uttar Pradesh demonstrated strong momentum in EV deployment, while Andhra Pradesh and Rajasthan also made moderate progress in this area. Bihar and Assam stood out in this dimension as well, driven by improvement in their EV ecosystem, availability of attractive green tariffs, introduction of solar-hour-aligned ToD tariffs, and renewable energy policy updates in 2025.

Figure 1 summarises where the states stand in terms of their progress across each dimension.

Figure 1: Dimension-level performance of 21 states



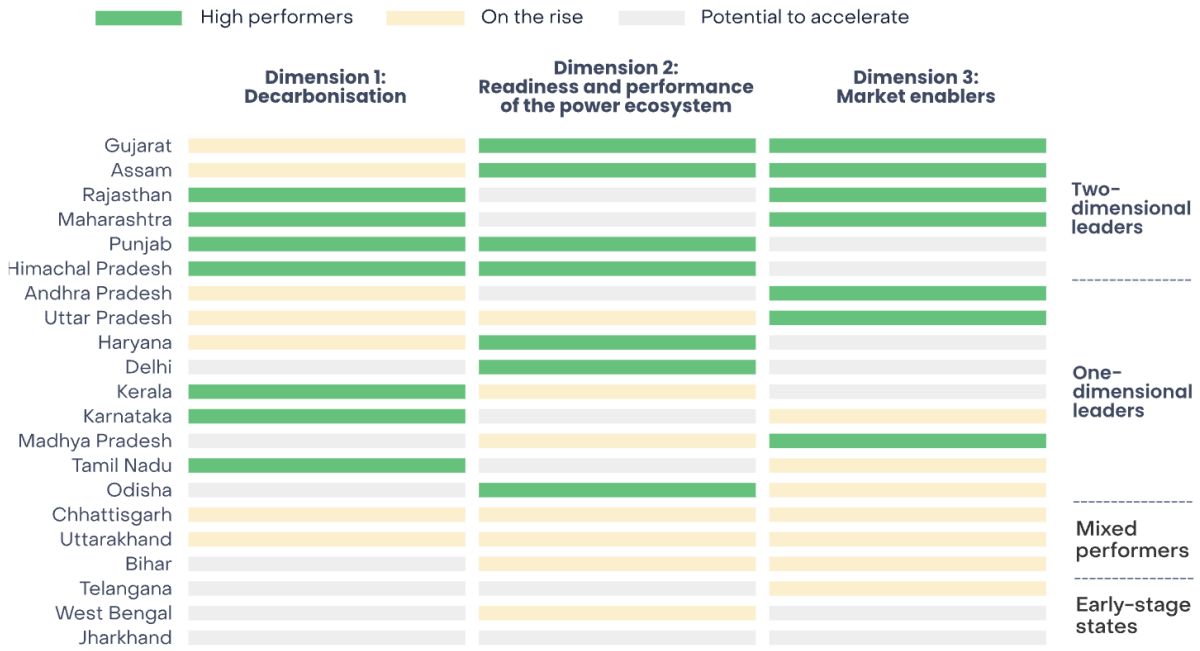
Source: Ember, IEEFA

A summary of cross-dimensional insights:

- Some states emerged as leaders in India's electric transition story, performing strongly in two of the three dimensions. These included Maharashtra, Rajasthan, Gujarat, Assam, Punjab and Himachal Pradesh.

- Maharashtra and Rajasthan did well under dimension 1 and dimension 3. However, there remained scope to strengthen the readiness and performance of their power ecosystem (dimension 2), reflecting limitations in DISCOM performance, low short-term market participation, and limited uptake of distributed solar (off grid + rooftop solar + solar pumps) and smart meters. Gujarat and Assam did well across dimensions 2 and 3, but their performance under dimension 1 remained moderate, with Gujarat utilising only 15% of its renewable potential and Assam adding limited renewable capacity over the past five years, constraining the share of renewables in their power procurement mix. Meanwhile, Punjab and Himachal Pradesh performed strongly in dimensions 1 and 2, but trailed in dimension 3 because of slow adoption of EVs, absence of solar-hour-aligned ToD tariffs, limited green hydrogen uptake and lack of energy storage additions. Collectively, these gaps constrained their ability to unlock a comprehensive clean electricity transition.

Figure 2: Macro-level performance of 21 states across electricity transition dimensions



Source: Ember, IEEFA

- Another group of states showed progress in a single dimension. These included Karnataka, Tamil Nadu, Kerala, Delhi, Uttar Pradesh, and Andhra Pradesh, among others.

- Karnataka, Tamil Nadu, and Kerala demonstrated strong performance in dimension 1 with good energy efficiency interventions and lower emissions intensity. Karnataka led in dimension 1 with low power sector emission intensity, strong SEEI 2024 performance, and good renewable energy share (~37%). The states will now need to address the gaps in their grid readiness, DISCOM health, and market-enabling conditions. Delhi, Odisha, Haryana did well under dimension 2 with good DISCOM health and lower power supply shortage. Delhi remained a high performer under dimension 2, driven by zero power shortage, distributed solar adoption, with 304MW of distributed solar capacity installed as of March 2025, accounting for nearly 97% of its total solar capacity, and strong DISCOM performance. Its weak performance in dimensions 1 and 3 was due to low renewable energy capacity addition, low renewable energy share in procurement mix, limited uptake of ToD tariffs and nascent energy storage deployment. Uttar Pradesh, Madhya Pradesh, Andhra Pradesh showed advancement under market enablers with policy mechanisms in place, green hydrogen progress, and good EV adoption. Andhra Pradesh led in dimension 3 with its integrated clean energy policy, progress in green hydrogen, and 1,440MW of pumped hydro storage capacity, as well as solar-hour-aligned ToD tariffs. These states are yet to translate these into robust renewable shares or strong system performance.

- Chhattisgarh, Uttarakhand and Bihar were among the states that exhibited moderate performance across dimensions. Chhattisgarh's moderate performance was down to its low renewable procurement (10% in FY2024) and large untapped renewable potential (~92%); low short-term market participation; limited distributed solar uptake (498 megawatt [MW]); and slow smart meter deployment. Meanwhile, Uttarakhand's strong hydropower base supported a high renewable procurement share (44% in FY2024) and low emissions intensity, even as 84% of its renewable potential remained untapped. Its energy efficiency progress was weak, decentralised solar adoption minimal and metering slow. Bihar performed moderately on dimensions 2 and 3 but lagged in dimension 1, having used only 3% of its renewable potential and sourcing 18% of procurement from renewables. Bihar's progress, though, was visible in smart metering (78% under the central government's Revamped Distribution Sector Scheme [RDSS]), implementation of ToD tariffs, and EV uptake (8% in FY2025), even though shortages (0.4% in FY2025), low power market activity and non-operational storage persisted.

- West Bengal, Telangana and Jharkhand remained in the early stages of transitioning and required foundational interventions, including stronger institutions, improved DISCOM finances, updated planning frameworks and clear long-term policy signals. West Bengal's renewable share was only ~7% of procurement in FY2024 with very low distributed solar and smart metering uptake. Telangana recorded modest renewable energy share in its procurement mix (14% in FY2024), low utilisation of renewable potential (<10% as of March 2025) and weak DISCOM performance. Jharkhand recorded low renewable energy penetration (~8%), minimal market participation and structural challenges in DISCOM performance and EV adoption.

Evidence from across dimensions highlights that accelerating India's electricity transition will require coordinated national and state-level actions, with targeted, dimension-specific interventions to address gaps in the areas where individual states show slower progress.

Introduction

Electricity lies at the heart of modern economies and underpins India's economic growth story. Globally, electricity accounted for 21% of total final energy consumption in 2024. In addition, it is the primary energy source for sectors representing over 40% of global economic activity and the main source of energy for households.[4]

India has set ambitious targets for its power sector as part of its clean energy transition. The country aims to achieve 500 gigawatts (GW) of non-fossil fuel installed capacity by 2030, reflecting its commitment to decarbonisation and sustainable economic growth. In FY2025, India added 29GW of renewable capacity, which was led by 24GW[5] of solar, pushing cumulative solar installations past 100GW.[6] By October 2025, India's total installed renewable capacity reached 251GW,[7] spanning solar, wind, hydro and bio-power sources. These additions enabled India to achieve 50% of installed power capacity from non-fossil sources, meeting its original 2030 target five years ahead of schedule.[8] Sustained national and state-level efforts, backed by targeted policies and flagship programmes, have expanded clean energy access and strengthened the foundation for faster renewable growth. India's global ambitions, including hosting the 33rd Conference of the Parties (COP33) in 2028, further signal its commitment to aligning economic growth with environmental stewardship.

Rising generation capacity has been accompanied by growing electricity demand. India's electricity consumption increased by 33% from FY2021 to 1,694 billion units (BUs) in FY2025, translating to a compounded annual growth rate (CAGR) of 7.4%.[9] This surge will further accelerate because of expanding industrial and commercial activities, rising ownership of appliances such as air conditioners, electrification of the mobility sector, and the proliferation of data centres and digital services.[10] Renewable generation now supplies a growing share of this rising demand, with over 404BUs generated from renewables, roughly 22% of total electricity generation in FY2025.[11] Projections under the International Energy Agency's (IEA) current policy scenario indicate an 80% increase in electricity demand by 2035, the fastest among emerging economies,[12] driving the need for higher overall electricity generation.

However, the clean energy transition has not been uniform across Indian states. Such divergence is inevitable at the sub-national level given the structural and historical factors, including differences in

[4] International Energy Agency. World Energy Outlook 2025, Page 19
[5] Calculated using data from Ministry of New And Renewable Energy (MNRE) state-wise (location based) installed capacity of renewable power as on 31 March 2025 and 31 March 2024
[6] Press Information Bureau (PIB). MNRE. India's Renewable Energy Capacity Achieves Historic Growth in FY 2024-25. 10 April 2025
[7] Central Electricity Authority of India (CEA). All India installed capacity (in MW) of power stations. 31 October 2025
[8] PIB. MNRE. India's Renewable Rise: Non-Fossil Sources Now Power Half the Nation's Grid. 14 July 2025
[9] India Brand Equity Foundation (IBEF). Power Sector in India. October 2025
[10] S&P. Will India become a global data center market. 17 September 2025
[11] CEA. Monthly Renewable Energy Generation Report. Page 5. March 2025
[12] IEA. World Energy Outlook. Page 138. 2025

resource endowment, development legacies, states' fiscal and economic conditions, rural-urban composition, and institutional capacity within the power sector. Each state presents unique challenges. While some have advanced rapidly in deploying renewable energy and strengthening grid infrastructure, others are only now gathering momentum, although with encouraging prospects for accelerated growth. Understanding these state-level differences is essential for designing policies and interventions. A purely national overview risks overlooking the distinct progress, constraints, and opportunities that exist across states.

At the same time, a Just Transition lens capturing socio-economic dimensions such as livelihoods, fiscal dependence and energy security is also important for certain states. For example, Jharkhand has a significant share of state revenue linked to legacy sectors, making socio-economic transition risks especially salient and requiring careful planning. However, these aspects, while critical, are not assessed in this report, which focuses exclusively on electricity transition indicators valid across the 21 states considered.

IEEFA and Ember launched the first edition of the State Electricity Transition (SET) report in 2023 to track states' progress and identify areas requiring urgent attention, followed by an update in 2024, and now in 2026. The report offers data-driven insights to help policymakers make informed, actionable decisions that support a faster, resilient, and sustainable clean electricity transition across Indian states.

What this report adds

This edition of the SET report builds on the previous two editions, incorporating more refined parameters and dimensions to capture the nuances and new developments in the state-level electricity transition. Details of the parameter-level updates are captured in the methodology section and in Table 1 and Annexure 1. The objective to provide clear, data-driven insights into how Indian states are progressing across key dimensions of the clean electricity transition remains unchanged.

Methodology

The SET scores are based on the dimensions selected and their associated parameters. SET 2026 uses a three-dimensional framework with 18 parameters. Table 1 outlines the details of the dimensions and parameters.

Table 1: Three-dimensional framework and the rationale

Parameter	Rationale
Dimension 1: Decarbonisation – Collectively, the parameters of this dimension offer a comprehensive perspective on states' advancement in procuring renewable electricity, realising renewable energy potential, analysing economic growth in terms of the power sector emissions lens, integrating energy efficiency into state-level policy adoption, tracking state expenditure on renewable energy and increase in renewable energy capacity.	
Renewable energy in the procurement mix	Indicates how far electricity supply has shifted towards clean sources
Utilised renewable energy potential	Reflects effectiveness in translating natural renewable energy potential into actual deployment
Power sector emissions intensity	Captures whether economic growth is decoupling from power-sector emissions
State Energy Efficiency Index (SEEI)	Shows demand-side reduction of energy use and emissions
State expenditure on renewable energy	Signals public financial commitment to decarbonisation
Renewable energy capacity addition	Measures the pace of clean capacity expansion
Dimension 2: Readiness and performance of the power ecosystem – This evaluates the state-level readiness, as well as performance, for transitioning the power system towards cleaner and more sustainable energy sources. The parameters considered for this dimension are selected to provide a comprehensive assessment of various aspects of the power system's performance and preparedness.	
DISCOM performance	Financially and operationally healthy distribution companies are essential for sustaining the electricity transition
Short-term market participation	Enables flexibility and efficient balancing of variable renewables
Power supply shortage	Reliable supply reflects system stability during transition
Uptake of distributed solar energy	Enhances resilience and decentralisation of the power system
Smart metering	Enables demand response and implementation of advanced tariff mechanism
Dimension 3: Market enablers – This dimension focuses on facilitating both the supply-side and demand-side aspects of transitioning towards renewable energy sources. It also emphasises measures to reduce emissions through electrification, particularly in sectors like transport and industry.	
Development of EV ecosystem	Drives new electricity demand aligned with decarbonisation
Availability of time-of-day tariff mechanism	Aligns consumption with renewable generation patterns
Availability and attractiveness of green tariff	Enables voluntary demand for renewable electricity
Storage capacity deployment	Provides flexibility to integrate intermittent renewables
Renewable energy policy landscape	Offers regulatory certainty and investor confidence
Adoption of green open access rules	Expands consumer access to renewable power
Green hydrogen uptake	Creates future large-scale demand for renewable electricity

Revisions incorporated in the 2026 edition

In each edition, we assess and review state performance across multiple dimensions and parameters, considering recent developments and emerging trends. We also undertake stakeholder consultations to capture perspectives from the ground and systematically incorporate their inputs and feedback into our methodology. The revisions made in this version are summarised below:

- **States (same as SET 2024):** This report, like the previous ones, tracks 21 states on 18 parameters grouped under three dimensions. These states collectively contributed to about 95% of India's annual power demand over the past eight financial years (FY), 2018 to 2025. Based on consultations with sectoral experts, the geographical scope has not been expanded in this edition, since the existing set of states sufficiently capture the country's overall power demand profile.

- **Dimensions and parameters:** Though no new dimensions have been introduced, the existing dimensions have been refined. Based on stakeholder feedback,[13] we have added one new parameter, "smart metering", under dimension 2; and two new parameters, "availability of time-of-day tariff mechanism" and "green hydrogen uptake" under dimension 3.

  We also removed three parameters — "MNRE state-level renewable energy target achieved" and "electricity intensity of GDP" from dimension 2; and "codes/regulations for distribution system" from dimension 3 — to avoid duplication of data across dimensions and address the lack of updated data. The Ministry of Power (MoP) now publishes state-level renewable energy targets in the form of the Renewable Consumption Obligation (RCO),[14] which is already captured under dimension 1 (parameter: renewable energy in the procurement mix).

- **Mode of measurement:** We have revised the mode of measurement for several parameters across all dimensions to incorporate newly available datasets and make the analysis robust. These revisions were guided by their relevance to the three dimensions, feedback received from experts following the launch of the previous two editions of the report, and the availability of reliable data sources.

Table 2 provides details on the parameters across all three dimensions, weightages, type of parameter, description and data sources for SET 2026. Annexure 1 presents additional information on the changes made to the dimensions, parameters and mode of measurement compared to the SET 2024 report. Annexure 2 elucidates the dimensions and parameters, data-related challenges and assumptions.

[13] Stakeholders' interaction include discussion with sectoral experts from organisations, including Vasudha Foundation, and International Institute for Sustainable Development, among others. The details are captured in the acknowledgement section.
[14] Ministry of Power. Renewable Consumption Obligation (RCO). 5 August 2025

Table 2: Parameters, descriptions, weightages and data sources

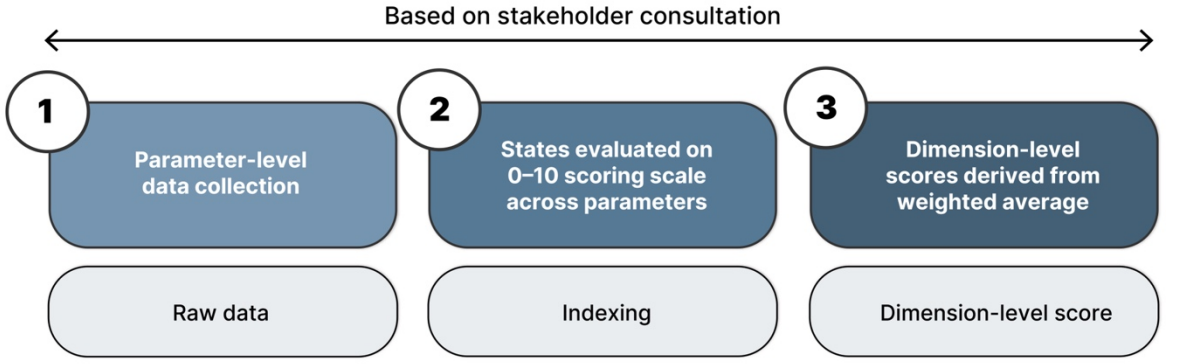
Parameters	Weightage (%)	Parameter type	Description	Data source
Dimension 1: Decarbonisation				
Renewable energy in the procurement mix	25	Progressive*	Provides insight into the portion of renewable energy sources within the overall electricity procurement of a specific state, highlighting the extent to which renewable sources are integrated into the state's electricity procurement mix	Central Electricity Authority (CEA) and India Climate & Energy Dashboard
Utilised renewable energy potential	10	Progressive	Evaluates the extent to which states facilitate the build-up of renewable energy capacity relative to their potential	Ministry of New and Renewable Energy (MNRE) and Ministry of Statistics and Programme Implementation (MoSPI)
Power sector emissions intensity	15	Regressive**	Highlights how decoupled a state's economic growth is with its power sector emissions	Ember, Reserve Bank of India (RBI) and India Climate & Energy Dashboard
State Energy Efficiency Index	20	Progressive	An assessment of energy efficiency improvements within Indian states	State Energy Efficiency Index 2024
State expenditure on renewable energy	15	Progressive	Gauges how well states are utilising public funds to accelerate electricity transition. It measures the percentage of public funds spent on: a) power (also taking into account the infrastructural development common to both conventional and non-conventional sources of energy); b) total new and renewable energy; and c) capital spent in building new renewable energy capacity	Comptroller and Auditor General of India (CAG) – State Accounts Report, and Principal Accounts Office - Delhi
Renewable energy capacity addition	15	Progressive	Considers the average of annual renewable energy capacity growth rates for FY2021–FY2025, of solar, wind, biomass, small and large hydro as a parameter for electricity transition, and provides an assessment of the uptake of renewable energy sources, aiding in gauging progress and informing strategic decisions for accelerating sustainable energy adoption	CEA

Dimension 2: Readiness and performance of the power ecosystem				
DISCOM performance	30	Progressive	Provides a comprehensive assessment of the financial and operational performance of distribution companies (DISCOMs)	Power Finance Corporation (PFC)
Short-term market participation	15	Progressive	Captures the level of participation in the short-term electricity market. A short-term electricity market facilitates nationwide power sharing and provides vital price signals essential for the strategic development of the transmission, storage and generation infrastructure. This enhances efficiency and augments system flexibility.	Central Electricity Regulatory Commission (CERC)
Power supply shortage	20	Regressive	Gauges a state's capability to fulfil its energy demand reliably based on power required versus met. As variable renewable energy (VRE) increases in the energy mix, balancing supply and demand becomes more challenging. Effective management of this balance indicates a state's readiness for transition.	Grid-India
Uptake of distributed solar energy	20	Progressive	Assesses the state's ability to leverage distributed renewable energy (rooftop solar and solar pumps) to increase overall renewable energy uptake.	MNRE physical progress report
Smart metering	15	Progressive	Smart meters are a prerequisite for ToD implementation and indicate a state's preparedness for ToD tariff for solar hours.	RDSS
Dimension 3: Market enablers				
Development of EV ecosystem	10	Progressive	An indicator of both EV adoption and the effectiveness of EV policy implementation at state level	Vahan, IEEFA and state EV policies
Availability of time-of-day tariff mechanism	15	Progressive	Assesses the availability of rebates during solar hours, reflecting efforts to shift demand to solar periods and integrate increasing solar generation.	States' distribution tariff orders
Availability and attractiveness of green tariff	15	Regressive and progressive ***	Assesses the presence and attractiveness of green tariffs in different states	States' distribution tariff orders
Storage capacity deployment	20	Progressive	Evaluates the progress made by states in building up their storage capacity, crucial for peak power management	CEA (Pumped Storage), BESS (IESA) and CEA

			and facilitating the integration of intermittent renewable energy sources into the power grid	(Peak Power Supply Position Report)
Renewable energy policy landscape	15	Progressive	Indicates the presence of policies for capacity addition in a state by analysing the existence of state government targets for renewable capacity	Various state nodal agencies/ states' energy departments
Adoption of green open access rules	15	Progressive	Indicates if states have announced the adoption of Green Energy Open Access Rules, 2022 (GEOA Rules) issued by the MoP	State Electricity Regulatory Commission (SERC) websites
Green hydrogen uptake	10	Progressive	Indicates an upcoming demand for electricity from renewable energy sources	MNRE and state policies from respective state nodal agency's websites

*Progressive – For progressive parameters, higher values on the parameter metric imply better performance. In this case, we used the following formula: Index score = [(actual value - lowest value)/ (highest value - lowest value)] *10
**Regressive – For regressive parameters, lower values imply better performance. We used the following formula: Index score = [(highest value - actual value)/ (highest value - lowest value)] *10
*** A mix of regressive and progressive sub-parameters

Figure 3: Process flow for the analysis



*Both progressive and regressive parameters were converted to a 0-10 ascending score. For progressive parameters:

Index score = [(Actual value - lowest value) / (Highest value - lowest value)] *10
For regressive indicators (where lower values are better):
Index score: [(Highest value - actual value) / (Highest value - lowest value)] *10

Dimensions 1 and 2 are quantitative assessments, while for dimension 3, we relied on qualitative data alongside quantitative datasets. To ensure uniformity, the report relied on data for FY2025 wherever possible. In cases where data for FY2025 was unavailable, the latest available data was used for the respective parameters. Similar to the last two editions of the report, there were challenges and assumptions taken into account in obtaining data for a few parameters. Refer to Annexure 2 for a full list of data-related challenges and assumptions.

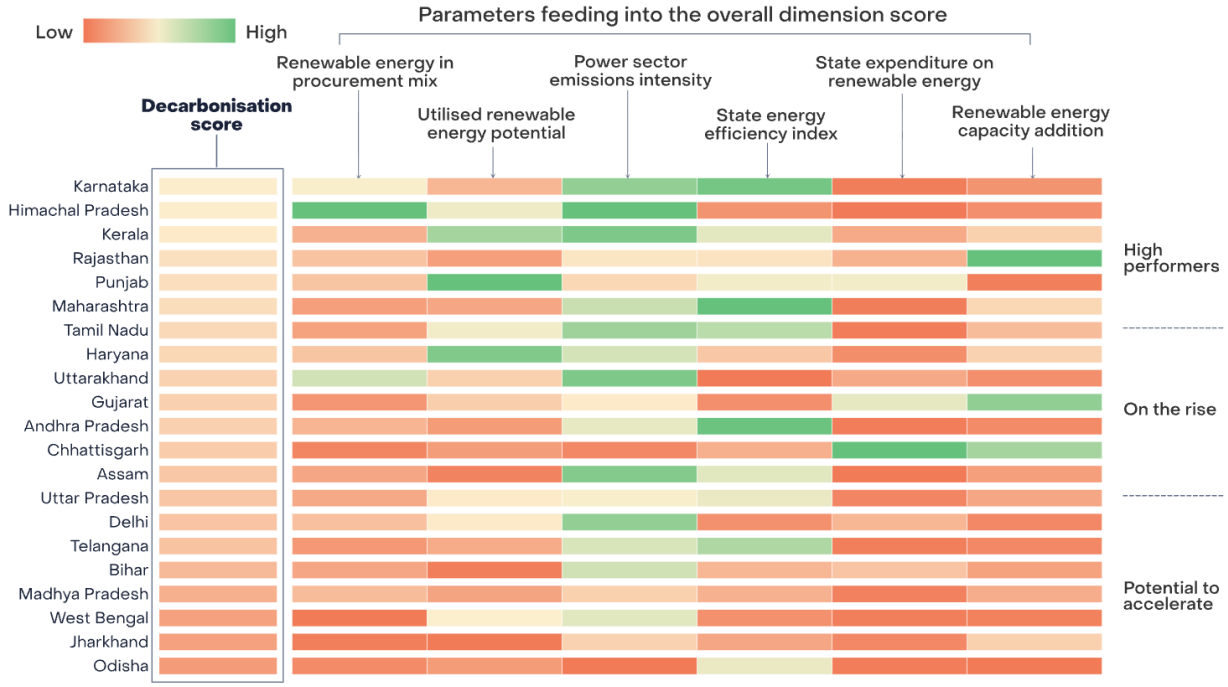
State categorisation based on their dimension-level performance

The dimension-level analysis and insights presented in the following sections are based on the classification of 21 states into three groups, reflecting their relative performance across the assessed parameters. These groups are: **High performers (1–7); states on the rise (8–14); states with potential to accelerate (15–21).** Insights for each group are presented in separate sub-sections.

Dimension 1: Decarbonisation

This dimension presents a holistic view of states' decarbonisation efforts by examining their shift to renewable electricity, utilisation of renewable energy potential, and the extent to which economic growth is decoupled from emissions. It also evaluates the integration of energy efficiency within state-level strategies, scale of government investments in renewable energy projects and renewable capacity additions in the last five financial years. Together, these parameters offer a comprehensive assessment of states' progress towards developing a low-carbon power system.

Figure 4: Dimension 1 — analysis of states' decarbonisation performance



Source: Ember and IEEFA research

Decarbonisation performance across states varies widely. Performance is characterised by a clear concentration effect, with only a few states emerging as strong performers across individual parameters. Importantly, no state demonstrates strong performance across all six parameters. This uneven pattern highlights substantial heterogeneity, where progress remains dispersed across parameters rather than comprehensive.

Karnataka, Himachal Pradesh and Kerala stand out as high performers

Karnataka continued to be a high performer driven by strong progress across various parameters. Its high renewable energy share of approximately 37% in the total power procurement mix contributed to its relatively lower power sector emission intensity, reflecting the state's growing green electricity portfolio. The state performed strongly in the State Energy Efficiency Index (SEEI) 2024, reflecting decisive action on energy-efficient buildings, widespread adoption of the Energy Conservation Building Code (ECBC) 2017, and the extensive use of BEE star-labelled appliances[15] and green building practices.[16] Karnataka also showed moderate momentum in its average of annual renewable energy capacity growth rate over the past five financial years (FY2021–25), averaging 5% growth with a total installed capacity of 24GW. Moreover, as of March 2025, Karnataka had utilised only 4% of its wind and 39% of its solar potential, leaving about 88% of its total renewable energy potential untapped.

Himachal Pradesh, a hydropower-dominated state, had the highest renewable energy share (~65%) in its overall power procurement mix and the lowest power sector emissions intensity, despite utilising its renewable energy potential only moderately at around 22%. Hence, it placed among the top three states in this dimension. It saw limited average of annual renewable energy capacity growth rate of 4.4% between FY2021 and FY2025 and scored low in SEEI 2024 with limited state expenditure on renewable energy and associated power system infrastructure.

Kerala excelled because of its low power sector emission intensity, high renewable energy potential utilisation (31%), and its performance in SEEI 2024. Its renewable potential utilisation as of March 2025 was the third highest after Punjab (38%) and Haryana (35%) among the 21 states considered, while its renewable energy share accounted for 21% of the total power procured for FY2024. Kerala also had the second-lowest power sector emission intensity among the 21 states. An average annual renewable energy capacity growth rate of around 11% over the past five financial years further strengthened the state's position under this dimension. Kerala has adopted initiatives like the State Energy Conservation Awards and the Kerala State Energy Conservation Fund to encourage energy efficiency across sectors. And though its SEEI 2024 score declined compared to previous years,[17] Kerala showed appreciable untapped renewable energy potential (69%) as of March 2025, offering scope for further growth.

[15] BEE star labelled appliances are electronic products certified by the Bureau of Energy Efficiency in India, indicating their energy efficiency on a 1-to-5 stars scale. Higher ratings (5 stars) mean lower power consumption and greater savings, helping consumers reduce electricity bills and carbon footprints. These labels are mandatory for many appliances, including refrigerators, air conditioners, and fans.

[16] With over 1,000 certified green buildings and major public-sector retrofits, the state has strengthened efficiency across government facilities, streetlighting, and schools. Its Energy Efficiency Policy (2022–27) and industry-focused initiatives further boost savings. Large-scale LED streetlighting and appliance replacements delivered substantial energy and CO_2 reductions, reinforcing Karnataka's strong performance.

[17] Bureau of Energy Efficiency (BEE), Alliance for an Energy Efficient Economy, State Energy Efficiency Index 2024, August 2025.

Rajasthan had the highest annual renewable energy capacity growth rate of 26% over the past five financial years. The share of renewables in its power purchase mix stood at 25%. With only about 8% of its significantly higher renewable energy potential utilised as of March 2025, Rajasthan has room to scale up renewable energy deployment and lower its power sector emission intensity. The state also has substantial scope to improve its energy efficiency efforts.

Maharashtra, another high performer in this dimension, showed remarkable improvement in SEEI 2024, overtaking Karnataka. This progress was driven by industrial advancements and DISCOM-led energy efficiency efforts, followed by improvements in the buildings and transport sectors. The state added a substantial 9.6GW of renewable energy capacity (including large hydro) between FY2021 and FY2025, leading to an average annual renewable energy capacity growth rate of about 12%. However, despite this progress, the state still has significant opportunities to better utilise its renewable energy potential (of which only 9% has been tapped), increase the share of renewables in its overall power procurement mix (which stands at around 16%), and further lower its power sector emission intensity.

Tamil Nadu tapped a significant share of its renewable energy potential but still has scope to increase the renewable share (~17% in FY2024) in its overall power procurement mix. The state performed well on the power sector emissions intensity parameter and recorded remarkable improvement in SEEI 2024 versus SEEI 2023.

Punjab utilised its renewable energy potential to a large extent but given the limited renewable resource base within the state, the share of renewables in its overall power procurement remained significantly lower.

Haryana, Gujarat and Uttarakhand on the rise

Haryana, positioned mid-table, utilised 35% of its renewable energy potential and consistently added renewable energy capacity, recording an average annual growth rate of 11% over the past five financial years. Despite the state's limited potential, Haryana's renewable energy share in overall power purchase remained moderate at 26%. However, the state recorded a comparatively lower SEEI 2024 score despite having its State Energy Efficiency Action Plan in place since September 2023.[18]

Gujarat maintained momentum under the renewable energy capacity addition parameter. The state has seen an average annual renewable energy growth rate of 23% for the past five financial years. However, it still has considerable scope to strengthen its energy efficiency efforts and increase the share of renewable energy (~14%) in its overall power purchase (a parameter of significant weightage in this dimension), given that only about 15% of its renewable energy potential has been utilised as of March 2025. Strengthening these efforts will directly translate into lower power sector emissions intensity for the state. Gujarat released its State Energy Efficiency Action Plan in October

[18] Bureau of Energy Efficiency. State Energy Efficiency Action Plan, Haryana. September 2023

2024,[19] focusing on the industry, agriculture, domestic and commercial buildings, and transport sectors.

Uttarakhand, also positioned mid-table, benefited from its geographical advantages, which enable a higher reliance on hydroelectric power, resulting in around 44% renewable energy in the total power procurement mix in FY2024. This contributed to the state's relatively low power sector emissions intensity. However, the state has considerable room to strengthen energy efficiency efforts, especially in buildings, industry and transport sectors through capacity building, and policy intervention with financial incentives for energy efficiency measures and developing sector-specific programmes.[20] It can also explore its untapped renewable energy potential (~84%) to position itself as a supplier of renewable energy to other states.[21]

Andhra Pradesh continued to demonstrate strong performance in SEEI 2024, driven by progress in industry, DISCOM-led efficiency measures, and improvements in the buildings and transport sectors. The state mandates Investment Grade Energy Audits (IGEA) for large industries and has implemented cluster-level interventions in jewellery, food processing, and pharmaceuticals, saving 0.67 million units (MUs) annually and cutting 0.54 million tonnes of CO_2. However, the state had utilised only ~7% of its renewable energy potential as of March 2025 and had a limited share of renewable energy (~22%) in the overall power procurement mix in FY2024.

Chhattisgarh's performance presented a contrasting picture across parameters. Its average annual renewable energy capacity growth rate stood at 21%, adding around 1.2GW, over the past five financial years. However, it continued to rely heavily on conventional sources, reflected in its power procurement mix, with renewables accounting for only about 10% of total procurement in FY2024. Despite recent renewable capacity additions, a significant share of the state's renewable energy potential remained underutilised at around 92% as of March 2025. Public expenditure on renewable energy was relatively higher compared to several other states, but it did not translate into overall power sector decarbonisation.

Uttar Pradesh and Assam's performance in renewable energy capacity additions remained subdued with limited capacity added over the past five financial years. This was directly reflected in the lower renewable energy shares in their power procurement mix, at 19% and 18%, respectively, in FY2024. This also highlighted the two states' underutilised renewable energy potential, standing at 19% and 4% as of March 2025, respectively. These states have also invested moderately in the new and renewable energy sector over the past five financial years compared with other states included in the analysis. On the SEEI 2024 front, their performance remained moderate.

[19] Bureau of Energy Efficiency. State Energy Efficiency Action Plan, Gujarat. October 2024
[20] AEEE. state performance summary. August 2025
[21] The Economic Times. India's ambitious energy transition: A pathway to sustainable investment. November 2024

Delhi, Telangana, and Bihar show high improvement potential

Delhi, despite having limited renewable energy potential, had 24% of renewable energy in the overall power procurement mix in FY2024, contributing to its lower power sector emissions intensity. However, its overall performance was affected by a low SEEI 2024 score, highlighting a need to integrate energy efficiency measures in its strategies. To address this, Delhi released its State Energy Efficiency Action Plan in September 2024, focusing on building, industry and transport sectors.[22]

Further, Madhya Pradesh and Telangana made limited progress across all parameters and remained low-scoring states in this dimension. In FY2024, Madhya Pradesh had approximately 23% renewable energy share in its power procurement while Telangana had 14%. As of March 2025, the renewable energy potential utilisation remained below 10% for both states. Madhya Pradesh showed moderate performance in renewable energy capacity additions while Telangana's performance under this parameter remained muted. As a result, Madhya Pradesh recorded weak performance on the power sector emissions intensity parameter while Telangana performed moderately. On the energy efficiency front, Telangana performed moderately, while a lower SEEI 2024 score affected the overall performance of Madhya Pradesh.

Bihar's utilisation of renewable energy potential (~3%) remained subdued with its share of renewable energy in power procurement being 18%. This presents a clear opportunity for improvement. In addition, the state had a lower average annual growth rate of renewable capacity as compared to other analysed states. It exhibited moderate power sector emissions intensity. Despite having a State Energy Efficiency Action Plan,[23] Bihar still has scope to improve on the energy efficiency front.

West Bengal, Jharkhand and Odisha, the eastern states, are in the early stages of their decarbonisation journeys and, hence, emerged as the states with the most scope for enhancement across all parameters. West Bengal and Jharkhand showed considerable scope to increase their share of renewables in their power procurement mix, which stood at 7% and 8%, respectively, in FY2024. For this, these states could tap into their underutilised renewable energy potential, which stood at only 20% and 2%, respectively, as of FY2025. Public expenditure on renewable energy will play a critical role in supporting this transition and ensuring long-term energy security, stable economic growth and new employment opportunities. At the same time, both states will need to strengthen their efforts to improve performance on the energy efficiency front. Despite having a State Energy Efficiency Action Plan since March 2023, West Bengal is yet to demonstrate reflective progress in its SEEI 2024.[24] In contrast, encouragingly, Jharkhand released its own State Energy Efficiency Action Plan in January 2025.[25]

[22] Bureau of Energy Efficiency. State Energy Efficiency Action Plan, Delhi. September 2024
[23] Bureau of Energy Efficiency. State Energy Efficiency Action Plan, Bihar. March 2023
[24] Bureau of Energy Efficiency. State Energy Efficiency Action Plan, West Bengal. March 2023
[25] Bureau of Energy Efficiency. State Energy Efficiency Action Plan, Jharkhand. January 2025

Odisha remained heavily reliant on thermal power due to legacy coal-based infrastructure, the local availability of coal, and a workforce dependent on thermal power plants. Similar to West Bengal and Jharkhand, renewables currently form a relatively small share of Odisha's power mix (11% in FY2024), but the state has substantial untapped renewable energy potential (only ~7% utilised as of March 2025). Accelerating renewable capacity additions could help diversify the power mix and lower power-sector emission intensity over time.[26] To achieve this, these states can direct greater investment towards renewable energy infrastructure[27] and strengthen its decarbonisation efforts.[28] Additionally, the Indian Renewable Energy Development Agency (IREDA) sanctioned around USD0.33 billion (INR30 billion) for green energy projects across the state, covering solar, hydro, and ethanol.[29]

Changes compared with SET 2024

Note: In this assessment year, no major changes have been made in this dimension. However, a further nuanced mode of measurement has been adopted for the **recent additions of renewable energy capacity** parameter, and its name changed to "**renewable energy capacity additions"**. This adjustment (captured in Annexure 1) aims to capture the growth rate of renewable energy capacity addition over the last five years. In addition, the scope of installed capacity has been widened to include large hydro, both for calculating utilised renewable energy potential and for assessing the average growth of renewable energy additions.

Noticeable movement was observed in the performance of several states under this dimension for this assessment year compared to the previous assessment period (SET 2024). Tamil Nadu, Chhattisgarh, Rajasthan and Maharashtra showed significant improvement in overall performance. In contrast, the performance of states, including Telangana, Andhra Pradesh, Haryana and Gujarat, declined considerably. Both improvement and declines in states' performances reflect the impact of the recalibrated mode of measurement for the capacity addition parameter, as well as the inclusion of hydro capacity in the analysis.

Karnataka continued to be the top performer in this dimension, showcasing consistent leadership in decarbonisation efforts. Tamil Nadu, Maharashtra and Rajasthan experienced upward movement with a remarkable improvement in SEEI 2024 scores. Additionally, the change in the mode of measurement of renewable energy capacity addition parameter contributed significantly to Chhattisgarh's upward movement.

Conversely, despite seeing continuous growth in renewable capacity addition, Gujarat's overall performance was negatively impacted due to its subpar performance under SEEI 2024. Similarly,

[26] EQ. Odisha Targets 10,000 MW Renewable Capacity addition in the State by 2030. August 2024
[27] EQ. Odisha Targets 10,000 MW Renewable Capacity addition in the State by 2030. August 2024
[28] The New Indian Express. Odisha approves Rs 1,386 crore for 192.41 MW renewable energy projects. December 2024
[29] The Economic Times. IREDA has sanctioned over Rs 3,000 crore for green energy projects in Odisha. December 2024

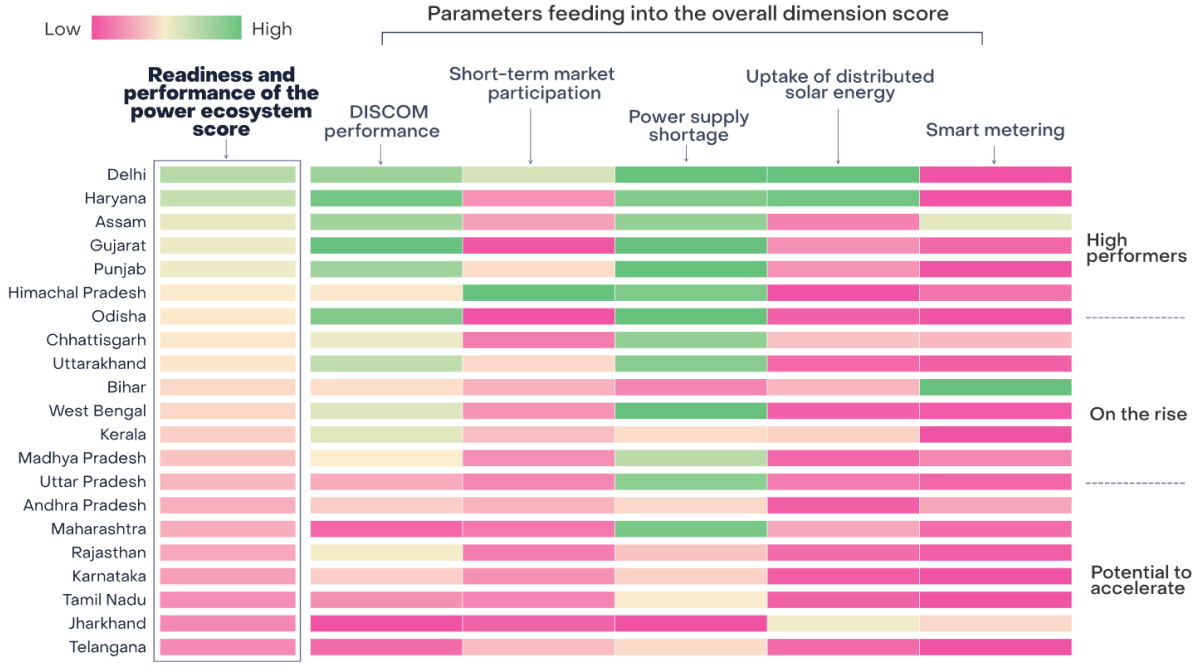
Haryana's decline was driven by its SEEI 2024 performance despite improvements in renewable energy share in power procurement. Telangana's performance under this dimension saw the steepest decline, primarily due to a change in the mode of measurement of renewable energy capacity additions, along with a decline in renewable energy share in total procurement mix and a slight dip in the SEEI 2024 score. Similarly, Andhra Pradesh's performance also declined, resulting from decline in its utilised renewable energy potential and power sector emissions intensity scores.

The overall performance of Delhi, Punjab, Odisha, Madhya Pradesh, West Bengal, Bihar, Kerala, Himachal Pradesh, Assam, Uttar Pradesh, and Uttarakhand remained almost unchanged in comparison with SET 2024.

Dimension 2: Readiness and performance of the power ecosystem

Alongside decarbonisation, power system readiness is crucial for accelerating state-level electricity transitions. A robust and well-prepared power system enables seamless renewable energy integration, enables decentralised energy solutions, and strengthens grid operations. This, in turn, enhances grid efficiency, reliability, and market competitiveness, laying the foundation for sustainable and resilient electricity systems.

Figure 5: Dimension 2 — analysis of states' power system readiness and performance



Source: Ember and IEEFA research

Readiness and performance of the power ecosystem across states shows wide variation in electricity transition outcomes. Performance is uneven and concentrated, with different states leading on individual aspects. However, similar to dimension 1, no state demonstrates consistently strong performance across all parameters. This dispersion highlights significant variation in power ecosystem readiness, indicating that the electricity transition progress is fragmented.

Delhi, Haryana, and Assam stand out as high performers

Delhi remained a strong performer across majority of parameters under this dimension except in smart metering. It made significant strides in distributed solar adoption, with 303MW of distributed solar capacity installed as of March 2025, accounting for nearly 97% of its total installed solar capacity and 76% of its total renewable energy capacity. Delhi actively encouraged rooftop solar uptake, with over 5,500 connections installed in North Delhi alone.[30] In addition to the Pradhan Mantri Surya Ghar Muft Bijli Yojana, Delhi's Solar Energy Policy offers a ceiling limit of USD334 (INR30,000) for 3kW solar plants in capital subsidies and generation-based incentives, strengthening the economics of rooftop systems.[31] The registration fees for rooftop solar installation for domestic consumers up to 10 kilowatts (kW) is waived off.[32]

Delhi experienced no energy shortages and met its requirement of 38,287MU in FY2025. Moreover, all three DISCOMs in Delhi, Tata Power Delhi Distribution Limited (TPDDL), BSES Yamuna Power Limited (BYPL), and BSES Rajdhani Power Limited (BRPL), with power purchase shares of 34%, 23%, and 43% of the territory's total DISCOM power procurement, respectively, performed moderately and received a B- rating in the PFC 13th Annual Integrated Rating and Ranking of Power Distribution Utilities (PFC 13th DISCOM rating report).[33,34] Although, Delhi's short-term market participation (sales + purchases) in FY2024[35] accounted for 28%, its total green day ahead market (GDAM) transactions represented only 2% of its short-term electricity market transactions volume. As of March 2025, 3,521 smart meters have been sanctioned for Delhi under the Revamped Distribution Sector Scheme (RDSS), but no installations have been recorded.[36]

Haryana also performed well, supported by a strong level of distributed solar capacity relative to its total renewable energy capacity base, sound DISCOM financial health and minimal energy shortages. Its distributed solar capacity of 1,798MW represents 87% of its total solar installed

[30] Hindustan Times. Over 5,500 rooftop solar connections installed in Delhi. 17 August 2025
[31] Department of Power. Delhi Solar Energy Policy (First Amendment). 10 July 2025
[32] Mercom Delhi Waives Fees for Rooftop Solar Systems up to 10 kW Under PM Surya Ghar. 6 May 2025
[33] The Average Cost of Supply vs Annual Revenue Requirement (ACS-ARR) gap (cash adjusted) for FY2024 stood at USD0.013/unit (INR1.19/unit) for TPDDL, USD0.003/unit (INR0.27/unit) for BYPL, and USD0.002/unit (INR0.16/unit) for BRPL. The Aggregate Technical & Commercial (AT&C) losses for the same period were 5.91% for TPDDL, 7.84% for BYPL, and 6.58% for BRPL.
[34] Power Finance Corporation. 13th annual integrated rating & ranking: Power Distribution Utilities. April 2025
[35] Delhi's total (sales + purchases) transactions in the bilateral, power exchange, and deviation settlement mechanism (DSM) markets as a percentage of its total power procurement (including DISCOM purchases and captive generation)
[36] RDSS dashboard, detail report. December 2025

capacity as of March 2025, accounting for approximately 8% of the total distributed solar installed across 21 states. The two DISCOMs, Dakshin Haryana Bijli Vitran Nigam Limited (DHBVNL) and Uttar Haryana Bijli Vitran Nigam Limited (UHBVNL), received an A+ rating in the PFC 13th DISCOM rating report.[37,38] In addition, Haryana registered just 30MU of shortage in FY2025, equivalent to 0.04% of its energy requirement of 70,237MU. In FY2024, its short-term transactions stood at 15% of its total power procurement, while GDAM transactions represented a mere 0.31% of the short-term market volume, indicating considerable untapped potential in this area. As of March 2025, Haryana had zero sanctioned smart meters under RDSS.

Assam excelled in this dimension driven by its strong performance in DISCOM performance and limited power supply shortage. Assam experienced minimal energy shortages, with only 9MU or 0.07% of its total requirement of 12,837MU for FY2025. The state's only DISCOM, Assam Power Distribution Company Limited (APDCL) scored an A rating in the PFC 13th DISCOM rating report. It also showed moderate performance under the smart metering parameter, with installation of 46% of the state's sanctioned smart meters under RDSS as of March 2025.

Gujarat showed strong DISCOM performance and excellent power adequacy (0.001% energy shortage in FY2025), but its overall standing was constrained by low short-term market participation (only 8% of total power purchase in FY2024), with GDAM making up just 0.5%. The state installed only 5% of its sanctioned meters under RDSS as of March 2025. Its distributed solar uptake stood at 5GW, representing 16% of its total renewable energy capacity as of March 2025.

Punjab ensured a reliable power supply, with zero energy shortage in FY2025 and demonstrated solid DISCOM operations. However, its overall standing was constrained by lack of progress in smart meter deployment. As of March 2025, there were no communicating[39] smart meters installed against a sanctioned 8,784,807 meters under RDSS. In addition, progress in distributed solar remained limited, with only 535MW installed, accounting for 16% of its total renewable energy capacity.

Himachal Pradesh excelled in short-term market participation, with short-term transactions representing 43% of its total power procurement and GDAM accounting for 1% of its short-term electricity transactions in FY2024, alongside sufficient power adequacy (0.04% energy shortage in FY2025). However, the near absence of distributed solar only 0.5% of its total renewable energy capacity as of March 2025 significantly constrained the state's performance under this dimension. It also saw limited progress in smart metering infrastructure.

[37] Power Finance Corporation. 13th annual integrated rating & ranking: Power Distribution Utilities. April 2025

[38] The score for DHBVNL increased from 86.7 to 87.6U, while UHBVNL's score increased from 88.0 to 92.8 from the 12th to the 13th report. For DHBVNL, AT&C losses reduced from 13.17% in FY2023 to 12.73% in FY2024, and the ACS-ARR gap decreased from USD-0.0021/unit (INR-0.19/unit) to USD-0.0006/unit (INR-0.05/unit). For UHBVNL, AT&C losses decreased from 10.32% in FY2023 to 9.15% in FY2024; although the ACS-ARR gap increased from USD-0.0011/unit (INR-0.10/unit) to USD-0.0016/unit (INR-0.14/unit), its overall score improved due to better overall performance.

[39] Under India's RDSS, communicating smart meters automatically send usage data to utilities and consumers, enabling prepaid billing, real-time monitoring, and better energy management. The 'communicating' function refers to Advanced Metering Infrastructure (AMI), which allows two-way data flow via technologies like Power Line Carrier (PLC) or Radio Frequency (RF), unlike conventional meters.

Odisha, despite limited power supply shortage and strong DISCOM performance, showed low short-term market participation and low distributed solar uptake. Under RDSS, data on smart meters is not available for Odisha. In terms of short-term market participation for FY2024, Odisha's participation in bilateral short-term electricity transactions, power exchange, and DSM markets stood at 7.56% (~7,199MU) of its total electricity procurement, with 0.42% (~31MU) traded through GDAM.

Chhattisgarh, Uttarakhand and Bihar are on the rise

Chhattisgarh featured mid-table in this dimension, indicating considerable potential for improvement. The state recorded strong power adequacy with only 0.03% (58MU) of energy shortage in FY2025. DISCOM performance was moderate, with its only DISCOM, i.e. Chhattisgarh State Power Distribution Company Limited (CSPDCL), having a score of 54.4 in the 13th PFC DISCOM rating report.[40] Its overall performance was limited by low short-term market participation, accounting for only 1.35% of total power procurement and GDAM transactions, representing just 0.3% of these in FY2024. The state also saw limited uptake of distributed solar at 498MW. And although this represented 27% of its total renewable energy capacity as of March 2025, progress on smart metering remained limited with just 26% deployment under RDSS.

Uttarakhand, supported by hydropower, maintained limited power supply shortage (9MU) of just 0.05% of electricity requirement in FY2025. It also demonstrated good DISCOM performance, with Uttarakhand Power Corporation Limited (UPCL) rated B- in the 13th PFC DISCOM rating report.[41,42] However, weak uptake of distributed solar (6% of total renewable energy capacity as of March 2025), limited smart metering infrastructure (4% progress under smart meter deployment), and only moderate participation in short-term electricity markets has held the state back.

Bihar recorded the highest percentage of progress in smart meter deployment (78%) under RDSS as of March 2025. With moderate DISCOM performance, the state saw limited short-term market participation and distributed solar energy uptake (25% of total renewable energy installed capacity as of March 2025). It also faced a relatively high energy shortage at 0.4% (170MU) in FY2025, as compared to other states. Together, these limitations constrained its overall performance.

Uttar Pradesh, with only 0.1% of energy shortage in FY2025, faced similar challenges: Minimal distributed solar adoption (10% of total renewable installed capacity as of March 2025); low short-term electricity market participation as compared to total power procurement by the state in FY2024 (representing only 9% of the power procurement); and limited DISCOM performance. These factors restricted the state's ability to achieve a higher standing.

[40] ACS-ARR gap declined from a surplus of USD0.0012/unit (INR0.11/unit) in FY2023 to a marginal deficit of USD-0.0002/unit (INR-0.02/unit) in FY2024.
[41] ACS-ARR gap decreased from USD0.008/unit (INR0.72/unit) to USD0.0011/unit (INR0.10/unit) and AT&C losses decreased from 15.34% to 14.65% from FY2023 to FY2024.
[42] Power Finance Corporation. 13th annual integrated rating & ranking: Power Distribution Utilities. April 2025

West Bengal recorded zero energy shortages in FY2025. However, its average performance across other parameters affected its overall standing. West Bengal's distributed solar capacity remained low at only 4% (80MW) of the total renewable energy installed capacity as of March 2025, indicating potential for expansion in decentralised solar adoption. It also exhibited modest DISCOM performance and had limited smart metering infrastructure (2% progress under smart meter deployment as of March 2025). Its participation in the short-term electricity market was low, with transactions accounting for only 15% of its total power procurement in FY2024 and GDAM transactions contributing just 0.19%.

Kerala was mid-tabled in this dimension despite its strong performance in dimension 1, indicating considerable potential for improvement. Kerala still has significant room to improve in distributed solar adoption, with 1,215MW of distributed solar installed as of March 2025, accounting for 79% (lower base effect) of its total solar capacity and 31% of its total renewable energy capacity. Kerala State Electricity Board Limited (KSEBL) showed moderate performance with a B rating, an improvement from B- in the previous year as per the PFC 13th DISCOM rating report.[43] The state also has room to reduce energy shortages, which stood at 0.3% (80MU) against an energy requirement of 31,510MU for FY2025. In addition, Kerala showed moderate participation in the short-term electricity market, with short-term electricity transactions accounting for 18% of its total power procurement in FY2024, while GDAM represented only 2% of these transactions.

Madhya Pradesh clocked moderate power supply adequacy, with 0.1% (135 MU) shortage in FY2025, but modest DISCOM performance and limited distributed solar adoption at 6% (615MW) of total renewable capacity as of March 2025. Short-term electricity market participation remained moderate (13% of total procurement, with GDAM just 1% in FY2024), and the state saw only 13% progress under smart meter deployment under RDSS as of March 2025. While supply reliability is appreciable, smart meter deployment and distributed renewable uptake would be key to improving performance.

Andhra Pradesh, Maharashtra and Rajasthan have potential to accelerate

Andhra Pradesh, Karnataka, Tamil Nadu and Telangana are beginning to evolve beyond renewable capacity addition in their power-sector transition, exhibiting significant scope for improvement across multiple parameters under this dimension.

Andhra Pradesh showed moderate power supply shortage (0.25% (205MU) with energy shortage in meeting energy requirement of 79,115MU in FY2025. Short-term market transactions constituted 16.5% of total electricity procurement, while GDAM participation remained limited at 2%, indicating opportunities to deepen engagement in competitive markets. The state demonstrated subdued progress in distributed solar adoption and smart metering. Despite a sizeable total installed

[43] Power Finance Corporation. 13th annual integrated rating & ranking: Power Distribution Utilities. April 2025

renewable energy capacity of 12,114MW as of March 2025, the state's distributed solar base remained modest at 360MW, accounting for only 3% of its total renewable energy capacity. The state had achieved 21% progress under smart meter deployment as of March 2025 under RDSS.

Maharashtra demonstrated strong power adequacy (0.03%, 58MU) in FY2025. Its distributed solar capacity comprised 21% of the state's total installed solar capacity, and the state itself accounted for a substantial 22% (4.7GW) of the total distributed solar capacity (21.4GW) among the 21 states as of March 2025. Maharashtra's overall performance was affected by weak DISCOM operations, limited smart metering infrastructure (6% progress under smart meter deployment as of March 2025), and low short-term market participation (9% of total power procurement in FY2024), which resulted in an overall moderate ranking.

Meanwhile, Rajasthan's moderate DISCOM performance was offset by gaps in other parameters, constraining its overall improvement. The state recorded 0.3% (330MU) energy shortage in FY2025. In FY2024, the state's short-term electricity transactions accounted for 12% of total power procurement with only 1% executed through GDAM. In addition, Rajasthan had 2,321MW of distributed solar installed, representing 7% of its total renewable energy installed capacity as of March 2025, and had achieved only 3% progress under smart meter deployment under RDSS.

Karnataka exhibited a mixed performance profile. The state's strong performance under dimension 1 was in contrast with its weaker outcomes under dimension 2, largely due to its limited smart meter deployment and low distributed solar capacity in its total renewable energy capacity mix. As of March 2025, Karnataka's distributed solar capacity of 736MW represents 8% of its total solar capacity and 3% of total renewable energy capacity (second lowest among the 21 states assessed). The state also does not have any smart meters sanctioned and installed under RDSS since it was one of the few states that missed out on RDSS due to electricity supply companies being owed over USD0.94 billion (INR8,500 crore) from various government departments at the time.[44] The state's short-term market participation represented only 11% of total power procurement (including DISCOM purchases and captive generation) in FY2024. The state experienced a 0.27% (250MU) energy shortage against its requirement of 92,880MU in FY2025. Karnataka's distributed solar capacity of 736MW as of March 2025 represents 8% of its total solar capacity and 3% of total renewable energy capacity.

Tamil Nadu, Jharkhand and Telangana showed limited progress across this dimension. Tamil Nadu's minimal smart metering infrastructure, low distributed solar uptake (only 4% of its total renewable capacity as of March 2025), along with limited short-term market participation and weak DISCOM performance slowed its advancement, even though it recorded only a 0.2% energy shortage in FY2025. Jharkhand's performance was subdued across most parameters, with energy shortages (0.5%, or 69MU in FY2025), minimal participation in short-term markets, and evolving DISCOM outcomes. However, it had a comparatively higher distributed solar share (41% of its renewable

[44] The Hindu. Karnataka gets two years to become eligible for RDSS. 18 June 2025

capacity). Telangana reported the most constrained performance in this dimension, driven by zero smart metering infrastructure under RDSS as of March 2025, limited distributed solar energy uptake and weak DISCOM performance.

Changes compared with SET 2024

Note: In this assessment year, several important changes have been made to dimension 2. The parameter on "MNRE state-level renewable energy targets achieved" has been removed due to the absence of revised state-level targets. The **renewable consumption obligation (RCO)** earlier **renewable purchase obligation (RPO)** serves as a partial proxy and is already captured under dimension 1 through the share of renewable energy in a state's procurement mix. Additionally, since RCO structures and compliance requirements vary widely across states, and there is no uniform basis for comparison, they are not assessed separately in this dimension.

The parameter "electricity intensity of GDP" has also been removed. While being treated negatively earlier, higher electricity intensity can also reflect greater electrification, which may signal stronger prospects for future electricity transition, particularly through power-sector decarbonisation. In this edition, **a new parameter on smart metering** has been introduced to assess progress in smart meter deployment across states. This parameter featured in SET 2023 (version 1) but was previously dropped due to data limitations.

Finally, rebalanced weightages across parameters, especially the increased emphasis on DISCOM performance and distributed solar uptake have led to notable shifts in state rankings. All methodological changes are detailed in Annexure 1 and are intended to make the assessment under this dimension more relevant and robust.

Noticeable shifts have occurred in the performance of several states under this dimension for this assessment year compared with the previous assessment period (SET 2024) due to revised parameters. Bihar, Chhattisgarh, Odisha, Uttarakhand, and Uttar Pradesh showed significant improvement in overall performance. In contrast, the performance of states like Telangana, Karnataka and Rajasthan declined considerably. Chhattisgarh showed the most significant upward trajectory, driven by better DISCOM performance and short-term market participation, along with the removal of the electricity intensity parameter and the inclusion of smart metering as compared with the SET 2024 analysis. Bihar also advanced due to improved DISCOM performance and higher distributed solar uptake, supported by the addition of the smart metering parameter and the removal of the MNRE state-level renewable energy target achievement parameter.

Uttarakhand improved due to stronger power adequacy in FY2025, while Odisha moved up on the back of robust power adequacy and DISCOM performance. Uttar Pradesh's overall performance was positively impacted due to slight improvement in DISCOM performance and distributed solar uptake.

Conversely, Telangana witnessed the steepest decline. This was largely driven by the removal of the MNRE state-level renewable energy target achieved parameter and compounded by a deterioration in power adequacy, with energy shortage rising from 0.001% (1MU) in FY2023 to 0.3% (227MU) in FY2025. The fall in its performance was also due to the newly added parameter on smart metering. The state had zero smart meters sanctioned and installed as of March 2025.

Karnataka also experienced a considerable decline, primarily due to deteriorating power adequacy. The state's energy shortage increased from 0.01% in FY2023 to 0.3% FY2025. The state's decline was further affected by the correction of previously inflated rooftop solar data reported by MNRE, with installed capacity revised from 1,562MW in February 2024[45] to 696MW in March 2025,[46] underscoring the significant impact of accurate data on overall performance. Its GDAM share of total short-term electricity transaction volume declined from 12% in FY2023 to 3% in FY2024. Karnataka's performance was also affected by the introduction of the smart metering parameter in the SET 2026 analysis as the state was not included in RDSS as of March 2025.

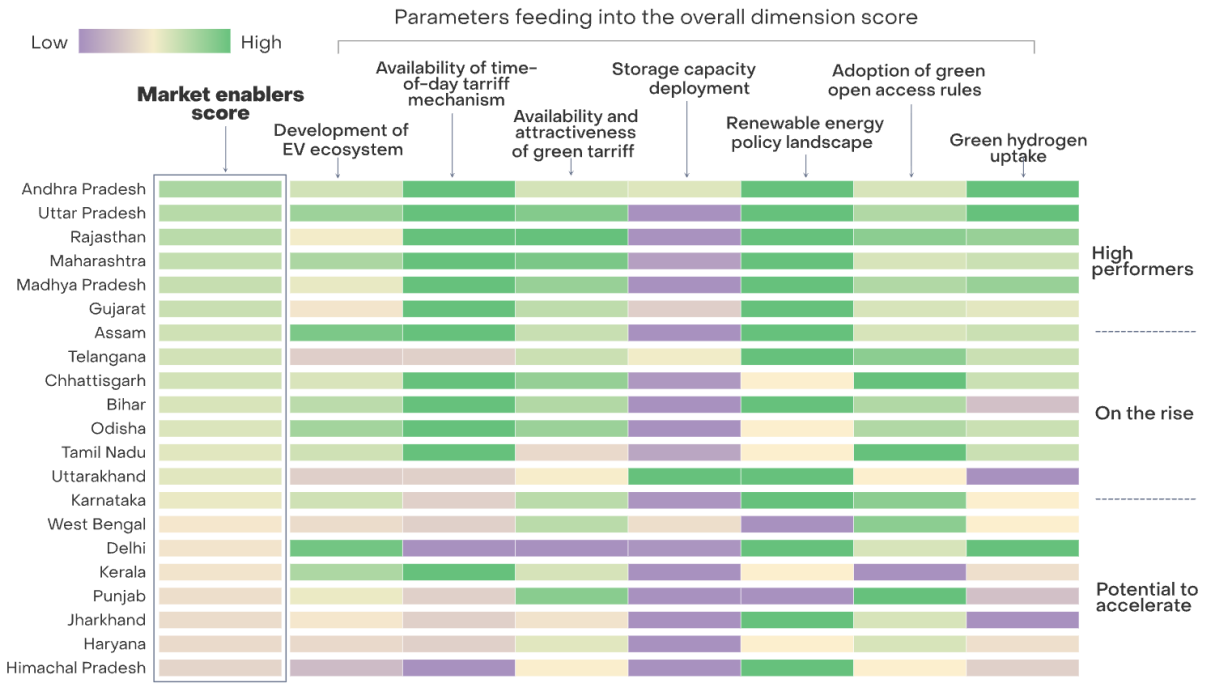
Rajasthan's energy shortage decreased as compared to other states (from 1.6% in FY2023 to 0.3% in FY2025) constraining its overall performance. Its performance was also constrained by limited smart metering infrastructure in the SET 2026 analysis. Kerala's performance also declined due to power supply inadequacy, the removal of the electricity intensity of GDP parameter, and the absence of any communicating smart meters as of March 2025.

Dimension 3: Market enablers

The "market enablers" dimension assesses a critical aspect of the electricity transition by examining initiatives that accelerate renewable energy adoption. It captures both demand side drivers such as electric vehicles (EVs) and green hydrogen and supply side measures that encourage consumers to procure more renewable power through mechanisms like green tariffs and green energy open access. It also considers the broader policy landscape and the integration of variable renewable energy (VRE) into the grid through energy storage capacity deployment and solar hour specific time-of-day tariffs.

[45] MNRE. State-wise installed capacity of Renewable Power including Off-grid as on 29.02.2024. 29 February 2024
[46] MNRE. State-wise (Location based) installed capacity of Renewable Power as on 31.03.2025. 31 March 2025

Figure 6: Dimension 3 — analysis of states' performance on market enablers



Source: Ember and IEEFA research

Viewed through the market enablers lens, electricity transition readiness varies sharply across states. Performance shows a concentration effect, with only a limited number of states scoring highly on specific enablers such as green open access adoption or emerging green hydrogen uptake. However, these strengths are rarely aligned within the same state. Several states perform well on policy and regulatory instruments but lag on physical enablers such as storage capacity deployment or EV ecosystem development, and vice-versa. Importantly, no state emerges as a comprehensive leader across all market enablers parameters, with leadership fragmenting across different parameters. This fragmented landscape suggests while enabling elements are present across the system, they remain partial and unevenly distributed rather than integrated into a cohesive, state-wide electricity transition ecosystem.

Andhra Pradesh, Uttar Pradesh and Rajasthan stand out as high performers

Andhra Pradesh emerged as a high performer, driven by its integrated renewable energy policy released in October 2024[47] and advancements in green hydrogen uptake. With the deployment of smart meters, Andhra Pradesh is actively moving forward to implement the solar-hour-aligned time-

[47] APERC. Andhra Pradesh Integrated Clean Energy Policy, 2024. October 2024

of-day (ToD) tariff mechanism. Andhra Pradesh has adopted the Green Energy Open Access Rules, 2022 (GEOA Rules)[48] with limited waivers on open access charges such as cross subsidy surcharge, state distribution and transmission charges; the latest green tariff premium stands at USD0.0083/kilowatt-hour (kWh), or INR0.75/kWh. The state performed moderately in EV ecosystem development with a 6.2% adoption rate in FY2025 across all vehicle categories as per the Ministry of Road Transport and Highways's (MoRTH) Vahan dashboard.[49] Andhra Pradesh has 1,440MW of pumped hydro storage capacity that is operational or under construction, demonstrating progress in energy storage capacity deployment, which is critical for integrating VRE. This diversified progress has attracted significant investments across energy storage, green hydrogen production and exports, and renewable energy projects.[50]

Uttar Pradesh has maintained momentum in EV deployment, with an adoption rate of 10% in FY2025. The state has a renewable energy policy[51] which targets 22GW of solar capacity installed by FY2027. Its green tariff premium for FY2026, at USD0.0041/kWh (INR0.34/kWh), reflects a reduction compared to the previous year. Uttar Pradesh is also advancing in green hydrogen uptake and has a target of 1 million metric tonnes (MMT) by 2028.[52] The state has introduced a solar-hour-aligned ToD tariff mechanism. It could benefit from accelerating its efforts to install storage capacity to facilitate reliability of renewable energy sources.

Building on its renewable energy leadership, Rajasthan continued to excel with a well-established renewable policy landscape[53] and with the lowest green tariff premium of USD0.0006/kWh (INR0.05/kWh). Rajasthan performed moderately in transport sector decarbonisation with an EV adoption rate of 6.6% in FY2025. However, despite advancing in ToD tariff mechanism adoption, Rajasthan fell behind in the deployment of smart meters and hence, in operationalising the ToD tariff mechanism. Rajasthan only has 25MW of storage capacity, indicating significant scope to expand its storage capacity to meet peak demand and support the integration of more variable renewable energy.

The other high-achieving states in this dimension, Gujarat and Maharashtra, also have a renewable energy policy in place. The two states continued strengthening their clean electricity transition by adopting the GEOA Rules, green energy tariffs and solar-hour-aligned ToD tariffs. However, both states provide limited exemption on open access charges to green open access consumers. Gujarat also houses one of the three major ports recognised as a green hydrogen hub and, along with Maharashtra, made notable progress on this front. EV adoption rate in Gujarat remained below moderate (3.6% in FY2025) whereas Maharashtra's performance was promising (8.3% in FY2025).

[48] Ministry of Power. Electricity (Promoting Renewable Energy Through Green Energy Open Access) Rules, 2022. June 2025
[49] Vahan. Vahan Dashboard. March 2024
[50] The Economic Times. Andhra Pradesh govt signs Rs 3 lakh crore renewable energy agreements ahead of CII Summit. November 2025
[51] Government of Uttar Pradesh. Uttar Pradesh Solar Energy Policy, 2022.
[52] Hindustan Times. U.P. cabinet approves green hydrogen policy, paves way for massive investment. March 2025
[53] Government of Rajasthan Energy Department. Rajasthan Renewable Energy Policy, 2023. 6 October 2023

Similarly, on the energy storage front, capacity addition was modest both in Gujarat and Maharashtra.

Assam and Madhya Pradesh released their renewable energy policies in Q12025 with significant renewable energy deployment targets. Assam performed remarkably in the deployment of the EV ecosystem with a high EV adoption rate of 11% in FY2025. The state is now gearing up to implement the solar-hour-aligned ToD tariff. Madhya Pradesh performed moderately in EV adoption (6.4% in FY2025). Both states made moderate progress in green hydrogen uptake. However, Assam's green tariff premium at USD0.012/kWh (INR1.00/kWh) was significantly higher than that of Madhya Pradesh at USD0.0064/kWh (INR0.53/kWh).

Telangana, Chhattisgarh and Bihar on the rise

Telangana performed moderately in this dimension. The state updated its renewable energy policy in 2025 with targets to install 20GW solar, 2.5GW wind and 4.3GW distributed renewable energy by 2030. Telangana also offers green tariff and ToD tariff mechanism; however, the ToD tariff is not aligned with solar hours and is not available across all consumer categories. Storage capacity remained limited beyond pumped hydro projects, while green hydrogen efforts remained at an early stage with one announced production facility. Telangana's EV adoption was low at 4%, but with a 100% exemption on road tax and registration fees for EVs announced in November 2024, this adoption rate is expected to climb significantly.[54]

Chhattisgarh's performance was average with a moderate EV adoption rate of 6.6% and an announced green hydrogen facility. This state, too, provides green tariffs at a premium of USD0.0056/kWh (INR0.50/kWh) and solar-hour-aligned ToD tariffs. The state's renewable energy policy was released in 2017 and expires in 2027. It could leverage the next update to set clear capacity installation targets.[59] It also needs to integrate storage capacity, which at present is minimal.

Bihar introduced a green tariff provision for the first time in FY2026, at a premium of USD0.0047/kWh (INR0.42/kWh). It created a conducive policy environment for both renewable energy (targeting around 24GW by FY2030) and for EV adoption (8.2% in FY2025). It also offered ToD tariff mechanism. While Bihar does not yet have operational energy storage capacity, it has made efforts through various auctions to integrate energy storage into its portfolio.[55] It also has scope to build momentum on its draft green hydrogen policy.

Both Tamil Nadu and Odisha performed moderately, with EV adoption rates at 7.1% and 8.1%, respectively. Both states adopted ToD tariffs for non-agricultural consumers above 10kW and have aligned off-peak hours with solar hours. Both states have considerable potential for integrating energy storage capacity. Odisha's green tariff is attractive at a premium of USD0.0024/kWh

[54] The Hindu. Telangana announces 100% exemption from road tax and registration fee on EV purchases. November 2024
[55] PV Magazine. Bihar tenders EPC of 116 MW solar with 50.5 MW/241 MWh battery storage. April 2025

(INR0.20/kWh), while Tamil Nadu's green tariff premium is linked to category-specific energy charges and is trending upward.

Uttarakhand's performance in this dimension was highly influenced by its highest energy storage capacity to peak demand ratio, which demonstrates the state's capability to meet peak demand. The state has also created a conducive environment for policy, and adopted green tariffs and GEOA Rules, with limited exemptions on open access charges. The state also provides ToD tariffs for select consumer categories and is yet to align off-peak hours with solar hours. From an EV adoption perspective, its performance remained moderate at a rate of 6.9%.

Karnataka, despite being a leader in decarbonisation efforts with a conducive renewable energy policy environment, demonstrated average performance under this dimension. The EV adoption rate stood at 9.4% with muted progress in green hydrogen uptake. Karnataka has adopted the GEOA Rules and provides limited exemption on open access charges. The state has also introduced green tariffs. Karnataka's performance under the time-of-day tariff mechanism remained muted due to the non-alignment of off-peak hours with solar hours and the non-availability of this mechanism across all consumer categories.

West Bengal, Delhi and Kerala show high improvement potential

Although both Delhi and West Bengal showed muted overall performance, the underlying reasons differ across key aspects of electricity transition. Delhi developed a strong EV ecosystem, recording an adoption rate of 11.6%, the highest among the assessed states, while West Bengal's adoption remained modest at 4.4%. Delhi's renewable energy policy, released in 2023, outlines a cumulative target of 4.5GW by FY2027, whereas West Bengal continues to operate under a dated 2012 policy. Delhi's performance was affected by the unavailability of the latest tariff orders, leaving the green tariff and ToD tariff details unreported. West Bengal offers green tariffs at a premium of USD0.0056/kWh (INR0.50/kWh). On green hydrogen uptake, both underperformed, but for Delhi, establishing a large-scale production facility seems unlikely due to constraints like limited land and water availability, and of abundant renewable energy needed for the production process, as well as limited proximity to major green hydrogen centres (industries). In contrast, West Bengal has substantial room to advance its efforts.

Kerala showed the highest improvement potential across most parameters. Kerala had a remarkable EV adoption rate of 10.5% in FY2025, adopted the ToD tariff mechanism, and aligned off-peak hours with solar hours. However, its green tariff premium, significantly higher than most states, stands at USD0.0086/kWh (INR0.77/kWh). Kerala's progress stalled in energy storage capacity deployment and policy implementation, with both its policies for renewable energy and green hydrogen still in the draft stage.

Punjab and Haryana demonstrated modest EV adoption at 6.3% and 4.1%, respectively, and both states are yet to amend their ToD tariff mechanism to align off-peak hours with solar hours. Smart meter deployment was slow, neither state deployed energy storage capacity, and renewable energy

policies in both states were dated. Their green hydrogen efforts also remained at a preliminary stage, with policies at the draft stage. However, Haryana announced two green hydrogen production facility.[56]

Jharkhand's performance under this dimension remained subdued, although the state has a renewable energy policy[57] with a cumulative target of 4GW by FY2027. The state has also adopted the GEOA Rules but provides limited exemptions in open access charges. In terms of development of the EV ecosystem, the adoption rate stood at 4.6%. Jharkhand offers green tariffs at a premium of USD0.0067/kWh (INR0.60/kWh). The state offers ToD tariffs but is yet to align its off-peak hours with solar hours. In the context of energy storage capacity and green hydrogen uptake, Jharkhand has significant opportunities[58, 59] given that it is a major industrial hub.

Himachal Pradesh remained the most constrained among 21 states, with limited movement in EV adoption rate (1.3% in FY2025). The state is also yet to adopt ToD tariffs but has made modest progress in deploying smart meters. While the state has a valid renewable energy policy[60] and adopted the GEOA Rules, exemptions on open access charges remain limited. Storage capacity deployment and green hydrogen uptake emerged as potential opportunities for improvement.

Changes compared with SET 2024

Note: In this dimension, two new parameters have been added, and the mode of measurement has been updated for three parameters to better reflect emerging market enablers within the electricity transition landscape. One parameter was also removed: Codes/regulations for distribution system. The mode of measurement for assessing the development of the EV ecosystem, availability and attractiveness of green tariffs and adoption of GEOA Rules has been revised. A new parameter on the **availability of ToD tariff mechanism** has been introduced to capture progress in integrating solar generation. Additionally, **green hydrogen uptake** has been incorporated as a new parameter, recognising its growing relevance in driving industrial decarbonisation. The earlier parameter on distribution system codes and regulations has been removed.

Noticeable shifts have occurred in the performance of several states under this dimension for this assessment year compared to the previous assessment period (SET 2024). Uttar Pradesh, Bihar, Assam, Rajasthan and Andhra Pradesh have shown significant improvement in overall performance. In contrast, the performance of Karnataka, Jharkhand, Haryana and Odisha, Jharkhand and Haryana have declined considerably, reflecting the impact of introducing new parameters and recalibrated

[56] Net-zero India. L&T to Build Nation's Largest Green Hydrogen Facility at IOCL Panipat. July 2025
[57] JREDA. Jharkhand State Solar Policy 2022. July 2022
[58] The Times of India. States lag in renewable energy generation, despite huge potential. August 2025
[59] CEED. Jharkhand aspires to create hydrogen ecosystem to strengthen energy security.
[60] Government of Himachal Pradesh. Energy Policy, 2021.

mode of measurement, along with the exclusion of codes/regulations for the distribution system parameter.

Assam, Bihar and Uttar Pradesh benefited from a change in the method used to measure EV ecosystem deployment. Further, Uttar Pradesh, Rajasthan, Bihar, Assam and Andhra Pradesh outperformed under the newly introduced parameter on ToD tariff mechanism. A comparatively lower green tariff premium positively influenced Uttar Pradesh and Rajasthan's performance under this dimension. Additionally, Bihar introduced green tariffs for the first time. The inclusion of a parameter on green hydrogen uptake further strengthened the overall performance of Andhra Pradesh, Rajasthan and Uttar Pradesh.

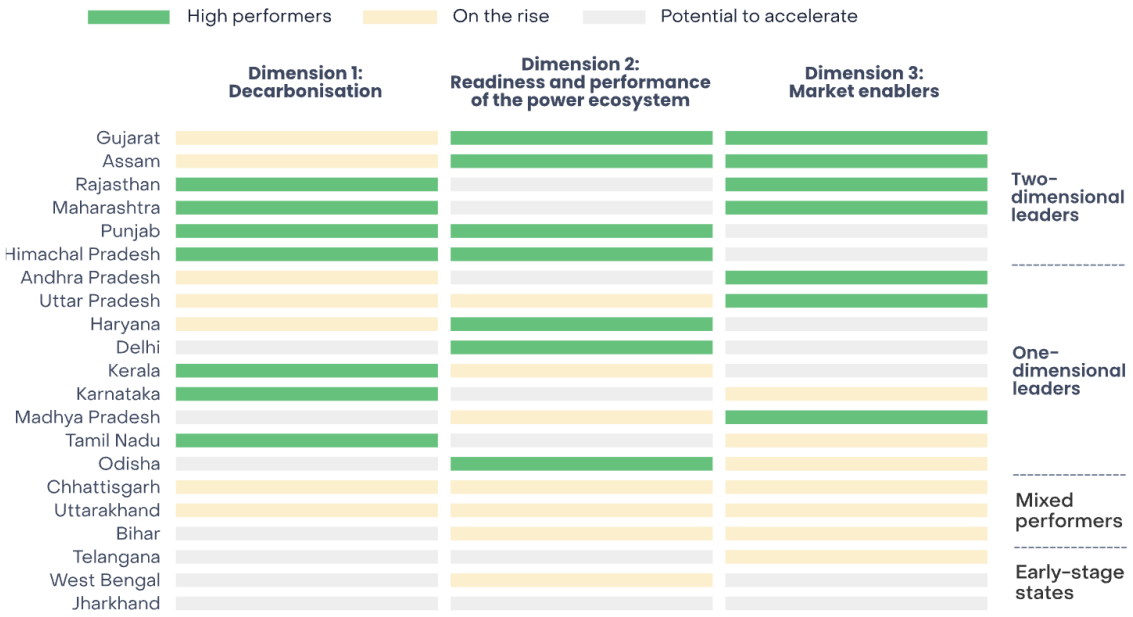
Conversely, Karnataka and Haryana were negatively impacted by the change in the method of measuring EV ecosystem deployment. Similarly, given that Karnataka, Haryana and Jharkhand do not align off-peak hours with solar hours under ToD tariff mechanism, the introduction of this parameter negatively influenced their overall performance. Changes in the method of measurement for GEOA Rules affected the overall performance of Karnataka, Haryana, Odisha and Jharkhand. Karnataka, Odisha and Haryana's decline was also driven by the removal of the earlier parameter on codes/regulations for distribution system where they had performed well, and the addition of green hydrogen uptake, where their performance was low to moderate.

The performance of Delhi, Gujarat, Maharashtra, Tamil Nadu, Telangana and Madhya Pradesh remained almost unchanged in comparison with the previous year's assessment.

Conclusion

The cross-dimensional assessment reveals significant variation in how states perform across the three dimensions, underscoring that strengths in one area do not necessarily translate into system-wide transformation.

Figure 7: An overview of states' results



Source: Ember and IEEFA research.

No state demonstrates consistently strong performance (features in top seven) across all three dimensions, unlike the previous edition of the report. Even strong decarbonisation leaders show clear gaps either in market-enabling conditions or system readiness, highlighting the heterogeneity of states' electricity transition. As renewable penetration rises, success increasingly depends not only on capacity addition but also on grid readiness, market participation, and demand-side efficiency. The findings suggest that even leading states need to strengthen weaker links to achieve a holistic transition.

Two-dimensional leaders — performing well in two of three dimensions

These states show strong performance in two dimensions, indicating directional progress but incomplete transition readiness. A cluster of states, including Gujarat, Maharashtra, Rajasthan, Himachal Pradesh, Punjab, and Assam, are moving in the right direction but must address specific structural gaps to unlock comprehensive clean electricity transition.

- **Maharashtra and Rajasthan perform strongly in dimensions 1 and 3.** Maharashtra combines sustained renewable energy capacity additions with strong performance under SEEI 2024 and has strengthened its clean electricity transition through the adoption of Green Energy Open Access Rules (2022), green energy tariffs, and solar-hour-aligned ToD tariffs. However, limitations in DISCOM operations, short-term market participation, and distributed solar uptake has resulted in moderate performance under dimension 2. Rajasthan, building on its renewable energy leadership, continued to excel with a well-established renewable energy policy landscape, the lowest green tariff premium in the country, solar-hour-aligned ToD tariff, the adoption of green open access rules, a functional green hydrogen policy and progress in EV ecosystem development. The state also performed well in renewable energy capacity addition over the last five financial years. Nonetheless, constraints related to smart metering, uptake of distributed solar energy, short-term market participation, and power adequacy affected its performance under dimension 2.
- **Gujarat and Assam perform strongly in dimensions 2 and 3**, supported by robust DISCOM performance. Gujarat recorded a negligible energy shortage of 0.001% in FY2025, while Assam faced shortages of just 9MU (0.07% of demand). Both states advanced in clean electricity transition. While Gujarat did it through green energy open access rules, green tariffs, and solar-hour-aligned ToD tariffs, Assam achieved this by leading in EV adoption (11.1% in FY2025). Gujarat also emerged as a green hydrogen hub. However, performance under dimension 1 remained moderate for both, with Gujarat utilising only 15% of its renewable potential and Assam adding limited renewable capacity over the past five years, constraining the share of renewables in their power procurement mix.
- **Punjab and Himachal Pradesh performed well in dimensions 1 and 2.** In dimension 1, Himachal Pradesh, dominated by hydropower, led with the highest renewable energy share (~65%) and the lowest power sector emission intensity, while Punjab effectively utilised its renewable energy potential. In dimension 2, Punjab ensured a reliable power supply with zero energy shortage in FY2025 and appreciable DISCOM operations. Himachal Pradesh excelled in short-term market participation with strong power adequacy (0.04% shortage), though limited distributed solar (0.5% of renewable energy capacity) constrained its performance. In dimension 3, both states faced challenges in clean energy and mobility transitions. EV adoption remained modest, with solar-hour-aligned ToD tariff mechanism yet to be adopted. In Punjab, energy storage capacities were absent, and renewable energy policies outdated. Himanchal Pradesh also lacked storage capacity.

One-dimensional leaders — strong in one aspect, held back in others

These states performed well in only one dimension.

- **Karnataka, Tamil Nadu, and Kerala performed strongly in dimension 1,** but showed mixed results in dimensions 2 and 3. Karnataka led in dimension 1 with low power sector emission intensity, strong SEEI 2024 performance, and good renewable energy share (~37%). Kerala scored high under this dimension, driven by low emissions, high renewable energy potential utilisation (31%), and strong renewable growth. Tamil Nadu also scored high under this dimension. Dimension 2 scores for Karnataka and Tamil Nadu were constrained by weak distributed solar and smart meter uptake. Under dimension 3, Karnataka and Tamil Nadu struggled with moderate EV adoption, limited green hydrogen uptake and limited storage capacity deployment. Kerala faced challenged due to stalled energy storage capacities and policy implementation.

- **Delhi, Odisha and Haryana performed strongly in dimension 2**. Delhi remained a high performer under dimension 2, driven by zero power shortage, distributed solar adoption, with 304MW of distributed solar capacity installed as of March 2025, accounting for nearly 97% of its total solar capacity, and strong DISCOM performance. Odisha and Haryana demonstrated good DISCOM performance and minimal power supply shortage. Delhi showed significant scope for improvement in both dimensions 1 and 3, mainly because of its weak performance on parameters such as renewable energy capacity addition, SEEI, state expenditure on renewable energy, and renewable energy in the procurement mix, along with the absence of ToD tariff mechanism and incremental green tariff, and low storage capacity deployment. Similarly, Odisha's poor performance in power-sector emissions intensity, renewable energy capacity addition, renewable energy share in procurement mix, and state expenditure on renewable energy impacted its score under dimension 1. Progress under dimension 3 was also moderate due to nascent energy storage deployment for all three states. Delhi also showed limited performance in availability of time-of-day tariff mechanism and availability and attractiveness of green tariff.

- **Uttar Pradesh, Madhya Pradesh, and Andhra Pradesh perform strongly in dimension 3,** but moderately in dimensions 1 and 2. Andhra Pradesh led dimension 3 with its integrated clean energy policy, progress in green hydrogen, and 1,440MW of pumped hydro storage capacity, as well as solar-hour-aligned ToD tariff. Despite lacking in storage capacity, Uttar Pradesh also advanced across the same other three parameters, while Madhya Pradesh showed gradual progress in renewable energy deployment, solar-hour-aligned ToD mechanism, and green hydrogen uptake. Telangana demonstrated early-stage progress in energy storage and green hydrogen, with moderate renewable energy deployment and policy incentives. However, dimension 1 performance was moderate for all three states due to limited renewable energy share in power procurement mix and substantial untapped

renewable energy potential. The three states also showed limited performance in state expenditure on renewable energy and renewable energy capacity addition. Dimension 2 performance was constrained by moderate DISCOM performance, limited participation in the short-term market, low uptake of distributed solar energy, and insufficient smart metering infrastructure, limiting overall effectiveness in this dimension.

Mixed performers — performing moderately in two or all three dimensions

These states indicate clear effort and intent to accelerate their electricity transition. One-dimensional leaders falling under this category are not included here.

- Chhattisgarh performed moderately across the three dimensions. Under dimension 1, the state added approximately 1.2GW of renewable capacity over the past five financial years, reflecting a robust 21% average annual growth rate. Yet renewables accounted for only 10% of its power procurement in FY2024, and nearly 92% of its renewable potential remained untapped as of March 2025, indicating significant scope for further expansion. Under dimension 2, the state recorded just a 0.07% shortage in FY2025, and moderate DISCOM performance. However, low short-term market participation, limited distributed solar uptake (498MW), and slow smart meter deployment constrained overall readiness. Under dimension 3, its performance was average, with moderate EV adoption (6.6%), the announcement of a green hydrogen facility, and the availability of green tariffs and solar-hour-aligned ToD tariffs. The 2017 renewable energy policy, valid until 2027, presented an opportunity for a strategic update to set clearer targets, strengthen storage deployment, and better integrate emerging market mechanism.
- Uttarakhand's geographical advantages enabled high hydropower reliance, resulting in a 44% renewable energy share in power procurement in FY2024 and relatively low power sector emissions intensity. However, energy efficiency efforts remained limited and renewable potential (84%) under-leveraged, leading to moderate performance in dimension 1. Under dimension 2, the state maintained strong energy adequacy and an average performing DISCOM, but weak distributed solar (6% of total renewable energy capacity), slow smart metering rollout (4%), and moderate short-term market participation constrained readiness. Under dimension 3, Uttarakhand led in energy storage relative to peak demand, offering green tariffs and ToD tariffs, and having a functional renewable energy policy. However, slower EV uptake and pending ToD alignment with solar hours impacted its performance.
- Bihar exhibited moderate performance under dimensions 2 and 3 but placed in the bottom seven for dimension 1. Under dimension 1, renewable energy utilisation remained subdued, with only 3% of its potential tapped and renewables contributing 18% to power procurement, highlighting significant room for growth. Despite having a State Energy Efficiency Action Plan, Bihar's energy efficiency efforts still require strengthening. Under dimension 2, Bihar showed

strong progress in smart meter deployment (78% under RDSS as of March 2025) and moderate DISCOM performance. However, limited short-term market participation, modest distributed solar uptake (25% of total renewable capacity), and relatively high energy shortages (0.4% or 170MU in FY2025) constrained the state's overall readiness. Under dimension 3, the state introduced green tariffs for the first time in FY2026, established ToD tariff mechanism, and supported both renewable energy (with a target of 24GW by FY2030) and EV adoption, which stood at 8.2% in FY2025. While energy storage is not yet operational, Bihar has initiated efforts through auctions to integrate storage and is advancing a draft green hydrogen policy, indicating a growing focus on market and technology signals.

States in early stages of transition

These are states that consistently place in the bottom seven across two or more dimensions, reflecting entrenched structural and institutional barriers.

- West Bengal has remained at an early stage of electricity transition due to limited progress across all three dimensions. Under dimension 1, renewable energy plays a marginal role in the state's power mix, accounting for just 7% of procurement in FY2024, despite having considerable untapped potential (only 20% utilised as of FY2025). In parallel, gains in energy efficiency remain limited. And although the state adopted a State Energy Efficiency Action Plan in March 2023, the SEEI 2024 does not yet reflect meaningful progress. The state demonstrated a similar pattern under dimension 2. While it maintained strong power adequacy with zero shortages in FY2025, its distributed solar uptake was low (80MW or 4% of renewable energy capacity), smart meter deployment minimal (2% as of March 2025), and short-term market participation subdued (15% of procurement in FY2024, with GDAM at just 0.19%). DISCOM performance was modest, further affecting system readiness. Finally, under dimension 3, enabling signals remained muted, with modest EV adoption (4.4%) and policy frameworks lagging, as the state continued to operate under an outdated 2012 renewable policy. Collectively, these factors indicate that while West Bengal has maintained power supply adequacy, more decisive policy, regulatory, market and efficiency actions are needed for the state to progress meaningfully in the electricity transition.

- Telangana's overall performance across the three dimensions remained constrained due to gaps in implementation and outcomes. Under dimension 1, the state scored low on account of a modest renewable energy share in power procurement (14% in FY2024), renewable energy potential utilisation below 10% as of March 2025, and muted renewable capacity additions. Under dimension 2, Telangana performance among the 21 states was the weakest, driven by limited uptake of distributed solar, and weak DISCOM performance. Under dimension 3, while policy intent was visible in an updated renewable energy policy, green tariff mechanism performance remained moderate due to misalignment of ToD tariffs with solar hours, and low EV adoption.

- Jharkhand's performance, too, remained subdued across all three dimensions, reflecting structural and legacy challenges. Under dimension 1, the state had significant room to scale renewables, which constituted only 8% of procurement in FY2024 and 2% of potential utilised by FY2025. Enhancing renewable deployment will be important for the state's energy security and diversification. Its State Energy Efficiency Action Plan released in January 2025 signals intent to improve efficiency. Under dimension 2, performance was weighed down by energy shortages (0.5% or 69MU in FY2025), weak DISCOM performance, and minimal short-term market participation, though the state has a comparatively higher distributed solar share (41% of renewable energy capacity). Under dimension 3, performance remained weak despite a 4GW renewable energy target by FY2027 and green open access rule adoption. Moreover, Jharkhand's EV uptake is nascent (4.6%) and storage or hydrogen pilots are yet to materialise.

This analysis acknowledges that Jharkhand also faces broader Just Transition challenges that sit outside the scope of electricity transition indicators. For example, the state has a significant share of revenues and employment linked to legacy fossil sectors, making socio-economic transition risks especially salient and requiring careful planning.

Recommendations

Based on our analysis, we make the following recommendations to accelerate the subnational electricity transition.

1. Create strong and predictable demand for clean electricity

The states should ensure timely policy updates, preparing revised policies in time before expiry, and prioritise the conversion of draft rules into in-force regulations to maintain investor confidence and support long-term renewable market growth.

Strengthen renewable energy targets and demand signals: States should align their power procurement planning and DISCOM operations with the Ministry of Power's revised Renewable Consumption Obligation (RCO) targets,[61] ensuring on-ground implementation across all renewable segments — wind, hydro, distributed renewables (≤10 MW), and other sources. By embedding RCO trajectories into procurement strategies, states can accelerate renewable energy deployment, reduce fossil fuel dependence, and provide a predictable, long-term demand signal for clean energy investors. Additionally, monitoring and reporting mechanisms should be strengthened through standardised quarterly compliance reporting, centralised digital tracking of procurement, and independent verification processes to enable timely corrective actions where RCO targets are lagging.

[61] Ministry of Power. Renewable Consumption Obligation (RCO). 5 August 2025

Prepare power systems for new sources of electricity demand: States should implement, track and regularly update their resource adequacy plans, ToD tariffs, and green energy open-access frameworks to create predictable demand for variable renewables, hybrid projects, and energy storage. Growing demand for electricity is increasingly coming not just from electric mobility and green hydrogen, but also from the rapid expansion of data centre infrastructure. India's data centre electricity demand is projected to grow almost five-fold from 13 terawatt hours (TWh) in 2024 to 57TWh by 2030, lifting data centres' share of national electricity demand from around 0.8% to 2.6%.[62]

States should proactively map and forecast demand to avoid supply bottlenecks and ensure that this new energy demand is met through clean energy sources. Better demand-side mapping and planning will help integrate these new loads smoothly, ensure grid reliability, and support a steady pipeline of clean-energy capacity.

2. Strengthen DISCOM financial health

States should address structural and financial challenges limiting DISCOMs' renewable procurement. As highlighted in the 13th PFC Integrated Rating Report,[63] many DISCOMs face high debt, delayed subsidies, operational inefficiencies, and tariff-revenue mismatch. Financial stress intensified in FY2024, with collection efficiency declining from 97.56% in FY2023 to 96.51% in FY2024,[64] contributing to a deterioration in aggregate technical & commercial (AT&C) losses, while billing efficiency continues to remain below 90%[65] at the all-India level.

States should deploy performance-linked financial support, ensure timely subsidy payments, implement regular cost-reflective tariff revisions, and strengthen billing and collection systems through digitisation, smart metering and feeder-level monitoring. These measures reduce risk perception and enable DISCOMs to drive renewable energy demand effectively.

3. Leverage direct benefit transfer (DBT) reforms to rationalise tariffs

States should adopt DBT for electricity subsidies under the 2025 Electricity Act amendments,[66] which mandate cost-reflective tariffs, remove hidden cross-subsidies, and allow explicit budgeting for vulnerable consumers. DBT ensures subsidies reach beneficiaries, stabilises DISCOM finances, improves revenue adequacy, and reduces financial risk, enabling long-term renewable procurement and grid investment. Transparent subsidy flows also enhance accountability and accelerate renewable integration.

However, DBT implementation poses challenges, including incomplete consumer databases, uneven bank account linkage, and administrative coordination gaps, which can delay rollout and temporarily

[62] S&P. Will India become a global datacenter market? 17 September 2025,
[63] Ministry of Power. 13th PFC Integrated Rating Report. April 2025, Power Finance Corporation. 13th annual integrated rating & ranking: Power Distribution Utilities. April 2025
[64] Power Finance Corporation. 13th annual integrated rating & ranking: Power Distribution Utilities. April 2025
[65] Power Finance Corporation. 13th annual integrated rating & ranking: Power Distribution Utilities. April 2025
[66] Ministry of Power. Draft Electricity Bill Amendment. 9 October 2025

affect low-income consumers. Addressing these through phased implementation, robust grievance mechanism, and targeted awareness programmes can ensure effective and equitable subsidy delivery while supporting renewable integration.

4. Market enforcement and procurement design

The introduction of market designs, like market-based economic dispatch (MBED)[67] and well-designed capacity markets[68], will modernise India's power sector by providing long-term signals for investment in grid flexibility, improving overall resource adequacy, and enabling system-wide optimisation across states. However, implementing MBED and capacity markets poses challenges, including the need for robust grid data, advanced forecasting, coordination across states, and capacity-building for regulators and DISCOMs to ensure transparent, efficient market operation.

Peer-to-peer (P2P) trading represents an emerging market design innovation that enables direct transactions between producers and consumers, improves consumer participation, enables distributed renewable energy adoption and optimises demand–supply matching at a granular level. Regulatory frameworks that explicitly enable P2P trading can foster competition, lower transaction costs, and support the integration of renewable generation. States like Delhi,[69] Uttar Pradesh,[70] and Karnataka[71] have already taken steps toward P2P trading regulations. The concept is still evolving and requires supportive regulatory frameworks and advanced IT infrastructure but has the potential to complement existing market mechanisms and accelerate the transition toward more participatory and decentralised energy systems.

5. Strengthen demand-side management (DSM) for a smarter, flexible power system

Effective DSM is essential for balancing India's increasingly renewable-heavy power system and reducing the need for costly peak-time capacity additions. States must accelerate the deployment of smart meters, automate demand response programmes, and promote ToD tariffs that incentivise consumers to shift usage towards solar-rich daytime hours. Large commercial and industrial consumers, including IT parks, data centres, and manufacturing clusters, should be integrated into structured DSM programmes to provide flexible load that aligns with renewable generation patterns. These measures shift loads from peak to off-peak periods, reduce system costs, minimise renewable curtailment, and enhance grid stability.

Artificial Intelligence (AI) and advanced analytics can optimise DSM by anticipating demand spikes and managing variable renewable output. While data centres and emerging high-growth loads add additional electricity demand, AI can help balance these loads efficiently, exemplifying the principle

[67] MBED proposes a market-based mechanism, which will lead to discovery of uniform system-wide marginal prices, essential for encouraging market-based generation capacity additions in the future.
[68] A capacity market is designed to ensure sufficient reliable capacity is available by providing payments to encourage investment in new capacity or for existing capacity to remain open.
[69] Delhi Electricity Regulatory Commission. Peer to Peer Energy Transaction Guidelines. 2024
[70] Uttar Pradesh Electricity Regulatory Commission (UPERC). Guidelines for peer-to-peer solar energy transaction through blockchain based platform. 2023
[71] Karnataka Electricity Regulatory Commission (KERC). Implementation of peer-to-peer solar energy transaction regulation. 2024

of "AI for energy, energy for AI". By combining real-time consumption data, weather forecasts, and renewable generation patterns, AI enables predictive load shaping, smoother integration of renewables, and more flexible, resilient grid operations.

6. Accelerate distribution and transmission grid build-out, and improve grid-forming flexibility

Grid readiness remains one of the most binding constraints for renewable energy expansion. Several states have renewable-rich regions where projects face delays due to inadequate or unsynchronised transmission infrastructure. Addressing this challenge requires states to assume a more proactive role in planning and commissioning intra-state networks, ensuring they are aligned with renewable energy project timelines and central transmission planning frameworks. In addition, states need to prioritise strengthening distribution grid infrastructure by upgrading lines, transformers and substations to enable efficient evacuation of renewable energy and distributed solar, reduce congestion and losses, and ensure reliable integration of higher shares of variable generation.

The recent amendments to the Electricity Rules and the central government's expansion of Green Energy Corridors (GOCs) provide an enabling policy framework, but states must internalise these changes into their own project-development cycles.[72] Integrating dynamic system studies, including load flow, transient stability, and renewable intermittency analyses, into routine planning will help states better understand their reserve requirements.

Strengthening ancillary service markets is equally critical for grid flexibility. Today, ancillary procurement remains limited in scale and scope, leading to higher reliance on thermal units for reserves. Expanding services such as frequency response, ramping reserves, and fast-response services and ensuring fair compensation would help states build the flexibility necessary for integrating variable renewable energy at much higher shares.

7. Scale up storage and flexibility services

Meeting India's renewable energy goals will be impossible without rapid acceleration of storage deployment. States must accelerate deployment of energy storage both battery energy storage systems and pumped storage hydropower to meet growing renewable capacity and prevent curtailment. The National Electricity Plan (NEP) estimates that India needs an energy storage capacity of 73.9GW by 2031-32, with storage of 411.4GWh to integrate planned renewable energy capacities. This includes 26.7GW/175.2GWh of pumped hydro storage plants and 47.2GW/236.2GWh of battery energy storage systems.[73]

States need to prioritise awarding new BESS and PSP tenders, expediting land and water clearances for pumped storage, and streamlining approvals for storage-linked renewable projects. To unlock this, states must leverage central policies, including inter-state transmission charge waivers for

[72] Power Line. Transmission Priority: Focus on grid modernisation, capacity build-out and network resilience. 30 October 2025
[73] CEA. National Electricity Plan. March 2023

storage projects (extended until mid-2028), and integrate storage deployment in their energy planning and procurement frameworks.

In addition, newer procurement models are emerging as important tools to accelerate storage deployment and system flexibility. Firm and Dispatchable Renewable Energy (FDRE) tenders, peak power tenders, and round-the-clock (RTC) renewable contracts explicitly value availability during non-solar hours and peak demand periods, creating stronger commercial signals for pairing renewables with storage. States should actively adopt and scale such next-generation tenders in their procurement portfolios, tailor them to local demand and grid conditions, and align them with resource adequacy planning to ensure that storage deployment is both timely and system-relevant.

8. Unlock decentralised renewable energy

While India's renewable energy growth has been driven primarily by large utility-scale projects, decentralised renewable energy remains an underutilised opportunity. Such an approach would strengthen DISCOM finances by reducing technical losses, support rural economies through improved power quality, and generate local employment opportunities. Distributed solar, agricultural feeder solarisation, and community energy models can significantly complement grid-scale additions. Simplifying metering, enforcing ToD exports, and introducing performance-based incentives for DISCOMs will accelerate adoption.

Annexure 1: Changes in dimension, parameters and mode of measurement

Table 3: Comprehensive list of changes in SET 2026 compared with SET 2024

Parameters	2024	2026	Updated name of parameters in SET 2026 (if included in SET 2026)	Mode of measurement	Change in mode of measurement (if applicable)
Renewable energy mix in consumption	Yes	Yes	Renewable energy in the procurement mix	Renewable energy in power procured/total power procured (FY2024) (power procured is calculated by adding total power procured by DISCOMs and captive generation)	No
Utilised renewable energy potential	Yes	Yes	-	Renewable energy installed capacity (as of March 2025; including large hydro)/Renewable energy potential as estimated on 31 March 2024	No (added large hydro to the analysis)
Power sector emissions intensity	Yes	Yes	-	FY2024 power sector emissions/FY2024 GSDP	No
State Energy Efficiency Index	Yes	Yes	-	SEEI 2024	No
State expenditure on renewable energy	Yes	Yes	-	Data taken from states' finance accounts. Years: Average for values from FY2020-FY2024 Weighted average of: 1) Capital expenditure on new and renewable energy/total expenditure on new and renewable energy 2) Total expenditure on new and renewable energy/total expenditure on energy 3) Total expenditure on energy/total consolidated fund expenditure Here, total expenditure = capital expenditure + revenue expenditure	No
Recent additions of renewable energy capacity	Yes	Yes	Renewable energy capacity addition	An average of annual % growth in renewable capacity addition (including large hydro) between FY2021 and FY2025	Yes
DISCOM performance	Yes	Yes	-	MoP 13th Annual Integrated Rating and Ranking of Power Distribution Utilities (state-level scoring derived by weighted average method based on power purchase at DISCOM level in that particular state out of total power purchase of all DISCOMs in the state)	No

Short-term market participation	Yes	Yes	-	Weighted average of: 1) Sum of total sales and purchases of electricity through short-term contracts/total of power purchase and captive generation (FY2024) 2) Sum of sales and purchases on GDAM/sum of total sales and purchases of electricity through short-term contracts in electricity market (FY2024)	No
MNRE state-level renewable energy target achieved	Yes	No	-	-	Removed
Power supply shortage	Yes	Yes	-	Shortage (MU)/power requirement (MU) (FY2025)	No
Uptake of distributed solar energy	Yes	Yes	-	Rooftop solar installed capacity + off-grid solar installed capacity/total installed capacity as of March 2025 (including large hydro)	No
Electricity intensity of GDP	Yes	No	-	-	Removed
Smart metering	No	Yes	-	Communicating smart meters/sanctioned smart meters as on March 2025 (data retrieved from the RDSS portal as on 7 November 2025)	New addition
Development of EV ecosystem	Yes	Yes	-	Average of: 1) FY2025 EV adoption rate (EV sales vs total vehicles); EV sales for Telangana is taken from its transport department 2) Supplemented with state's EV policies	Yes
Availability of time-of-day tariff and associated infrastructure	No	Yes	-	Average of: 1) Qualitative categorisation of the states based on availability of ToD tariff mechanism for FY2026 2) Qualitative categorisation of the states based on inclusion of all consumer categories except agriculture 3) Qualitative categorisation of the states based on alignment of off-peak hours with solar hours	New addition
Availability and attractiveness of green tariff	Yes	Yes	-	Average of: 1) Qualitative categorisation of the states based on (1.a.) availability of green tariff for following year (FY2026) (1.b.) increase or decrease in green tariff from previous financial year (FY2025) 2) states' FY2026 incremental green tariff	Yes

Storage capacity deployment	Yes	Yes	-	State wise total storage capacity (pumped hydro storage + BESS) as of November 2025/peak demand for FY2025	No
Renewable energy policy landscape	Yes	Yes	-	Qualitative categorisation of states based on existence of state-wise renewable energy policies, including renewable energy targets	No
Codes/regulations for distribution system	Yes	No	-	-	Removed
Adoption of green open access rules	Yes	Yes	-	Average of: 1) Qualitative categorisation of states based on adoption of Green Energy Open Access Rules 2) Qualitative categorisation of states based on exemptions on open access charges for green energy under captive mode 3) Qualitative categorisation of states based on exemptions on open access charges for green energy under third-party mode 4) Qualitative categorisation of states based on availability of energy banking facility	Yes
Green hydrogen uptake	No	Yes	-	1) Qualitative categorisation of states based on individual green hydrogen policy or inclusion in renewable energy policy or in industrial policy 2) States' green hydrogen production project deployments — announced, commissioned, under construction as per the National Green Hydrogen Mission (NGHM), as of November 2025	New addition

Annexure 2: Rationale for dimensions and parameters; data-related challenges and assumptions

Table 4: Dimensions, parameters and the data-related challenges and assumptions

Parameter	Rationale	Challenges	Assumptions
Dimension 1: Decarbonisation – Collectively, the parameters of this dimension offer a comprehensive perspective on states' advancement towards decarbonisation, which includes transitioning to renewable electricity, realising renewable energy potential, analysing economic growth in terms of power sector emissions, integrating energy efficiency into state-level policy adoption, tracking state expenditure on renewable energy and increment in renewable energy capacity.			
Renewable energy in the procurement mix	This parameter provides insight into the portion of renewable energy sources, such as solar, wind, hydro and biomass, within the overall electricity procurement of a specific state. It quantifies the contribution of renewable energy in meeting the state's total electricity requirement, highlighting the extent to which renewable sources are integrated into the state's electricity mix. This is a direct indicator of a state's progress in decarbonisation. The higher the proportion of renewable energy in the procurement mix, the higher the state's efforts in diversifying its electricity mix.	State-level renewable energy procurement data was not available for all states for FY2025. In absence of that, we used FY2024 data. Similarly, captive consumption data was only available for FY2023.	For procurement, the aggregate of captive power generation within a state and power procured by the DISCOMs of the states are taken into consideration. Direct data collection from source and analysis. This assessment is based on historical performance and current implementation status. Prospective long-term renewable energy PPAs that are yet to be operationalised are not included and will be incorporated in subsequent editions of this report.
Utilised renewable energy potential	Evaluates the extent to which states facilitate the build-up of renewable energy capacity relative to their renewable energy potential. It measures the percentage of installed renewable energy capacity versus the estimated potential within each state. A higher percentage signifies the state's market conduciveness for utilisation of its renewable energy potential.	The 2025 estimates of renewable energy potential for different states were not publicly available. The latest available data on the renewable energy potential of states is from MoSPI's Energy Statistics 2025 report pertaining to potentials as of March 2024. We used this data as a proxy for potential estimates in 2025 as potential is not generally expected to substantially change within a year.	Direct data collection from source and analysis. We used the 2024 data for potential estimates.
Power sector emissions intensity	Gives a sense of how decoupled a state's economic growth is or isn't with its power sector emissions. Given that power sector emissions constitute a significant portion of the energy emissions, this parameter serves as a proxy measure. A lower emissions intensity of GSDP indicates reduced reliance on fossil fuel-based generation to drive economic growth, aligning with decarbonisation objectives and indicating readiness for transition towards cleaner energy sources.	States with a smaller industrial base or dominated by service or tourism sectors may naturally exhibit lower power sector emissions intensity, whereas industry-heavy states may have higher emissions intensity, creating potential bias in cross-state comparisons. Also, we have used FY2024 GSDP to keep it for the same time frame as electricity procurement mix data. While	We assume that states with a larger industrial sector need to undertake greater decarbonisation efforts, as their economic structure tends to drive higher power sector emissions intensity. Emission factors are as per Ember's methodology, based on IPCC 5th Assessment Report Annex- 3.

		calculating the emissions intensity of GSDP, FY2024 GSDP data was unavailable for Gujarat in the RBI database. Therefore, our FY2024 estimates for Gujarat are based on FY2023 GSDP data, assuming a 7% real GDP growth rate (national average) for FY2024.	
State Energy Efficiency Index	The SEEI gauges energy efficiency initiatives within Indian states and UTs. It offers a comprehensive assessment of state-level policies, implementation effectiveness and monitoring mechanism related to energy efficiency. Coupling energy efficiency with renewable energy will help states cater to growing consumer aspirations while ensuring affordable energy access and reducing energy and emission intensity. SEEI provides insights into states' efforts to improve energy efficiency, which complements renewable energy deployment in achieving clean electricity transition goals. The higher the score of a state, the better its performance in terms of energy efficiency.	SEEI 2024 introduced new indicators reflecting evolving national priorities, such as the ESCO model, star rating for buildings, MSME cluster profiling, PAT scheme expansion, EV demand-side incentives, and DISCOMs' demand-side management efforts, which led to upward/downward jump of a few states. However, we do not compare year-on-year change in this parameter, hence the assessment is not overall impacted.	The SEEI is the best proxy source to capture energy efficiency progress at the state level.
State expenditure on renewable energy	Gauges how well states are utilising public funds to accelerate electricity transition. It measures the percentage of public funds spent on: (a) power (also taking into account the infrastructural development, which are common for both conventional and non-conventional sources of energy); (b) new and renewable energy; and (c) capital spent in building new renewable energy capacity. A higher weighted average percentage (of a, b and c) signifies greater flow of funds into renewable energy development facilitating the transition towards cleaner energy sources and contributing to achieving renewable energy targets.	State-wise private investment data in renewable energy was not available, limiting the analysis to public expenditure alone.	We relied on state government expenditure as a representative measure of total investment in renewable energy. In addition, this included spending on infrastructure elements such as transmission, distribution, and grid modernisation, which is why public expenditure is an important indicator for electricity sector decarbonisation. Hence, a state investing more public funds in developing its renewable energy ecosystem will be able to accelerate its transition more.
Renewable energy capacity addition	Assesses how well states have performed in building renewable energy capacity in recent years, i.e. between FY2021 and FY2025. It serves as a pivotal supply-side indicator, showcasing the states' proficiency in bolstering renewable energy capacity, a crucial aspect of decarbonisation efforts.	Since MNRE started providing state-wise large hydro data only in FY2025, we relied on CEA data for renewable-energy capacity additions. While CEA and MNRE's total large hydro align at the national level as of 31 March 2025, their state-level figures differ, likely because CEA follows a different approach to allocating hydro capacity across states.	Direct data collection from source and analysis.

Dimension 2: Readiness and performance of power ecosystem – This dimension is crucial as it evaluates the state-level readiness as well as performance for transitioning the power system towards cleaner and more sustainable energy sources. The parameters considered for this dimension are selected to provide a comprehensive assessment of various aspects of the power system's performance and preparedness.			
DISCOM performance	The financial and operational performance of distribution utilities is fundamental to the transition of the power system. It reflects the efficiency and effectiveness of electricity distribution, which is essential for ensuring reliable and uninterrupted power supply during the transition to cleaner energy sources. The PFC's 13th Annual Integrated Ratings and Ranking of Power Distribution Utilities report, which looks at DISCOMs' performance parameter consisting of 15 base metrics[74] and nine specific disincentives,[75] forms the basis for this score. The higher the score, the better the state's power sector is placed to transition to clean power.	Due to the lack of credible and consistent data for all the states, we used the PFC's 13th Annual Integrated Ratings of Power Distribution Utilities for DISCOM-level integrated scores. For cumulative data at state level, weighted averages based on DISCOM consumption data were calculated.	Due to the lack of credible and consistent data from some states, we used the PFC's 13th Annual Integrated Ratings and Ranking of Power Distribution Utilities report for DISCOM performance as a proxy.
Short-term market participation	Participation in short-term electricity markets facilitates efficient power sharing and enhances system flexibility. It provides essential price signals that drive strategic development of infrastructure, promoting efficiency and resilience in the power system. In addition, higher participation in the green market mechanism indicates higher possibility to unlock untapped renewable energy potential.	Tracking states' performance in the short-term market is also crucial, along with Green Term Ahead Market (GTAM). Due to a lack of available data on state-level GTAM performance, this report could not capture it.	Total volumes (quantum inclusive of buy and sell) through the short-term market and then GDAM participation out of the short term shall give a good understanding of states' participation in green markets.
Power supply shortage	Reliable power supply is critical for supporting economic growth and meeting energy demand. The ability to manage power shortages and maintain quality of supply is indicative of a state's readiness to balance supply and demand effectively, especially with increasing integration of variable renewable energy sources. The lower the percentage of power shortage compared with the state's power requirement, the more reliable the state's power sector.	-	Direct data collection from source and analysis.

[74] Fifteen base metrics considered in DISCOM rating: ACS-ARR gap (cash adjusted); days receivable; days payable to GenCos & TransCos; adjusted quick ratio; debt service coverage ratio (cash adjusted); leverage (debt/EBITDA) (cash adjusted); billing efficiency; collection efficiency; distribution loss (SERC approved); corporate governance; subsidy realised (past three FYs); loss takeover by state government; government dues (past three FYs); tariff-cycle timelines; and auto pass-through of fuel costs.
[75] Nine specific disincentives in DISCOM rating: Auditor's adverse opinion; availability of audited accounts; default to banks/FIs; audit qualifications; governance (audit committee, exclusive MD & DF, quarterly accounts); tariff-cycle delays; tariff independent of subsidy; uncovered revenue gap (current year); and regulatory assets.

Uptake of distributed solar energy	Decentralised renewable energy (DRE) systems play a vital role in promoting resilience and inclusivity in electricity transition. The penetration of distributed solar energy reflects the state's efforts towards diversifying the energy mix and ensuring energy access and energy security across diverse regions and communities. The higher the distributed solar energy penetration, the better the state's resilience and inclusiveness in the transition to renewable energy.	Distributed energy data concerning all sources of energy were not available.	Distributed solar energy installed capacity taken as proxy for accessing decentralised electricity penetration in a state.
Smart metering	Smart meters are a prerequisite for ToD tariff implementation and indicate a state's preparedness.	Smart meter data for Karnataka is not available.	Data for smart meter deployment in Delhi, Telangana, Odisha and Haryana is outdated and either utility owned or pilots. To maintain uniformity and recency, only smart meter data provided under RDSS is considered in the analysis.
Dimension 3: Market enablers – This dimension focuses on facilitating both the supply-side and demand-side aspects of transitioning towards renewable energy sources. It also emphasises measures to reduce emissions through electrification, particularly in sectors such as transportation.			
Development of EV ecosystem	The EV sector presents an upcoming demand for electricity that is vital for electricity transition. This parameter reflects EV adoption and related policy at state level. The higher the adoption rate along with policy mandates and incentives, the better the preparedness of the state to accelerate EV uptake.	Up-to-date data on public charging infrastructure for all states is not available. Data sources also do not provide clarity on type of charging stations that are being considered under the public charging infrastructure category.	Direct data collection from source and analysis. Assumption is that EV adoption will continue to grow irrespective of deployment of public charging stations. Although, such infrastructure is important for intercity/long-distance travel.
Availability of time-of-day tariff mechanism	Assesses the availability of rebates during solar hours, reflecting efforts to shift demand to solar hours to integrate increasing solar generation.	-	In absence of tariff orders for Delhi, 0 is given assuming that ToD mechanism is not adopted.
Availability and attractiveness of green tariff	Green tariffs serve as a mechanism to procure renewable energy, offering consumers the option to support clean energy sources. In India, green tariffs are typically incremental, meaning they are priced higher than conventional electricity tariffs. Despite this, green tariffs can still drive demand for renewable energy purchase at state level, particularly for consumers committed to reducing their emissions footprint. The availability of green tariffs sends a clear market signal to investors and developers about the demand for renewable energy. The lower the	Incremental green tariff data was not available for all states.	Incremental green tariffs, as provided in distribution tariff orders, are taken for analysis for each state. Assuming the highest incremental tariff for states that don't have a green tariff. For green tariff in % form, a high tension (HT) industrial consumer's energy charge is considered.

	green tariff, the higher the market pull for consumers to increase their renewable energy purchase.		
Storage capacity deployment	Storage capacity vs peak demand indicates the state's preparedness to move to a flexible clean power system. BESS provides the flexibility and agility to better integrate intermittent solar and wind energy resources into India's electric grid and ensure high-quality power for consumers, thus accelerating the electricity transition. In addition, pumped hydro storage provides much-needed flexibility. The higher the score, the better the state's storage capacity to deal with its peak demand.	Offtakers of energy storage capacity under central tendering agencies was not available in some cases.	States with higher storage capacity (pumped hydro + BESS) will be better equipped to handle higher renewable energy penetration along with meeting their peak demands. Only constructed or commissioned projects are considered. For BESS developed by renewable energy implementing agencies, we have considered the capacity being utilised in the same state where it is physically deployed.
Renewable energy policy landscape	Renewable energy policy target contributes as a market enabler by providing clarity and direction to investors, signaling government commitment to renewable energy, and creating a stable regulatory environment. This fosters investor confidence, attracts necessary investment and streamlines project development, accelerating the transition to clean energy sources by stimulating market growth and driving renewable energy deployment. Thus, presence of a renewable energy policy by the government is necessary to accelerate renewable energy uptake.	-	States without a target beyond FY2025 are not considered.
Adoption of green open access rules	The implementation of Green Energy Open Access Rules, 2022 (GEOA Rules) by states strengthens market enablers by allowing consumers to access renewable energy and simplifying approval processes. By ensuring transparency in cost structures, the regulation incentivises consumer participation, fostering growth in the renewable energy market. Thus, GEOAs facilitate access to renewable energy.	-	States that are not under various stages of implementation of GEOA are not given a score. For green energy open access (OA) charges exemption, only cross subsidy surcharges, state transmission utility (STU) and distribution charges are considered.
Green hydrogen uptake	Deployment of green hydrogen production facilities indicates an upcoming demand for electricity from renewable energy sources.	-	For scoring, green hydrogen projects are grouped into three categories: Announced, commissioned, and under-construction. A state receives full marks for each category if it has at least one project in that category, regardless of the total number of projects. This approach ensures that any progress in the emerging green hydrogen sector is recognised equally across all categories. Delhi is an exception since it doesn't have potential or demand.

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Acknowledgements

The authors would like to thank Dr. Sambit Basu, Abhishek Ranjan (BSES Rajdhani), Dhruvak Aggarwal (CEEW), Dr. Praveer Sinha (Tata Power), Swasti Raizada (IISD), Charith Konda (IEEFA), Saurabh Trivedi (IEEFA), Subham Shrivastava (IEEFA), Richard Black (Ember), Aditya Lolla (Ember), and Neshwin Rodrigues (Ember), for their constructive feedback during the peer review process. Any errors are our own and should not tarnish the reputation of these people.

We would also like to thank Karishma Joseph (IEEFA), Rashi Tiwary (IEEFA), Zinnia Ray Chaudhuri (IEEFA), Prionka Jha (IEEFA), Janhvi Saini (IEEFA), Cara King (IEEFA), Debabrata Das (Ember), and Chelsea Bruce-Lockhart (Ember) for their support in the editing and designing of this report.

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