GOVERNMENT OF INDIA
MINISTRY OF POWER

# STATE ENERGY EFFICIENCY INDEX

## 2021-22






Alliance for an Energy Efficient Economy

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सत्यमेव जयते

विद्युत मंत्री एवं
नवीन और नवीकरणीय ऊर्जा मंत्री
भारत सरकार
Minister of Power and
Minister of New & Renewable Energy
Government of India

## MESSAGE

India is the third-largest energy consumer in the world and the demand for energy is expected to grow exponentially in the coming years. To meet this demand, we must focus our efforts on promoting energy efficiency and conservation. Energy efficiency is not just about saving energy but also about reducing carbon emissions, enhancing energy security, and promoting sustainable development.

At the 26th Conference of the Parties (COP26), Hon'ble Prime Minister Shri Narendra Modi presented India's *Panchamrit* of climate action, which included the goal of achieving 'net zero emissions by 2070'. We have committed to reduce the emissions intensity of our GDP to 45% below 2005 levels by 2030, building upon our previous commitment to a 33% reduction under COP21. Several initiatives in energy efficiency, such as the UJALA scheme for affordable LED bulbs, the PAT scheme for industries, the Energy Conservation Building Codes and Eco Niwas Samhita for commercial and residential buildings have helped move towards achieving these goals.

India's commitment to reducing emissions and transitioning to a sustainable energy future is evident by the fact that despite having 17% of the world's population, we contribute only 3.5% to global emissions, which is significantly lower than the world average. Moreover, India is amongst the top 5 countries in the Climate Change Performance Index (CCPI), a testament to our leadership in the energy transition. To continue this momentum, energy transition at the state level will be crucial to reduce carbon emissions and fulfil our international obligations. It is imperative to achieve state-specific sustainable development goals in the most energy-efficient manner, which requires the active participation of states. In this regard, the State Energy Efficiency Index (SEEI) is a novel endeavour of Bureau of Energy Efficiency (BEE) to ensure continuous improvement in states' progress on energy efficiency and emission mitigation, thereby helping the nation meet its climate action commitments.

I congratulate BEE for publishing this report.

(R.K. Singh)

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**Disclaimer:**
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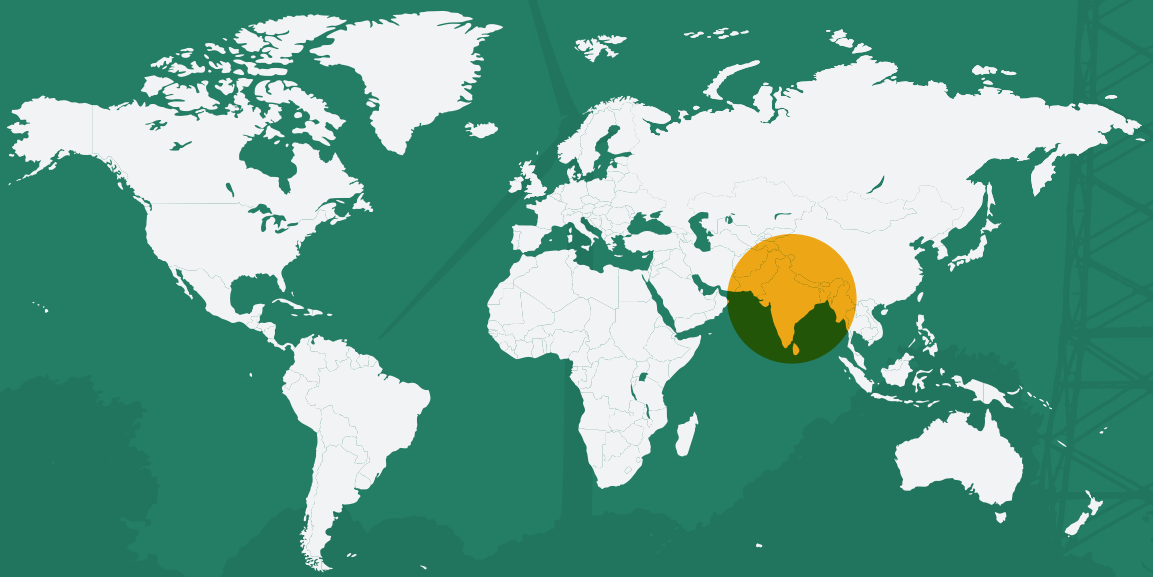
We would like to thank GreenTree Global for their support with data review and analysis.

Finally, BEE is grateful to our in-house teams for handling various energy efficiency programmes.

**Energy efficiency is a key lever for meeting India's updated NDC on emission intensity reduction**

**Centre–state collaboration is crucial for enhanced energy efficiency to ensure:**

- **alignment of policies**
- **allocation of resources**
- **monitoring of progress**



# EXECUTIVE SUMMARY

India submitted the updated Nationally Determined Contribution (NDC) under the Paris Agreement to the United Nations Framework Convention on Climate Change (UNFCCC) on August 23, 2022. The updated NDC translate the five-fold strategy, or Panchamrit, announced at the 26th session of the Conference of the Parties (COP 26) in Glasgow into enhanced climate action targets. In a step forward towards long-term goal of reaching net-zero by 2070, India is now committed to reduce the emission intensity of its GDP by 45% by 2030 from 2005 levels. Since the energy sector is responsible for 75% of India's total greenhouse gas (GHG) emissions, energy efficiency (EE) is the key to emissions reduction. In line with the revised NDC, India has increased its cumulative energy savings targets till 2030 from 86.9 megatonnes of oil equivalent (MTOE) to 150 MTOE with updated targets for all states and union territories (UTs).

Energy efficiency is a viable, cost-effective solution, complementary to renewables, to address the pressing issues of climate change and energy security. States must adopt a customised, holistic approach through coordination with all key stakeholders to integrate energy efficiency into the state economy and realise its optimum potential. This, in turn, will help to achieve state goals on energy savings and reduction in emission intensity. Collaboration between the central government and the state governments is crucial to ensure alignment of policies, prudent allocation of resources and regular monitoring of the progress of EE implementation in states.

**SEEI 2021–22 is the fourth edition of the index after State Energy Efficiency Preparedness Index 2018, SEEI 2019, and SEEI 2020**

## STATE ENERGY EFFICIENCY INDEX 2021–22

The State Energy Efficiency Index (SEEI) 2021-22 is developed by Bureau of Energy Efficiency (BEE) in association with Alliance for an Energy Efficient Economy (AEEE). SEEI is a tool designed to track EE initiatives in the states and UTs. It provides insights on focus areas of intervention with respect to state-level policy adoption, effective implementation, and monitoring. SEEI 2021-22 is the fourth edition of the index after the successful execution of State Energy Efficiency Preparedness Index 2018, SEEI 2019, and SEEI 2020.

The objectives of SEEI 2021-22 are to:

- Help drive EE policies and programme implementation at the state and local level.
- Highlight best practices and encourage healthy competition among states.
- Track progress in managing the states' and India's energy footprint.
- Institutionalise state-level data capture and monitoring of state EE activities by State Designated Agencies (SDAs).

In SEEI 2021-22, the indicator framework is updated to align with the national priorities on EE and include more focus on tracking the outcomes and impacts of EE initiatives. A new set of indicators, viz. the programme-specific indicators, is introduced to assess the programmes/projects undertaken by the SDAs or state departments individually or jointly with each other, BEE, or industry associations or in public-private partnerships (PPPs). The assessment is done based on the project objective, timeline, budget, collaborating entities, progress made, resulting energy savings, and emissions reduction. Furthermore, the common indicators assess states' performance in policy, institutional capacity, financing mechanisms, and adoption of EE measures. SEEI 2021-22 assesses the performance of 36 states and UTs in EE implementation for two fiscal years (FY), FY 2020-2021 and 2021-2022, using 50 indicators across seven (7) sectors: buildings, industry, municipal services, transport, agriculture, electricity distribution companies (DISCOMs), and cross-sector.

Figure A.1 below shows the performance of states/UTs in SEEI 2021-22, with the most improved states, i.e. those that have increased their scores by 15 or more points from SEEI 2020, marked with a star.

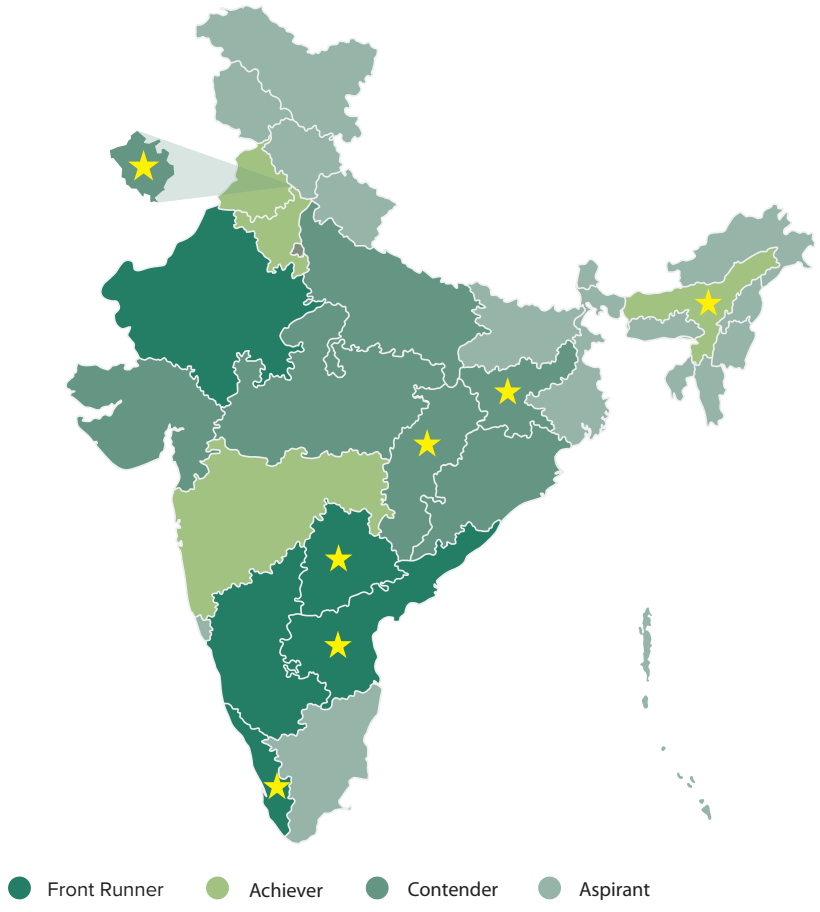



**Figure A.1: Performance of states and UTs under SEEI 2021–22**

# KEY OUTCOMES

In SEEI 2021-22, the states and UTs are categorised as 'Front runner' (>60), 'Achiever' (50-60), 'Contender' (30-49.5), and 'Aspirant' (<30) based on their total scores. Furthermore, to enable peer-to-peer comparison of performance, all the states and UTs are classified into four groups based on their total final energy consumption (TFEC): Group 1 (>15 million tonnes of oil equivalent (MTOE), Group 2 (5-15 MTOE), Group 3 (1-5 MTOE), and Group 4 (<1 MTOE).

The top-performing states in each group are Karnataka (Group 1), Andhra Pradesh (Group 2), Assam (Group 3), and Chandigarh (Group 4). Karnataka, Andhra Pradesh, and Assam received top honours at the National Energy Conservation Awards (NECA) 2022. Compared to two (2) states in SEEI 2021-22, there are five (5) states namely Andhra Pradesh, Karnataka, Kerala, Rajasthan and Telangana in the 'Front runner' category in SEEI 2021-22. Four (4) states, Assam, Haryana, Maharashtra, and Punjab, are in the 'Achiever' category, and eight (8) states—Chandigarh, Chhattisgarh, Delhi, Gujarat, Jharkhand, Madhya Pradesh, Odisha, and Uttar Pradesh—are in the 'Contender' category.

**5**

**'Front Runner' states in SEEI 2021–22 vs 2 in SEEI 2020**

With an overall score of 82.5 out of 100, Karnataka is the top-performing state in SEEI 2021-22. Karnataka has implemented various initiatives to increase EE adoption in the state. The state government has notified the 'Karnataka Energy Conservation and Energy Efficiency Policy 2022-2027' to promote and enhance EE across different sectors of the economy. The policy includes measures for programme adoption, financial mechanisms, and institutional capacity for major energy-intensive sectors in the state. SDA Karnataka provided comprehensive data on various state EE initiatives such as the Building Energy Efficiency Programme (BEEP) in public and commercial buildings, demonstration projects on EE appliance retrofitting in government hostels, electric vehicle (EV) charging infrastructure projects, procurement of EVs for government and public use, light-emitting diode (LED) street lighting, and EE water pumps, among others. The SDA also conducted regular capacity building and training programmes to raise awareness about the importance of EE and disseminate important information amongst concerned stakeholders across all sectors. Furthermore, there is a dedicated budget allocated to the SDA from the state government for EE activities.

The second-highest performer, Andhra Pradesh, with a score of 77.5 out of 100, is also included in the 'Front runner' category. The state has drafted the Eco Niwas Samhita (ENS) or Energy Conservation Building Codes (ECBC) for residential buildings, 2022. The Andhra Pradesh SDA has collaborated with Efficiency Services Ltd. (EESL), The Energy and Resources Institute (TERI), and Petroleum Conservation Research Association (PCRA) to implement diverse EE initiatives across all the key demand sectors. Andhra Pradesh SDA has also constituted the Andhra Pradesh State Energy Conservation Awards for the textile industry, micro, small, and medium-sized enterprises (MSMEs), buildings, and rural panchayats. The state government provides financial assistance to the SDA for implementing schemed EE initiatives.

**Good progress in most states, 7 states improved their scores by >15 points**

In SEEI 2021-22, twenty-eight (28) states/UTs improved their scores compared to SEEI 2020. Out of these, seven (7) states/UTs— Assam, Andhra Pradesh, Chandigarh, Chhattisgarh, Jharkhand, Kerala and Telangana —improved their scores by over 15 points. Telangana and Andhra Pradesh improved the most, increasing their scores by 45.5 and 27 points, respectively. Their significant progress may be due to improvements in reporting the common indicators and the data furnished for the programme-specific indicators. In contrast, Tamil Nadu saw the largest decline in score in SEEI 2021-22, 22.5 points, primarily due to a lack of reported data.

The states enhanced their efforts to implement EE measures across various sectors, which led to an improvement in most states' scores from SEEI 2020. Most states and UTs effectively furnished data related to policies, institutional capacity, and sector-specific programmes. However, data on the impact and results of these measures were mostly not available. Most of the data on outcome-based indicators have been compiled from external sources such as the building rating agencies and other reports from various ministries/departments of central government.

In the buildings sector, the Energy Conservation Building Code (ECBC) 2017 was notified in six (6) additional states in SEEI 2021-22, making the total number of states with gazette ECBC 2017 notification eighteen (18). ECBC has been adopted in municipal building bye-laws by twelve (12) states. Seventeen (17) states, compared to six (6) in SEEI 2020, conducted training and awareness programmes on Eco Niwas Samhita (ENS). Furthermore, ten (10) states have drafted the ENS rules for residential consumers. Ten (10) states reported adopting ECBC in new constructions. As many as twenty-two (22) states have EE programmes in public buildings, primarily the BEEP. However, EE programmes in commercial and residential buildings are limited, with only eleven (11) states having pertinent programmes in each of these categories. Most SDAs have an ECBC cell to develop capacity and provide technical expertise on EE in buildings. In contrast, only five (5) states have budgetary allocation for EE in buildings. It is imperative for states to provide adequate financial support to facilitate widespread adoption of EE in the sector.

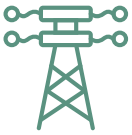
In the industry sector, BEE has constituted a Perform, Achieve and Trade (PAT) cell in each state having Designated Consumers (DCs) to develop capacity and provide technical expertise on EE. Twenty-seven (27) states have an Adjudicating Officer (AO) in SEEI 2021-22. Only thirteen (13), seventeen (17), and four (4) states have EE programmes in large industries, MSMEs, and public sector undertakings (PSUs), respectively. Most of these programmes are under PAT or the National Motor Replacement Programme. Six (6) states have allocated budgets to government authorities for EE in industries. A total of 356 industrial units in twenty-four (24) states and UTs won energy conservation awards through state/national/industry association awards.

In the transport sector, eleven (11) states have transport policies/guidelines to advocate fuel efficiency. Compared to SEEI 2020, thirteen (13) more states have notified state electric mobility policies, bringing the total number of states with such policies to twenty-two (22). The policy is in the draft stage in two (2) other states. Three (3) states have a dedicated budget for EE activities in the transport sector, and eleven (11) have entities to develop capacity and provide technical expertise on EE in transport. Fourteen (14) states have policies on EV procurement for government use, up from eleven (11) in SEEI 2020. There is state-run EV charging infrastructure in nine (9) states, and twenty-seven (27) states have ethanol blended petrol available. Twenty-two (22) states have EE public transport programmes, whereas six (6) states have similar programmes for private transport. States are collaborating with entities such as EESL and PCRA on capacity building and relevant programmes on EE measures in the transport sector.

In the municipal services sector, twelve (12) states have conducted capacity building on EE in municipal services for relevant stakeholders at the state level. Eleven (11) states have a government authority to enforce energy conservation (EC)/EE regulations or measures in the municipal services sector. However, only four (4) states have provided a dedicated budget to the relevant government authority for EE initiatives. Twenty-nine (29) states have EE street lighting programmes. Furthermore, nine (9) states have EE programmes related to water/sewerage systems.

In the agriculture sector, four (4) states have formulated policies to encourage EE and climate-friendly cold chain infrastructure development in the state, whereas in SEEI 2020, only Rajasthan had such a policy. Compared to SEEI 2020, four (4) new states have introduced policies for integrated water and energy savings in the agriculture sector, bringing the total number of states with such policies to nine (9) in SEEI 2021-22. Twelve (12) states have an authorised entity to develop capacity and provide technical expertise on EC/EE in agriculture to farmers, producer organisations, and other stakeholders across the value chain. Five (5) states have allocated budgets for capacity building to implement EE measures in agriculture. Fourteen (14) states have EE programmes in place in the agriculture sector.

In the DISCOM sector, target for reducing the transmission and distribution (T&D) loss percentage has been assigned to ninety-five (95) utilities under PAT cycle VII. Twenty-five (25) states have implemented Time of Day (ToD)/Time of Use (ToU) tariffs for industrial/commercial consumers, while only seven (7) have ToD/ToU tariffs for domestic consumers. Twenty (20) states' DISCOMs have designated a nodal officer to conduct mandatory energy audits, and twenty-four (24) have submitted periodic energy accounting reports to BEE. DISCOMs in twenty-six (26) states have shared the status of feeder metering, whereas only seven (7) have shared the distribution transformer (DT) metering status. Thirteen (13) states reported smart meter installation at the consumer level, and twenty-eight (28) have DSM programmes in place for utility consumers, with Unnat Jyoti by Affordable LEDs for All (UJALA) being the most common.



In cross-sectoral initiatives, only two (2) states have EE/energy savings targets at the state level and sector level. Five (5) states have a policy or programme for promotion of innovation and research & development (R&D) in EE. Six (6) states allocated a dedicated budget to the SDA for EE implementation in the state. Thirty-one (31) states have established a State Energy Conservation Fund (SECF), out of which twenty-six (26) have contributed the matching grant. However, only five (5) states reported utilisation of SECF on Revolving Investment Fund (RIF) mode for EE implementation. Sixteen (16) states have formed a state level steering committee headed by the Chief Secretary for the energy transition, with another two (2) in progress. Eight (8) SDAs have collaborated with government entities, and six (6) with private entities, to promote EE in different sectors. Only eight (8) SDAs furnished data on activities undertaken by the Inspecting Officers (IOs).

## FINDINGS AND RECOMMENDATIONS FOR STATES

The key findings of SEEI 2021-22 are summarised below:

- While SDAs demonstrated eagerness and competitiveness to submit relevant data within short timeframes, data on the impacts and outcomes of most EE measures, such as penetration of green buildings and passenger EVs, energy savings, and emissions reductions from EE programmes, is largely unavailable with the SDAs.
- The states are yet to develop a structured process or framework to capture data on EE implementation across the economy-wide focus sectors.
- Except for a few states, most states and UTs are yet to scale up energy efficiency programmes at state level to realize potentially available benefits.

Based on the above findings, recommendations are outlined below to assist the states in driving a step change in EE implementation:

- **Develop and implement the State Energy Efficiency Action Plan:** The onus of implementing the BEE-initiated State Energy Efficiency Action Plans (SEEAPs) lies

**States and UTs should enhance EE investment and SDA budgets**

entirely on the states and UTs. Once the state-specific plans are finalised, it will be imperative for states and UTs to work in close coordination with the government and private stakeholders within clearly defined timelines to reap the maximum benefits of EE and achieve the shared goals.

- **Facilitate fiscal support for energy efficiency:** To supplement central support, the states should earmark funds specifically for EE. The SECF must be effectively utilised to create bankable opportunities in EE and facilitate private sector investment through appropriate business models.
- **Strengthen institutional capacity:** Strong institutional capacity in states and UTs is vital for better decision making, improved accountability, efficient implementation of programmes and policies and enhanced readiness to address emerging needs and challenges in EE implementation. The states and UTs should appoint EC/EE nodal officers in all government departments and set up EC/EE cells in district and head offices of all concerned state departments to plan, incorporate and track energy efficiency gains in the state.
- **Collaborate with financial institutions (FIs), energy service companies (ESCOs), and energy professionals:** FIs, ESCOs, and energy professionals play a critical role in identifying and implementing EE projects that are cost-effective, technically feasible, and financially viable. The SDAs should bridge the gap between demand and supply of EE solutions in the state by facilitating collaboration of these groups with different industries and local and district authorities for large-scale deployment of customised EE programmes in the state.
- **Mainstream energy data monitoring and reporting:** Efficiently capturing the progress of the implemented programmes will help states identify the areas of concern and course-correct if needed. To mainstream energy data monitoring, states must institute transparent reporting through online portals hosted by different state agencies, in alignment with the national initiatives. Furthermore, SDAs must engage regularly with government departments and private entities such as CII, EESL IGBC, GBCI India, and GRIHA to compile updates on EE projects and outcomes across various sectors.
- **Drive EE implementation in MSMEs:** MSMEs are one of the biggest and most important contributors to the Indian economy. However, the sector is limited by various challenges, including limited resources and access, outdated technology, inefficient equipment, inadequate finance, etc. The expansive size and spread of MSMEs provide a great opportunity to create an enabling ecosystem for EE adoption. The SDAs, through collaboration with relevant state departments and private partners, must leverage the untapped potential of MSMEs to promote the penetration of EE measures such as energy audits and retrofit services, low-cost financing, training, and technical support.

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# ABBREVIATIONS

| | |
|---|---|
| **AAI** | Airports Authority of India |
| **AC** | Air Conditioner |
| **ACEEE** | American Council for an Energy-Efficient Economy |
| **AEEE** | Alliance for an Energy Efficient Economy |
| **AgDSM** | Agriculture Demand Side Management |
| **AJAY** | Atal Jyoti Yojana |
| **AMRUT** | Atal Mission for Rejuvenation and Urban Transformation |
| **AO** | Adjudicating Officer |
| **APEPDCL** | Andhra Pradesh Eastern Power Distribution Company Limited |
| **APSECM** | Andhra Pradesh State Energy Conservation Mission |
| **APSEEDCO** | Andhra Pradesh State Energy Efficiency Development Corporation Limited |
| **APSWDP** | Association of Professional Social Workers and Development Practitioners |
| **BEE** | Bureau of Energy Efficiency |
| **BEEP** | Building Energy Efficiency Programme |
| **BESCOM** | Bangalore Electricity Supply Company Limited |
| **BLDC** | Brushless Direct Current |
| **BMTC** | Bengaluru Metropolitan Transport Corporation |
| **CEA** | Central Electricity Authority |
| **CEIBIC** | Clean Energy Incubation and Business Incubation Centre |
| **CFL** | Compact Fluorescent Lamp |
| **CII** | Confederation of Indian Industry |
| **CNG** | Compressed Natural Gas |
| **COE** | Centre of Excellence |
| **COP** | Conference of the Parties |
| **CREDA** | Chhattisgarh State Renewable Energy Development Agency |
| **CSVTU** | Chhattisgarh Swami Vivekananda Technical University |
| **DC** | Designated Consumer |
| **DEFP** | Domestic Efficient Fans Programme |
| **DELP** | Domestic Efficiency Lighting Programme |
| **DISCOM** | Electricity Distribution Company |
| **DoEFCC** | Department of Environment, Forest and Climate Change |
| **DoT** | Department of Transport |
| **DPR** | Detailed Project Report |
| **DSM** | Demand Side Management |
| **DT** | Distribution Transformer |
| **EASS** | Energy Audit Subsidy Scheme |
| **EC** | Energy Conservation |
| **ECBC** | Energy Conservation Building Code |
| **ECBC-R** | Energy Conservation Building Code-Residential |
| **EE** | Energy Efficiency, Energy-Efficient |
| **EERB** | Energy Efficiency in Residential Buildings |

| | |
|---|---|
| **EESL** | Energy Efficiency Services Limited |
| **EETL** | Energy-Efficient Tube Light |
| **EMC** | Energy Management Centre |
| **EMI** | Equated Monthly Installment |
| **ENS** | Eco Niwas Samhita |
| **ESCert** | Energy Saving Certificate |
| **ESCO** | Energy Services Company |
| **EV** | Electric Vehicle |
| **FI** | Financial Institute |
| **FICCI** | Federation of Indian Chambers of Commerce & Industry |
| **FY** | Fiscal Year |
| **GBCI** | Green Business Certification Inc. |
| **GDP** | Gross Domestic Product |
| **GHG** | Greenhouse Gas |
| **GRIHA** | Green Rating for Integrated Habitat Assessment |
| **GSDP** | Gross State Domestic Product |
| **GST** | Goods and Services Tax |
| **HAREDA** | Haryana Renewable Energy Development Agency |
| **HEC** | Heavy Engineering Cooperation |
| **HMWS&SB** | Hyderabad Metropolitan Water Supply and Sewerage Board |
| **HT** | High-Tension |
| **IEA** | International Energy Agency |
| **IESS** | India Energy Security Scenarios |
| **IGBC** | Indian Green Building Council |
| **INR** | Indian Rupee |
| **IO** | Inspecting Officer |
| **JERC** | Joint Electricity Regulatory Commission |
| **JICA** | Japan International Cooperation Agency |
| **KDISC** | Kerala Development and Innovation Strategic Council |
| **km/L** | Kilometre per Litre |
| **KREDL** | Karnataka Renewable Energy Development Limited |
| **KSEB** | Kerala State Electricity Board |
| **KSRTC** | Karnataka State Road Transport Corporation |
| **KTOE** | Kilotonnes of Oil Equivalent |
| **kVA** | Kilovolt Ampere |
| **kW** | Kilowatt |
| **kWh** | Kilowatt-Hour |
| **LED** | Light-Emitting Diode |
| **LEED** | Leadership in Energy and Environmental Design |
| **LNG** | Liquified Natural Gas |
| **LPG** | Liquified Petroleum Gas |
| **MC** | Municipal Corporation |
| **MEDA** | Maharashtra Energy Development Agency |
| **MEEP** | Municipal Energy Efficiency Programme |
| **MLA** | Member of Legislative Assembly |
| **MLD** | Million Litres per Day |

| | |
|---|---|
| **MMRDA** | Mumbai Metropolitan Region Development Authority |
| **MNRE** | Ministry of New and Renewable Energy |
| **MoP** | Ministry of Power |
| **MoPNG** | Ministry of Petroleum and Natural Gas |
| **MoRTH** | Ministry of Road Transport and Highways |
| **MoSPI** | Ministry of Statistics and Programme Implementation |
| **MoU** | Memorandum of Understanding |
| **MP** | Madhya Pradesh |
| **MSEDCL** | Maharashtra State Electricity Distribution Company Limited |
| **MSME** | Micro, Small, and Medium-Sized Enterprise |
| **$MtCO_2$** | Million Tonnes of Carbon Dioxide |
| **MTOE** | Million Tonnes of Oil Equivalent |
| **MU** | Million Units |
| **MuDSM** | Municipal Demand Side Management |
| **NaMTTRI** | National Mass Transit Training and Research Institute |
| **NDC** | Nationally Determined Contribution |
| **NECA** | National Energy Conservation Awards |
| **NEERMAN** | National Energy Efficiency Roadmap for Movement towards Affordable and Natural Habitat |
| **NITI AAYOG** | National Institution for Transforming India |
| **NMRP** | National Motor Replacement Programme |
| **NREDCAP** | New and Renewable Energy Development Corporation of Andhra Pradesh Ltd. |
| **NTPC** | National Thermal Power Corporation |
| **OEM** | Original Equipment Manufacturer |
| **OPTCL** | Odisha Power Transmission Corporation Limited |
| **PAT** | Perform Achieve and Trade |
| **PCRA** | Petroleum Conservation Research Association |
| **PEDA** | Punjab Energy Development Agency |
| **PEM** | Proton Exchange Membrane |
| **PM-KUSUM** | Pradhan Mantri Kisan Urja Suraksha evam Utthaan Mahabhiyan |
| **PNG** | Piped Natural Gas |
| **PPP** | Public-Private Partnership |
| **PSU** | Public Sector Undertaking |
| **PWD** | Public Works Department |
| **R&D** | Research and Development |
| **RBEI** | Residential Building Energy Indexing |
| **RBI** | Reserve Bank of India |
| **RIF** | Revolving Investment Fund |
| **ROSHANEE** | Roadmap of Sustainable and Holistic Approach to National Energy Efficiency |
| **RPDS** | Revamped Public Distribution System |
| **RRECL** | Rajasthan Renewable Energy Corporation Limited |
| **RTP** | Retailer Training Programme |
| **S&L** | Standards and Labelling |
| **SAATHEE** | State-wise Actions on Annual Targets and Headways on Energy Efficiency |
| **SDA** | State Designated Agency |
| **SDG** | Sustainable Development Goal |

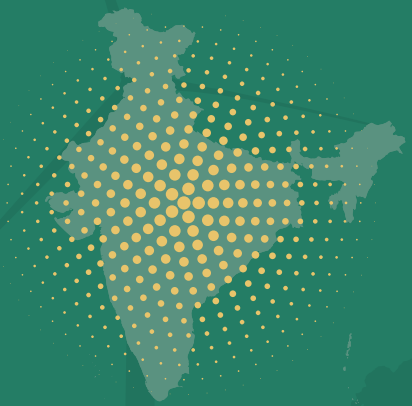
| | |
|---|---|
| **SEC** | Specific Energy Consumption |
| **SECF** | State Energy Conservation Fund |
| **SEEAP** | State Energy Efficiency Action Plan |
| **SEEI** | State Energy Efficiency Index |
| **SEEM** | Society of Energy Engineers and Managers |
| **SERC** | State Electricity Regulatory Commission |
| **SITA** | State Innovation and Transformation Aayog |
| **SHLC** | State High Level Committee |
| **SLNP** | Street Lighting National Programme |
| **SLSC** | State Level Steering Committee |
| **SME** | Small and Medium-Sized Enterprise |
| **SRTC** | State Road Transport Corporation |
| **STP** | Sewage Treatment Plant |
| **T&D** | Transmission and Distribution |
| **TERI** | The Energy and Resources Institute |
| **TFEC** | Total Final Energy Consumption |
| **ToD** | Time of Day |
| **TOE** | Tonne of Oil Equivalent |
| **ToU** | Time of Use |
| **TPPDL** | Tata Power-Delhi Distribution Limited |
| **TSREDCO** | Telangana State Renewable Energy Development Corporation Ltd. |
| **TWh** | Terawatt-Hour |
| **U.S.** | United States |
| **UDD** | Urban Development Department |
| **UHBVNL** | Uttar Haryana Bijli Vitran Nigam Limited |
| **UJALA** | Unnat Jyoti by Affordable LEDs for All |
| **ULB** | Urban Local Body |
| **UNFCCC** | United Nations Framework Convention on Climate Change |
| **UNNATEE** | Unlocking National Energy Efficiency Potential |
| **UT** | Union Territory |
| **VGU** | Vivekananda Global University |
| **W** | Watt |

India aims to reduce the emission intensity of its Gross Domestic Products (GDP) by


**45% by 2030**

from 2005 levels

**Cumulative energy savings targets for 2030 have been revised in line with the updated NDC goals**



**The national energy savings targets have been apportioned to cumulative state-wise energy savings targets for 2030**

# 1. INTRODUCTION

In a steady stride towards low carbon development, India formalised its updated Nationally Determined Contribution (NDC) based on the five-fold strategy or Panchamrit to the United Nations Framework Convention on Climate Change (UNFCCC) on August 23, 2022. With the long-term commitment to transition to a net-zero economy by 2070, India now aims to reduce the emission intensity of its Gross Domestic Products (GDP) by 45% by 2030 from 2005 levels[1]. Since energy contributes to over three-fourths of the total greenhouse gas (GHG) emissions, energy efficiency (EE) is crucial to emissions reduction. In accordance with the revised NDC, India has updated its cumulative energy savings targets for 2030 from 86.9 million tonnes of oil equivalent (MTOE) to 150 MTOE. Underscoring the need to translate the national emission reduction targets into state-wise emission reduction targets, the national energy savings targets have been apportioned to cumulative state-wise energy savings targets for 2030.[2]

**States and UTs should integrate EE into the state economy to achieve energy-saving targets**

The Energy Conservation (EC) Act, 2001 established a two-fold organisational structure, with the Bureau of Energy Efficiency (BEE) at the centre and the state designated agencies (SDAs) in the states and union territories (UTs) as the nodal agencies to enforce, develop, and implement EE policies and programmes. The BEE has initiated and driven several successful energy efficiency programmes in India, including Standards and Labelling (S&L) for appliances and equipment, Energy Conservation Building Code (ECBC) for commercial buildings, and Perform Achieve and Trade (PAT) for energy-intensive industries and buildings, in addition to providing technical support and assistance to the SDAs and industry. Two strategy documents, Roadmap of Sustainable and Holistic Approach to National Energy Efficiency (ROSHANEE) and Unlocking National Energy Efficiency Potential (UNNATEE), have also been developed by BEE to outline the sector-wise action plan for the period 2021-2031. Furthermore, in October 2021, the BEE initiated the process of developing State Energy Efficiency Action Plans (SEEAPs) for each state in India. These plans will identify focus sectors and include sector-specific targets for the states to help integrate energy efficiency into the most energy-intensive areas.

Energy efficiency is a cost-effective and viable solution that can complement renewable energy in addressing climate change and achieving energy security. A collaborative effort between the central and state governments can help ensure that resources are allocated judiciously, policies are aligned, and progress is regularly tracked and reported. India's thirty-six (36) states and UTs are diverse in terms of their economy (Figure 1.1), level of development, climate, and energy consumption (Figures 1.2 & 1.3). Therefore, to mainstream energy efficiency in the larger scope of the economy, states need to adopt customised, integrated approaches, coordinating with other stakeholders, including the central government, private sector, utilities, and non-governmental organisations, and implementing robust monitoring and verification mechanisms.

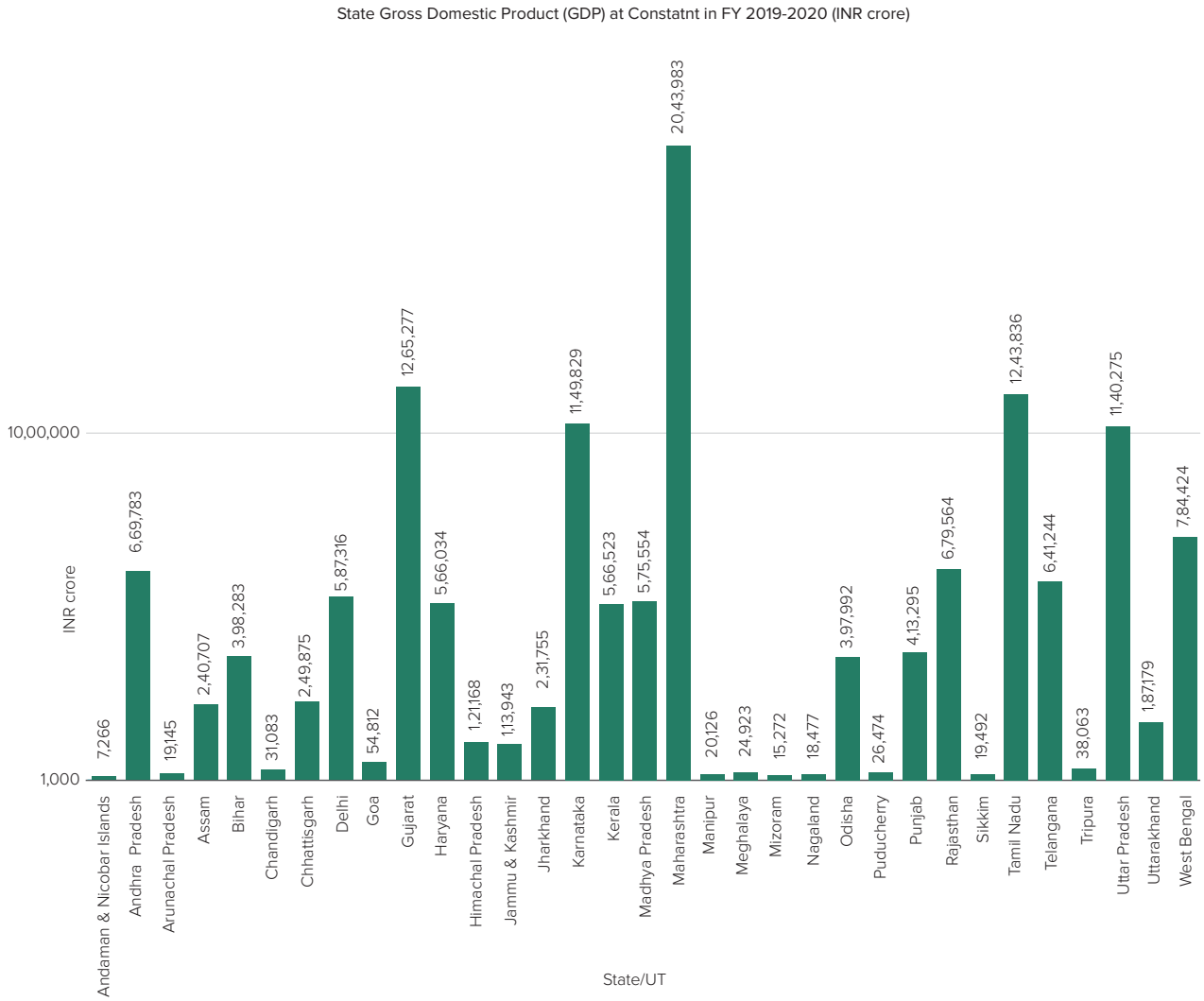



**Figure 1.1: State GDP 2019–2020**

*Source: RBI Handbook of Statistics on Indian States, GSDP at constant prices, base 2011-2012*
*Note: GDP FY 2019-2020 not available for Dadra & Nagar Haveli and Daman & Diu, Ladakh, & Lakshadweep*

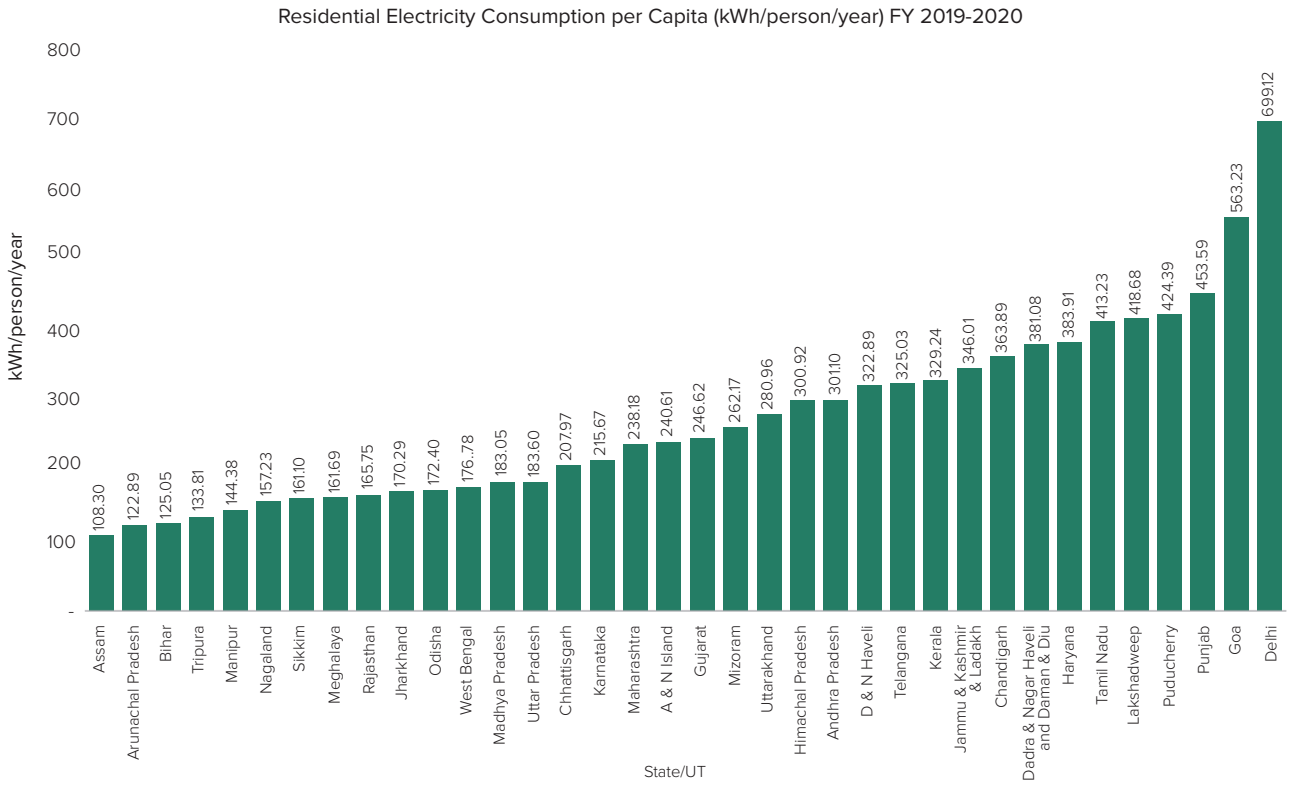



**Figure 1.2: Per Capita Residential Electricity Consumption — 2019-2020**

*Source: CEA General Review 2021*

*Note: Data for Ladakh is not provided separately; it is included in the data for Jammu and Kashmir*

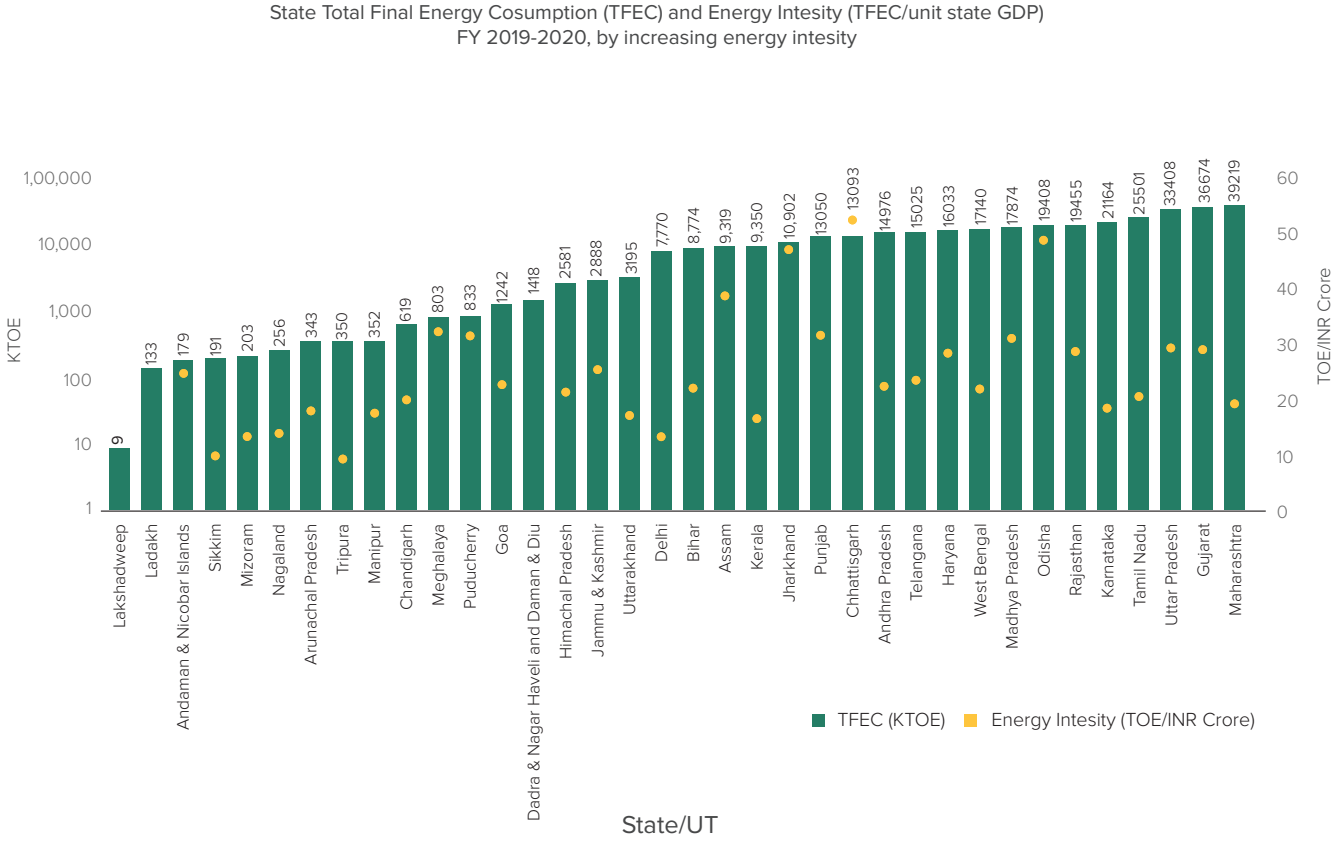



**Figure 1.3: State Total Final Energy Consumption & Energy Intensity**

*Source: Ministry of Statistics and Programme Implementation (MoSPI), CEA General Review, Petrol and Natural Gas Statistics, Coal Directory, NITI Aayog India Energy Dashboard, RBI*

The State Energy Efficiency Index (SEEI) is a tool designed to identify and address gaps concerning state-level energy efficiency policies, programmes, and investment. The SEEI was developed by the BEE, in collaboration with the Alliance for an Energy Efficient Economy (AEEE), to evaluate the annual progress of EE implementation in the states. The first edition, State Energy Efficiency Preparedness Index, was launched in August 2018, followed by SEEI 2019 in January 2020 and SEEI 2020 in October 2021.

As done for SEEI 2019, a feedback survey was undertaken by BEE and AEEE with the SDAs in April 2022 to capture their views on SEEI 2020. Eighteen (18) SDAs responded, the answers of which regarding the usefulness of the index are summarised in Figure 1.4:

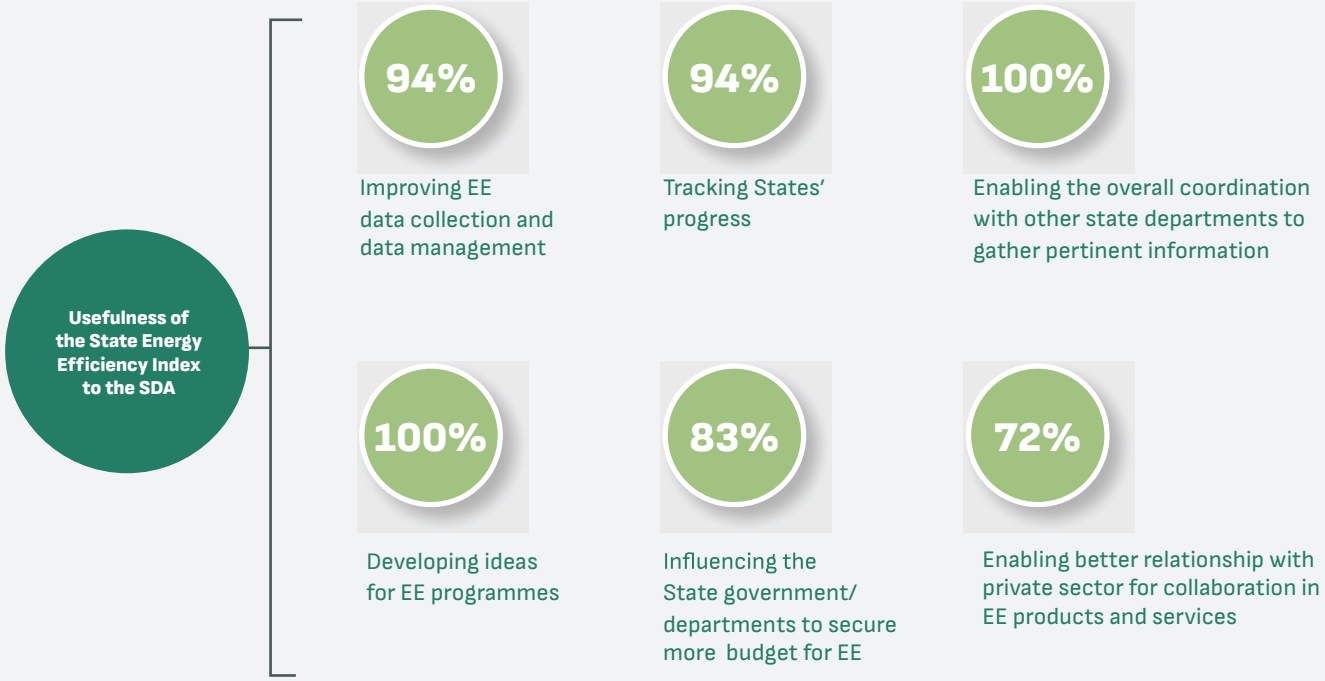



**Figure 1.4: Usefulness of the State Energy Efficiency Index to the SDA**

Most SDAs stated that the state government departments are a key source of data collection for the index. The fourth edition of the index, SEEI 2021-22, evaluates the EE progress of the states and UTs for two fiscal years (FY) – FY 2020-21 and FY 2021-22 (April 2020 to March 2022). This time, the index has been upgraded to advance to the next level of EE implementation, where the focus is more on tracking the outcomes and impacts of the EE initiatives.

The objectives of SEEI 2021-22 have been updated to align with the national priorities and agenda on energy efficiency and are the following:

- Help drive EE policies and programme implementation at the state and local level.
- Highlight best practices and encourage healthy competition among states.
- Track progress in managing the states' and India's energy footprint.
- Institutionalise state-level data capture and monitoring of state EE activities by the SDAs.

Accordingly, the indicator framework has been revised to include a new set of indicators, viz. programme-specific indicators. The number of generic indicators pertaining to common state EE measures such as adaptable policies has been limited in each sector. The programme-specific indicators are outcome-based indicators that pertain to programmes/ projects undertaken by the SDAs or state departments individually or in conjunction with each other, BEE, or industry associations, or in public-private partnerships (PPPs). Indicative, but not exhaustive, examples of programmes include retrofit or greenfield projects, energy audits and implementation of recommendations, technology demonstration projects, training, capacity building, and awareness programmes, fiscal incentive programmes to increase EE adoption, etc.

Furthermore, contrary to the six sectors covered in the last three indices, SEEI 2021-22 assesses states' EE performances in seven sectors: buildings, industry, municipal services, transport, agriculture, electricity distribution companies (DISCOMs), and cross-sector.

The results are based on the latest data available on EE implementation in the states and UTs from the SDAs, BEE, central government sources such as the Central Electricity Authority (CEA), National Institution for Transforming India (NITI) Aayog's India Energy Dashboard, Energy Efficiency Services Limited (EESL), Ministry of Road Transport and Highways (MoRTH), state government sources such as State Electricity Regulatory Commissions (SERCs), and industry bodies such as Indian Green Building Council (IGBC), Green Building Certification Inc. (GBCI) India, and Green Rating for Integrated Habitat Assessment (GRIHA). All data and associated references were initially reviewed and validated by AEEE and further reviewed and vetted by BEE. Commendable performance, therefore, is not only limited to the implementation of EE activities in the states, but is also characterised by the authenticated reporting of these activities.

**SEEI helps states and UTs identify and address gaps concerning state-level EE policies, programmes and investment towards meeting India's NDC**

## States and UTs are evaluated using qualitative, quantitative, and outcome-based indicators

**Selection of performance indicators and allocation of maximum scores are based on**

- the sectoral share in India's final energy consumption
- energy savings potential in the sector
- the state's role in promoting EE in different sectors

# 2. APPROACH

SEEI 2021-22 uses a framework similar to the State Energy Efficiency Preparedness Index 2018, SEEI 2019, and SEEI 2020. SEEI 2021-22 considers two financial years, FY 2020-21 and 2021-22. As mentioned in the Introduction, BEE, in association with AEEE, developed the SEEI framework, which hinges on objectivity, transparency, and consistency to assess states' annual performance and progress. The framework also draws on the United States (U.S.) State EE Scorecard, developed by the American Council for an Energy-Efficient Economy (ACEEE), which has published 15 editions of the scorecard and five editions of the International Energy Efficiency Scorecard. Now in its fourth iteration, SEEI 2021-22 focuses more on evaluating results-based and action-oriented indicators.

This chapter presents the approach taken in developing the SEEI framework, which has been followed for all the indices. The main steps in the process are as follows:

1. **Selection of performance indicators and allocation of maximum scores** reflect the state's role in promoting EE and the relative importance of demand sectors concerning each sector's share in total energy consumption and energy savings potential.
2. **Categorisation of states based on their TFEC** enables peer-to-peer comparison among states.
3. **Data collection and validation** are used to comprehensively review each state based on the best available data, validated against credible references.
4. **Data analysis and scoring** of states assess states' performance and progress.

## 2.1 INDICATOR FRAMEWORK

In SEEI 2021-22's indicator framework, the selection of performance indicators and allocation of maximum scores are based on the sectoral share in India's final energy consumption, energy savings potential in a sector, and the state's role in promoting EE in different sectors. Figures 2.1 and 2.2 show India's sector-wise annual final energy consumption and electricity consumption in 2019-2020. Figure 2.3 shows the sector-wise energy savings potential. Table 2.1 summarises the state's role in EE in each sector as per the EC Act 2001, EC (Amendment) Act 2022, and Electricity Act 2003.

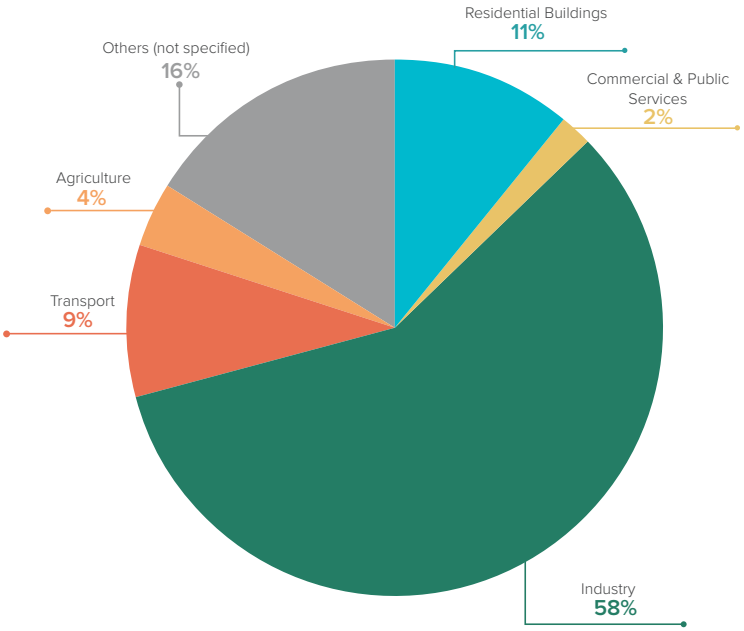



**Figure 2.1: Sector-wise TFEC in India (FY 2019-20)**

*Source: MoSPI India Energy Statistics 2021; Excludes non-energy use of energy commodities*

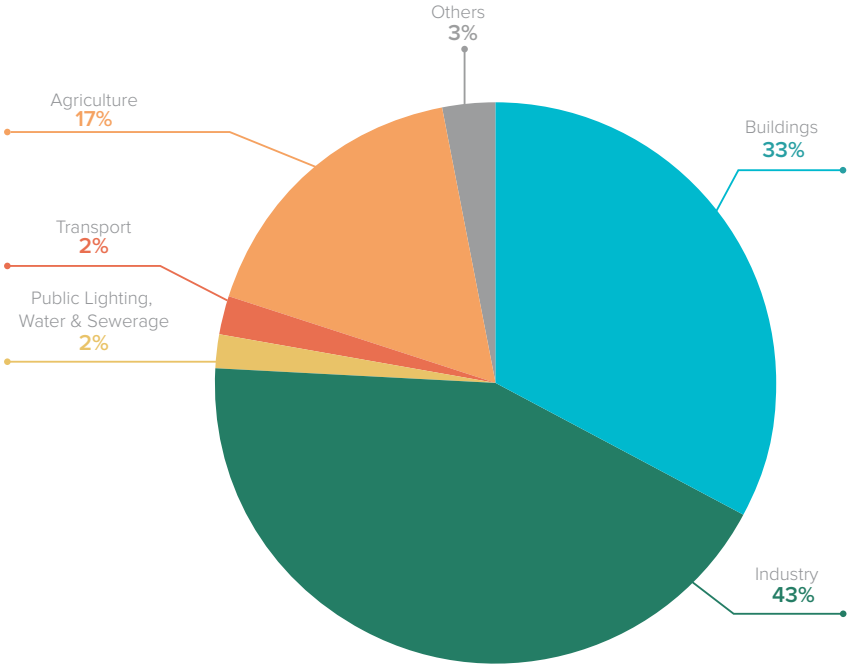



**Figure 2.2: Sector-wise Electricity Consumption in India (FY 2019-20)**

*Source: CEA General Review 2021*

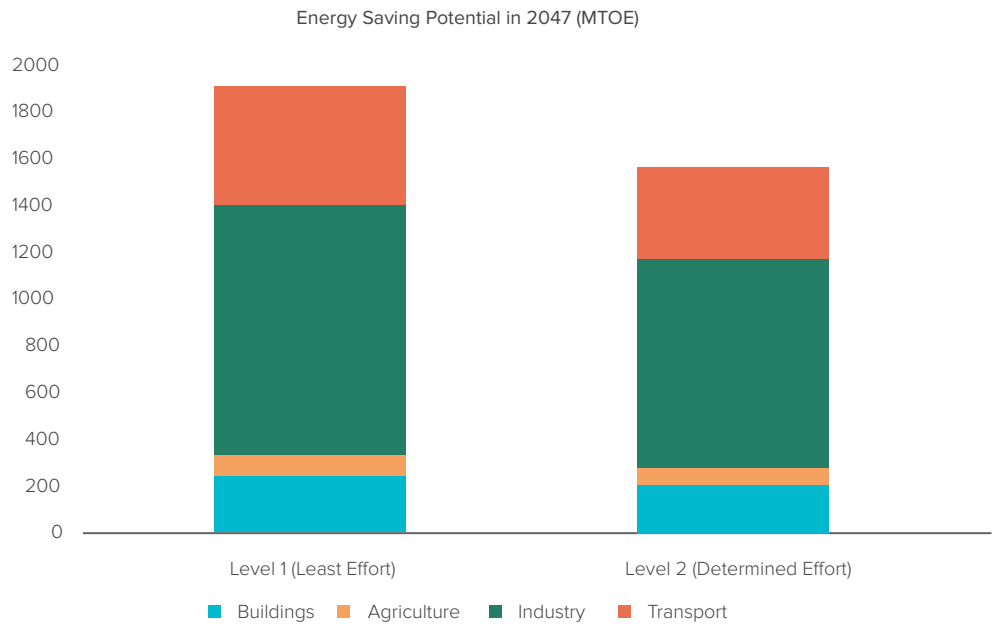



**Figure 2.3: India's Sector–wise Energy Savings Potential**

*Source: NITI Aayog IESS*

**Table 2.1: States' Role in Energy Conservation**

| Sector | State's (or SDA's) Role and Authority in Driving Energy Efficiency |
|---|---|
| **Buildings** | **EC (Amendment) Act, Section 2:** Definition of 'building' revised to include any structure or erection or part of structure or erection constructed after the rules relating to energy conservation and sustainable building codes have been notified by the Central Government, which has a minimum connected load of 100 kilowatts (kW) or contract demand of 120 kilovolt-amperes (kVA) and is used or intended to be used for commercial purposes or as an office building or for residential purposes. The State Government may specify a lower connected load or contract demand.<br><br>The phrase 'Energy conservation building codes' in the Act has been substituted with the words 'Energy conservation and sustainable building codes', which would provide norms and standards for energy efficiency and its conservation, use of renewable energy, and other green building requirements for a building.<br><br>**EC (Amendment) Act, Section 15:** Amend the energy conservation and sustainable building codes to suit the regional and local climatic conditions. Notify energy conservation and sustainable building codes with respect to use of energy in the buildings and implement these codes through state-level building bye-laws. Direct designated consumers to comply with code and/or energy audit requirements and furnish requisite data at requisite time.<br><br>**EC Act, Section 17:** Power of inspection of buildings to check compliance with requirements of the EC Act.<br><br>**EC Act, Section 18:** Regulation of norms for energy consumption standards in any building. Regulation of the energy consumption standards for equipment and appliances.<br><br>**EC Act, Section 26:** Impose penalties for non-compliance of either central or state government energy conservation regulations.<br><br>**EC Act, Section 27, 28, 29:** Power to adjudicate the penalties imposed for non-compliance |

| Sector | State's (or SDA's) Role and Authority in Driving Energy Efficiency |
|---|---|
| **Industry** | **EC Act, Section 15:** Direct the designated consumers to comply with energy audit requirements and furnish requisite data at requisite time.<br><br>**EC Act, Section 17:** Power of inspection of industries to check compliance with requirements of the EC Act.<br><br>**EC Act, Section 18:** Regulation of norms for process and energy consumption standards in any industry. Regulation of the energy consumption standards for industrial equipment and appliances, including motors.<br><br>**EC Act, Section 26:** Impose penalties for non-compliance of either central or state government energy conservation regulations.<br><br>**EC Act, Section 27, 28, 29:** Power to adjudicate the penalties imposed for non-compliance |
| **Municipal Services** | **EC Act, Section 18:** Regulation of the energy consumption standards for street lighting and drinking and/or waste water pumping. |
| **Transport** | Road transport under state purview<br><br>State Road Transport Corporations<br><br>State Transport Department defines policies and regulations |
| **Agriculture** | **EC Act, Section 18:** Regulation of the energy consumption standards for agricultural pumping.<br><br>**EC Act, Section 27, 28, 29:** Power to adjudicate the penalties imposed for non-compliance |
| **DISCOM** | **Electricity Act, Section 23, 42, 61 and 181:** Empowers SERCs to make demand side management (DSM) regulations that are applicable for all DISCOMs in the state.<br><br>**EC Act, Section 17:** Power of inspection of concerned entities to check compliance with requirements of the EC Act<br><br>**EC Act, Section 26:** Impose penalties for non-compliance of either central or state government energy conservation regulations.<br><br>**EC (Amendment) Act, Section 27:** SERCs may make regulations for discharging their functions.<br><br>**EC Act, Section 28, 29:** Power to adjudicate the penalties imposed for non-compliance. |
| **Cross-Sector** | **EC (Amendment) Act, Section 4:** BEE's Governing Council membership expanded from thirty-one to thirty-seven members to be more inclusive in representation<br><br>**EC (Amendment) Act, Section 15:** Create awareness and disseminate information for efficient use of energy and its conservation. The SDA budget will be part of the larger state budget.<br><br>**EC (Amendment) Act, Section 16:** Constitute State Energy Conservation Fund for meeting the expenses incurred for the designated agency in the discharge of its functions and for the objects and purposes of implementing EE projects authorised by the Act.<br><br>**EC Act, Section 57:** Power of State Government to make rules, by notification, for carrying out the provisions of EC Act and not inconsistent with the rules, if any, made by the Central Government. |

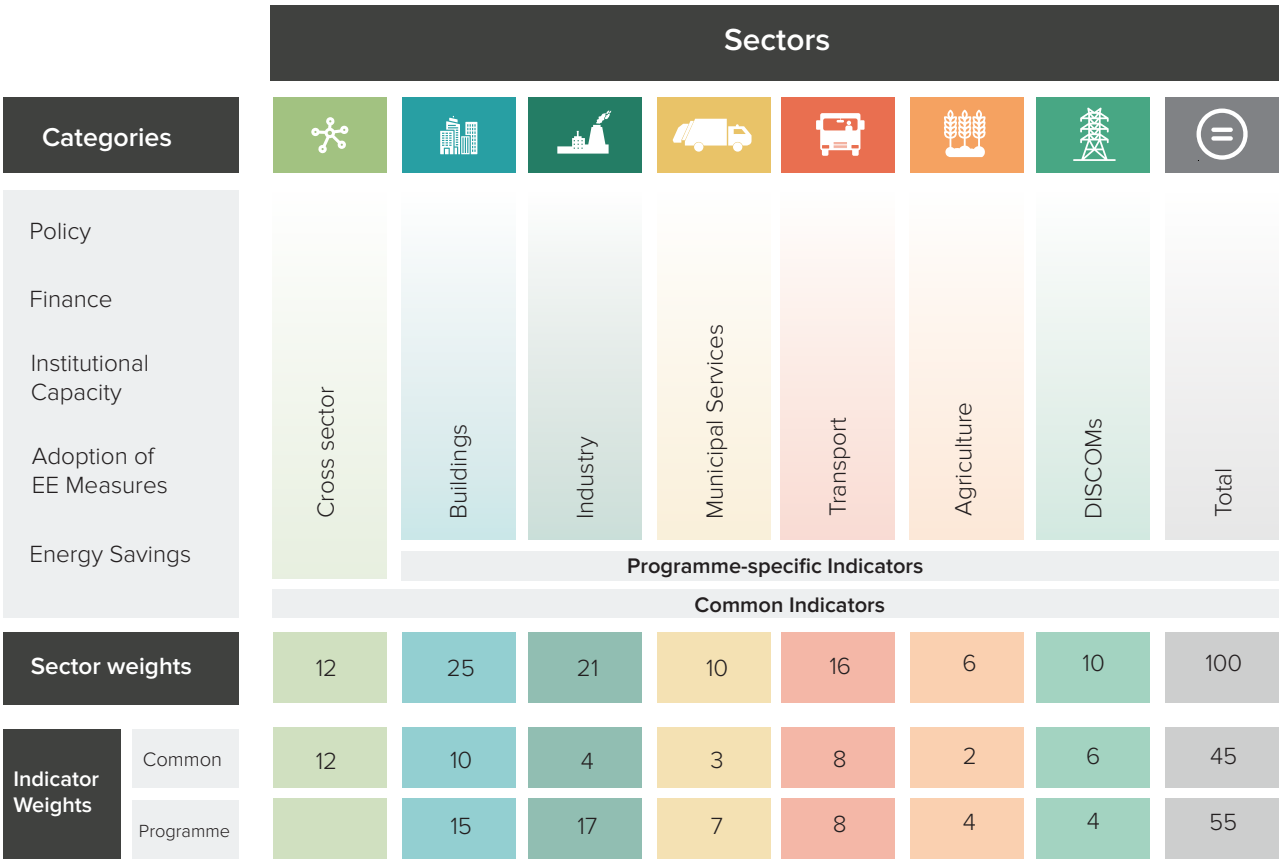



**Figure 2.4: Framework for SEEI 2021–22**

**Table 2.2: Sector-wise split of common and programme-specific indicators**

| Sector | Common Indicators | Programme-specific Indicators | Total |
|---|---|---|---|
| Cross-sector | 13 | 0 | 13 |
| Buildings | 7 | 3 | 10 |
| Industry | 2 | 3 | 5 |
| Municipal Services | 1 | 2 | 3 |
| Transport | 8 | 2 | 10 |
| Agriculture | 3 | 1 | 4 |
| DISCOMS | 4 | 1 | 5 |
| Overall | 38 | 12 | 50 |

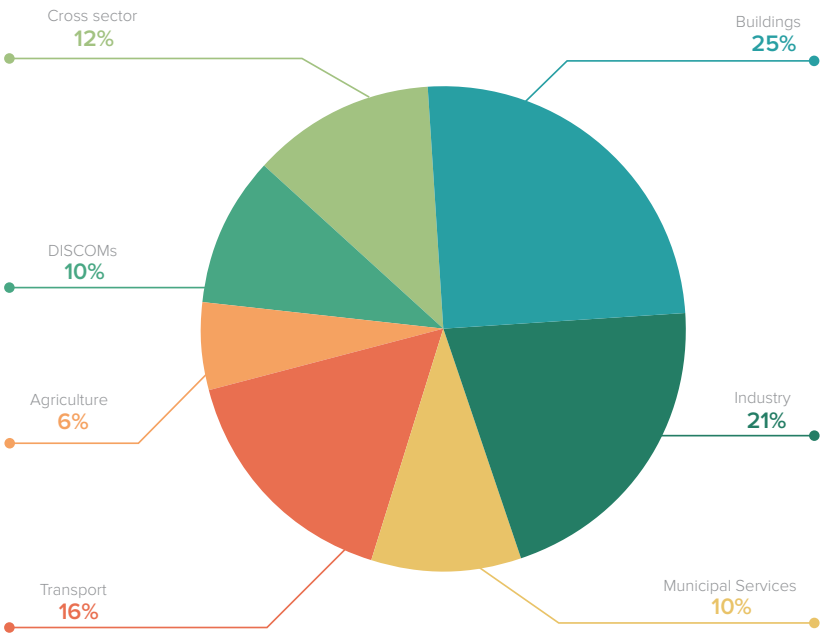



**Figure 2.5: SEEI 2021–22 Score allocation per sector**

**50 qualitative, quantitative and outcome-based indicators across sectors — buildings, industries, municipal services, transport, agriculture, DISCOMs, and cross-sector**

**SEEI 2021–22 uses common and programme-specific indicators to assess states' performance in EE**

The SEEI 2021-22 comprises 50 qualitative, quantitative, and outcome-based indicators to monitor the progress in implementing policies, programmes, and projects. All the indicators have been structured to eliminate or reduce subjectivity due to state-specific conditions. In each sector, indicators have been selected based on their impact on driving EE implementation in states. The outcome-based indicators have been chosen to quantify the adoption of EE measures, energy savings, and reduction in energy intensity.

Indicators have been defined for seven (7) demand sectors: Buildings, Industry, Municipal Services, Transport, Agriculture, DISCOMs, and Cross-Sector initiatives. Within each sector, indicators have been categorized into common and programme-specific indicators to assess states' performance. Programme indicators have a larger weight of 55% in scoring, compared to 45% for common indicators, to focus on more outcome-based representation of progress.

- **Common indicators** include indicators for policy, institutional capacity, finance, adoption of energy efficiency measures and energy savings. Many are simple 'yes/no' indicators, but some involve data for which scoring is done in a graded manner.
- **Programme-specific indicators** evaluate state programmes in energy efficiency based on objective, timeline, progress, the budget allocated and utilized, entities running the programme, deemed energy saving, and deemed emissions avoided.

The maximum score for the Index is 100. The sector-wise maximum scores are shown in Figure 2.4. The buildings and industry sectors, which have the highest share in energy use, account for 25% and 21% of the weight respectively. Industry has the largest share in the economy-wide energy use, however, buildings are given more weight since states play an influential role in buildings' energy efficiency and the sector offers low-hanging fruit for realising energy savings through state-level action. Meanwhile, states' role in propagating energy efficiency in the industry sector is still not up-to-mark, as evident in past indices.

Transport, with the third largest share in energy use, has the third highest weight, at 16 percent. Weights for the other sectors follow a similar rationale. In SEEI 2021-22, the weight for cross-sector indicators has increased to 12%, from 5% in SEEI 2020. This has been done to ensure greater inclusion of integrated and cross-cutting efforts for energy efficiency at the state level.

## 2.2 GROUPING OF STATES

The grouping of states is based on the states' Total Final Energy Consumption (TFEC) in FY 2019-2020, which was the latest available state-wise final energy consumption data from central government sources. The purpose of grouping states is to bring together states with similar energy consumption levels for rational peer comparison. A few other parameters for grouping, such as the energy intensity of the Gross State Domestic Product (GSDP), energy savings potential, and per capita energy consumption, in isolation or combination, were also considered. Given the lack of available data and for the sake of simplicity, the final grouping is based solely on TFEC. The grouping is depicted in Figure 1.6. Except for Meghalaya, which moved down from Group 3 in SEEI 2020 to Group 4 in SEEI 2021-22, the groups for other states remain the same.

**For peer comparison of SEEI results, states and UTs are categorised into four groups based on their total final energy consumption**

**Group 1**
**>15 MTOE**

- Maharashtra (MH)
- Gujarat (GJ)
- Uttar Pradesh (UP)
- Tamil Nadu (TN)
- Karnataka (KA)
- Odisha (OD)
- Rajasthan (RJ)
- Madhya Pradesh (MP)
- West Bengal (WB)
- Haryana (HR)

**Group 2**
**5-15 MTOE**

- Telangana (TS)
- Andhra Pradesh (AP)
- Chhattisgarh (CG)
- Punjab (PB)
- Jharkhand (JH)
- Kerala (KL)
- Bihar (BR)
- Delhi (DL)

**Group 3**
**1-5 MTOE**

- Assam (AS)
- Uttarakhand (UK)
- Jammu and Kashmir (JK)
- Himachal Pradesh (HP)
- Goa (GA)
- Dadra & Nagar Haveli and Daman & Diu (DD)

**Group 4**
**<1 MTOE**

- Puducherry (PY)
- Meghalaya (ML)
- Chandigarh (CH)
- Manipur (MN)
- Tripura (TR)
- Arunachal Pradesh (AR)
- Nagaland (NL)
- Mizoram (MZ)
- Sikkim (SK)
- Andaman and Nicobar Islands (AN)
- Ladakh (LK)
- Lakshadweep (LD)

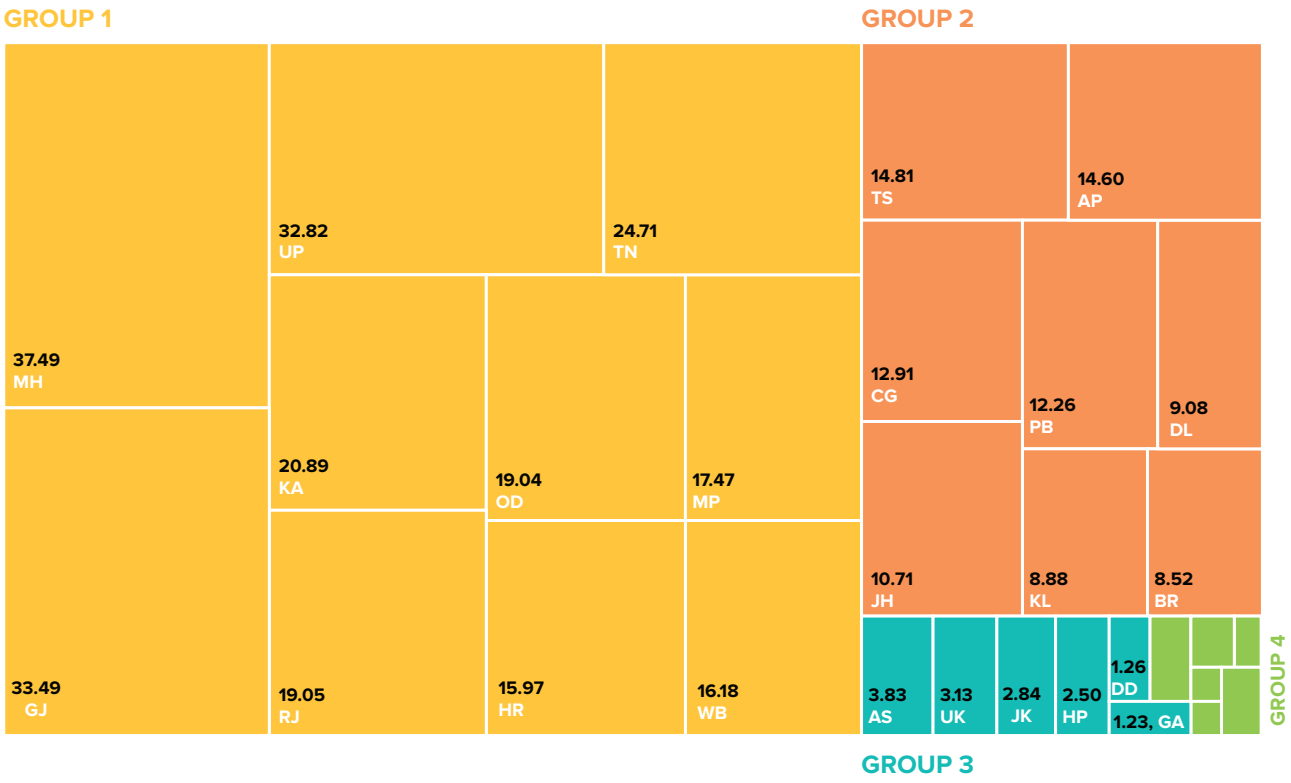



**Figure 2.6: Grouping of States by TFEC**

*Source: MoSPI's India Energy Statistics, CEA General Review[3], MoPNG's Petroleum and Natural Gas Statistics (oil, compressed natural gas (CNG))[4], and the Coal Directory (coal)[5], Reserve Bank of India (RBI) Handbook of Statistics on Indian States (GSDP)*

*NOTE: TFEC is unavailable for Ladakh, and GSDP is unavailable for Dadra & Nagar Haveli and Daman & Diu, Ladakh, & Lakshadweep. The TFEC is derived from state-wise data in CEA General Review 2021 (electricity), MoPNG's Petroleum and Natural Gas Statistics 2021 (oil, CNG), and the Coal Directory 2021 (coal). TFEC per state includes final electricity consumption, electricity T&D losses, and the use of coal, oil, and gas (CNG only) for energy other than that used for power generation*

Data gaps exist in state-wise final consumption data for different fuels, particularly natural gas and biofuels. We have only included CNG consumption, not piped natural gas (PNG) and liquefied natural gas (LNG) for natural gas since there is no disaggregated state-wise data for PNG and LNG consumption. Biofuels and biomass have not been included, since the data is not available. To avoid double counting, the coal used for electric power generation has been deducted from the state-wise coal consumption. The conversion factors for toe (ton of oil equivalent) have been taken from MoSPI's India Energy Statistics[6], IEA[7], and MoPNG.

**SDAs collaborated with the concerned state departments for data collection**

## 2.3 DATA COLLECTION AND REVIEW

BEE nominated the SDAs to act as central coordinating bodies in the respective states to collect data from the concerned state departments. The data collection portal used in SEEI 2020 was enhanced to make it more user friendly in SEEI 2021-22 and to streamline institutionalize data collection by the SDA for the index. Apart from the data furnished by SDAs, data is also collected from various central government sources, such as Central Electricity Authority (CEA) General Review, Energy Efficiency Services Limited (EESL), and Ministry of Road Transport and Highways (MoRTH) and publicly available information from the websites of State Electricity Regulatory Commissions, private sector business associations such as CII, and certification bodies such as IGBC, GBCI India, and GRIHA. The data provided by SDAs and collected by AEEE was compiled and shared with the respective SDAs for their review. The SEEI only uses data vetted by the SDAs and BEE.

## 2.4 DATA ANALYSIS AND SCORING

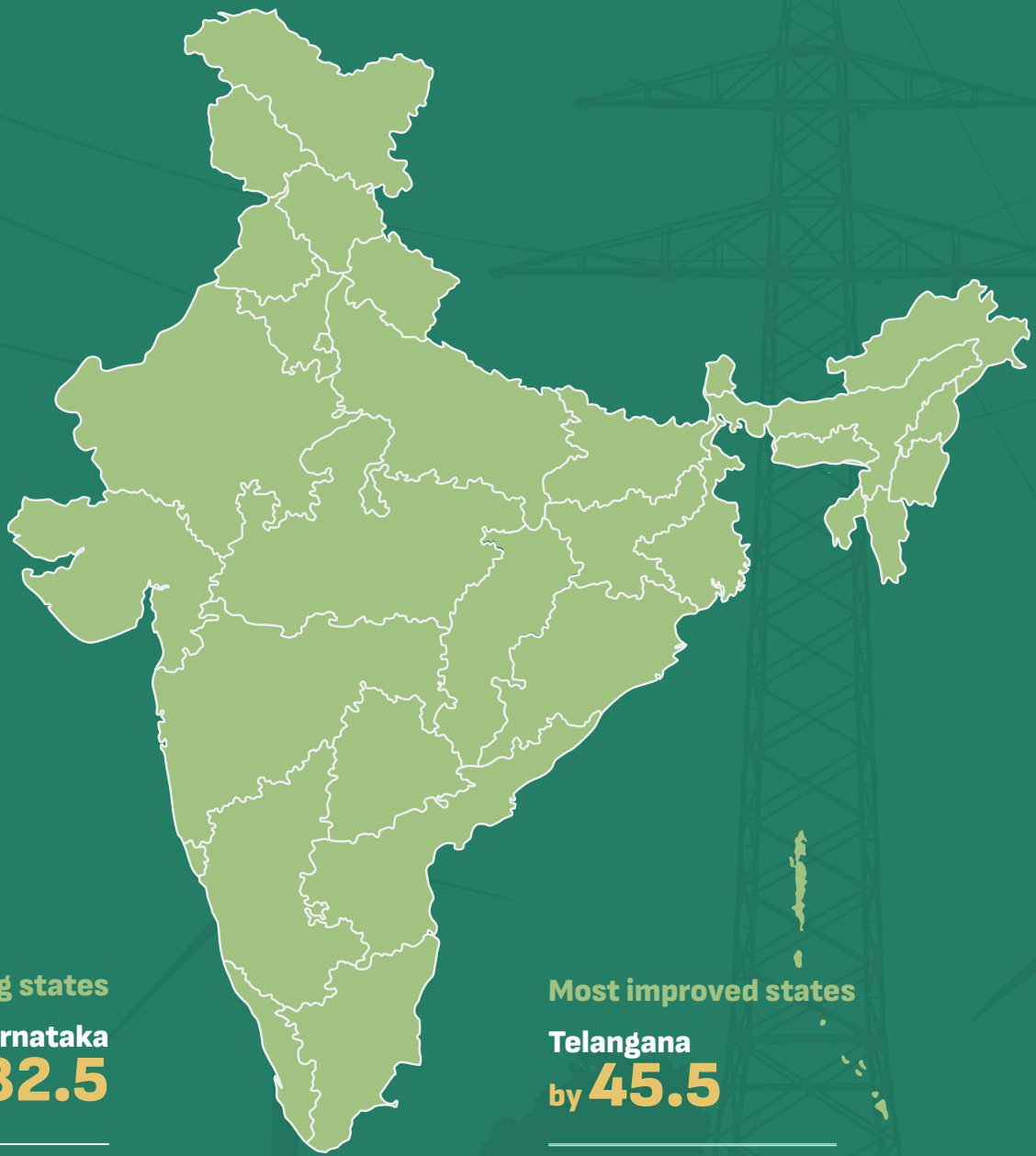
In the final step, BEE and AEEE analysed the data collected for all the states and scored states based on a defined criterion for each indicator. The findings are presented in the next chapter.

**28**
states and UTs improved their scores from SEEI 2020

**7**
states improved their scores by more than 15 points

**5**
'Front runner' states

**4**
'Achiever' states



Top performing states

Karnataka
**82.5**

Andhra Pradesh
**77.5**

Most improved states

Telangana
by **45.5**

Andhra Pradesh
by **27**

# 3. STATE ENERGY EFFICIENCY INDEX 2021–22 RESULTS

In SEEI 2021-22, all 36 SDAs (28 states and 8 UTs) participated by providing data on their EE progress. Most SDAs demonstrated eagerness to share relevant data within the short timeframe. This affirmative response of the SDAs indicates the growing culture of using data to effectively assess EE implementation. As mentioned earlier, SEEI 2021-22 uses programme-specific indicators for the first time to evaluate the efforts and achievements in implementing EE programmes across all sectors in the states and UTs. The SDAs can use SEEI as a tool to institutionalise the practice of measuring and tracking the impacts of EE initiatives.

In SEEI 2021-22, as many as twenty-eight (28) states and UTs improved their scores from SEEI 2020. Out of these, seven (7) states— Assam, Andhra Pradesh, Chandigarh, Chhattisgarh, Jharkhand, Kerala, and Telangana—improved by over 15 points compared to SEEI 2020. In SEEI 2021-22, each state/UT is classified as 'Front runner' (>60), 'Achiever' (50- 60), 'Contender' (30-49.5), and 'Aspirant' (<30) based on its performance, similar to SEEI 2020. Table 3.1 below shows the number of states in the different performance categories in SEEI 2019, SEEI 2020, and SEEI 2021-22.

**Table 3.1: Performances of states and UTs in in SEEI 2019, SEEI 2020 and SEEI 2021–22**

| Performance Category | 2019 | 2020 | 2021-22 |
|---|---|---|---|
| **Front Runner** | 0 | 2 | 5 |
| **Achiever** | 3 | 6 | 4 |
| **Contender** | 8 | 4 | 8 |
| **Aspirant** | 25 | 24 | 19 |

In SEEI 2021-22, Karnataka and Andhra Pradesh are the top-performing states, with overall scores of 82.5 and 77.5, respectively, out of 100. The two most improved states are Telangana and Andhra Pradesh, increasing their scores by 45.5 and 27 points, respectively. The improvement can be attributed to refined data submission for the common indicators and data provided for the programme-specific indicators. Tamil Nadu has seen the largest decline in score in SEEI 2021-22, a decrease of 22.5 points, primarily due to a lack of reported data.

Figure 3.1 shows the performance of states in SEEI 2021-22 with the most improved states, i.e., those that have increased their scores by more than 15 points from SEEI 2020 marked with a star. Meanwhile, Figure 3.2 highlights the TFEC group-wise state total scores for all seven (7) sectors and Figure 3.3 depicts the progress of each state in SEEI 2021-22 compared to SEEI 2020.

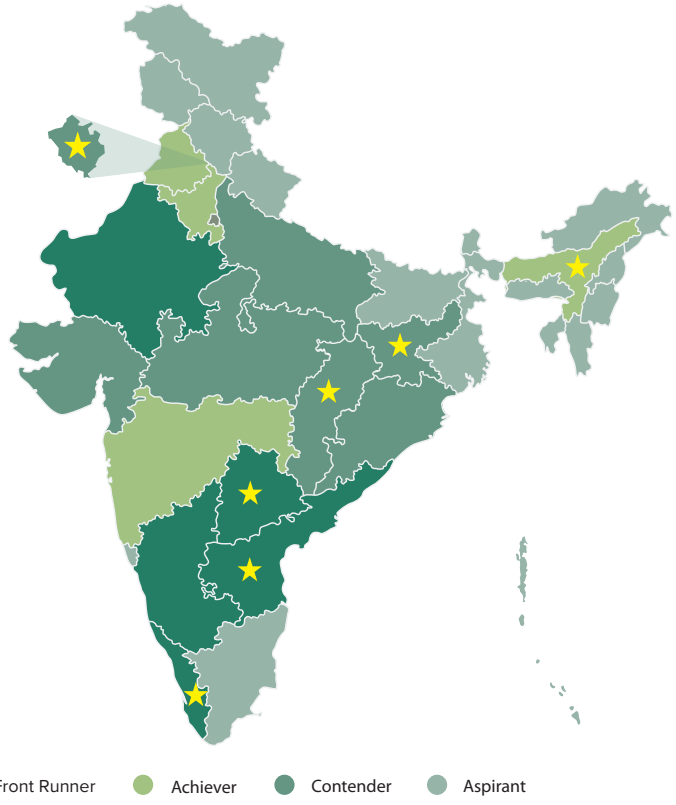



**Figure 3.1 State-wise SEEI 2021-22 Performance**

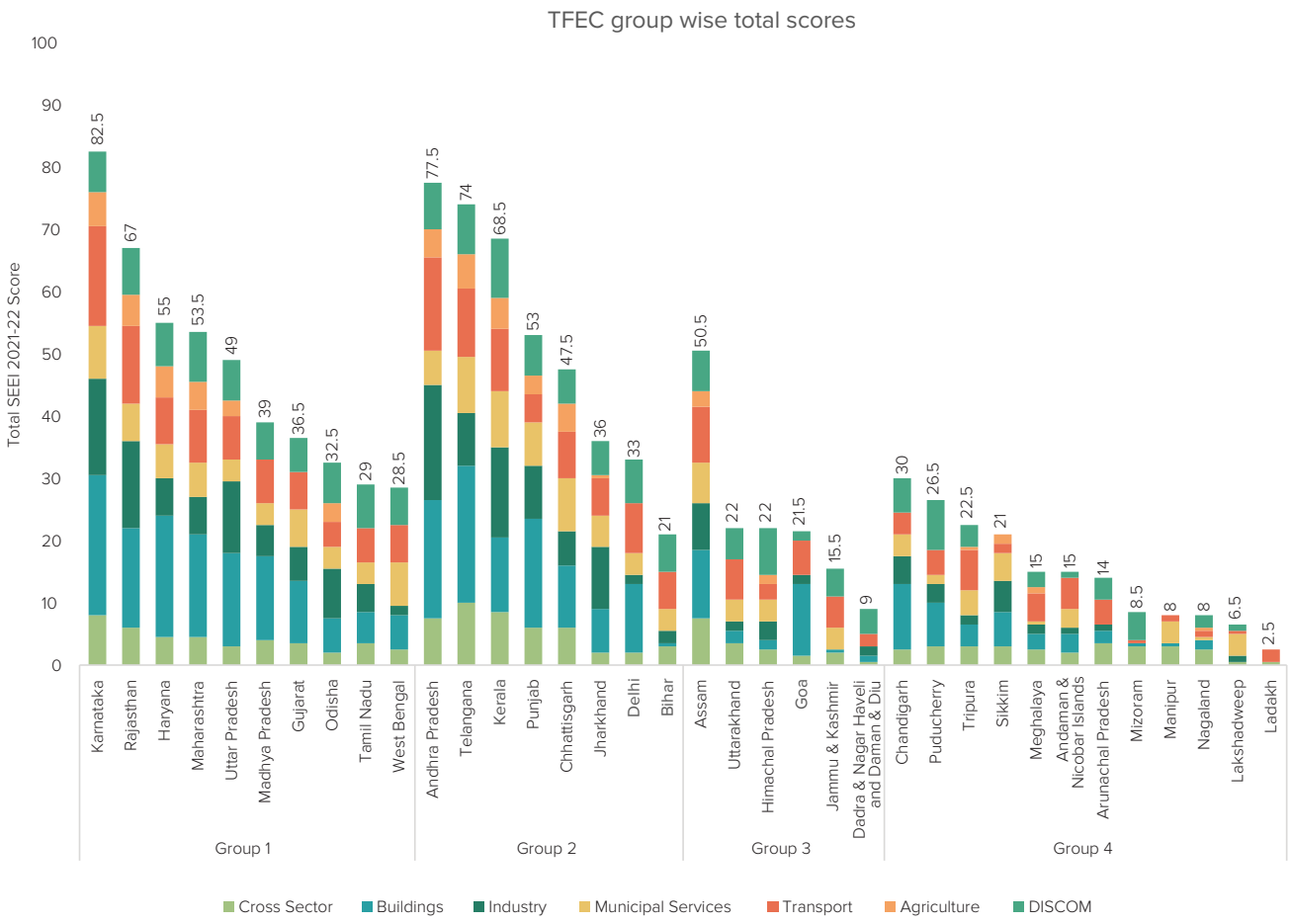



**Figure 3.2 TFEC Group-wise State Total Scores (All Sectors)**

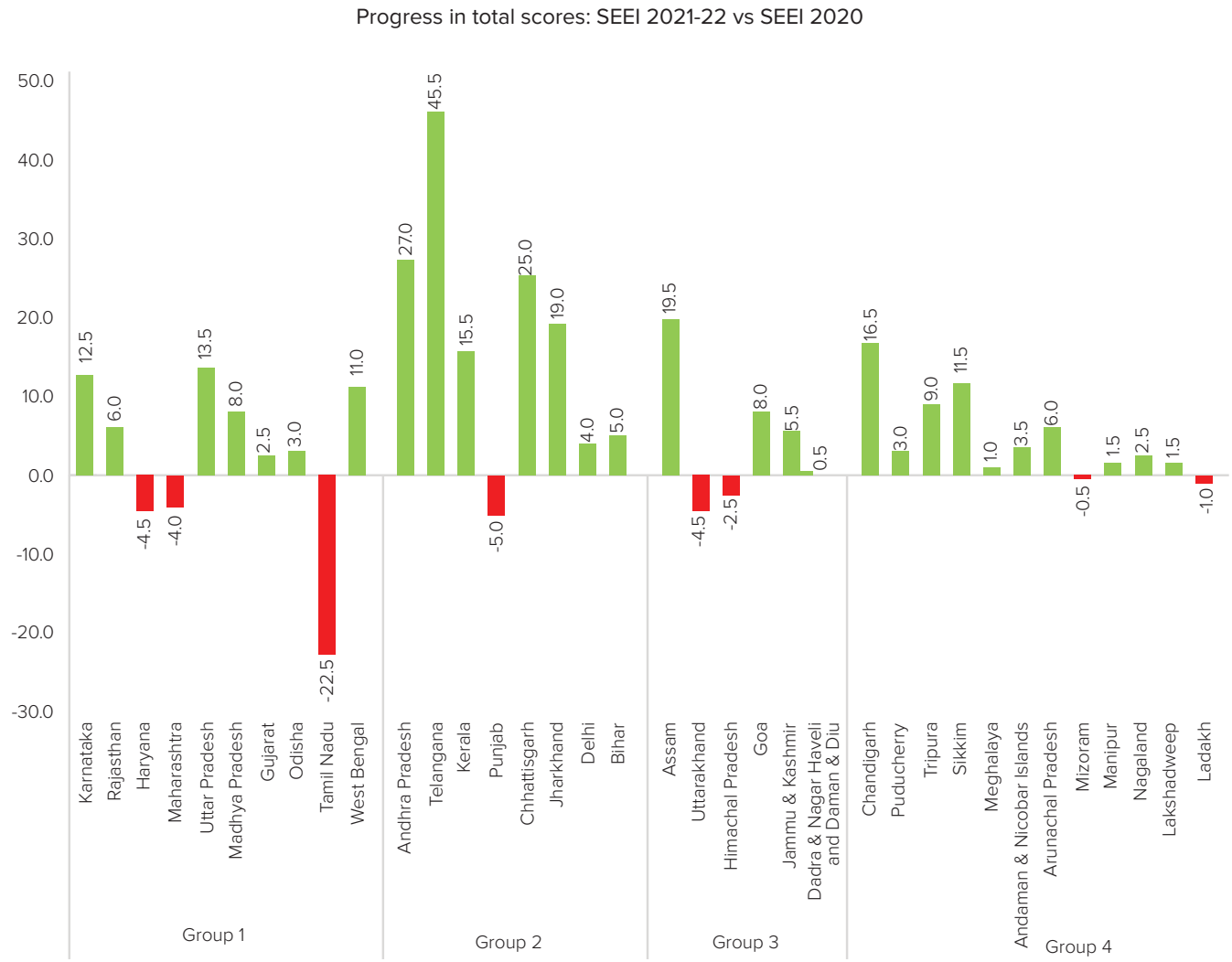



**Figure 3.3: State Progress in Total Score – SEEI 2021–22 vs SEEI 2020**

# 3.1 BUILDINGS

In India, the buildings sector is the second-highest in TFEC and is projected to grow by 45% up to 2027 from the 2017 baseline[8]. The energy consumption in Indian buildings is expected to rise due to rapid urbanization and economic development. It is vital for India to develop energy-efficiency strategies focused on the building sector to limit the unsustainable escalating energy demand[9].

In SEEI 2021-22, there are ten (10) indicators to evaluate EE initiatives in the building sector. Seven (7) are common indicators spanning across policy, institutional capacity, financial mechanisms and adoption of EE measures and three (3) are programme-specific indicators to assess the performance of energy efficiency programmes developed and implemented within the state. The maximum score in this sector is 25, of which 10 are for the common indicators and 15 is allotted to the programme-specific indicators.

The overall scores of 20 states in SEEI 2021-22 have increased in the building sector from SEEI 2020 due to improvements in common indicators and data provided for the programme-specific indicators.

The summary of the indicators in the Building Sector is provided in the following table 3.2. Figure 3.4 depicts each state's score for the buildings sector across the two different indicator categories – common and programme-specific Indicators- grouping states based on their TFEC. The states' progress in percentage in the SEEI 2021-22 compared to SEEI 2020 is shown in Figure 3.5.

**Table 3.2: Building sector indicators**

| Sl. No. | Indicator | Max Score | Scoring Criteria |
|---|---|---|---|
| **Policy** | | | |
| 1 | ECBC (2017) notification and adoption in bye-laws<br>• Has the State notified mandatory compliance with norms in ECBC 2017?<br>• Has ECBC been amended for the state or adopted in bye-laws of one or more cities?<br>• If the above are 'in progress', what is the current status? | 2 | Notified = 1, notification draft in cabinet = 0.5<br>Amended for the state = 0.5<br>Adopted in bye-laws of at least 1 city = 1, else 0 |
| 2 | Measures taken towards adoption of Eco Niwas Samhita (2021) in the state<br>• Has the state taken any measure for adoption of ENS 2021 (ECBC-R) (e.g. awareness and capacity building initiatives and incorporation into schemes)?<br>• If 'Yes', what is the progress in implementing ECBC-R? | 1 | Yes = 1, else 0 |
| 3 | Data disclosure of energy and emission intensity for energy-intensive buildings<br>• Has the state taken any steps towards data disclosure of energy and emission intensity for energy-intensive buildings (e.g. stakeholder discussion)? | 0.5 | Yes = 0.5, else 0 |
| **Institutional Capacity** | | | |
| 4 | Advisory services, certification, and enforcement capacity in state government<br>• Does the state have an entity to develop capacity and provide technical expertise on EE in buildings for architects, engineers, building facility managers, city officials, and other stakeholders?<br>• Does the state have a government authority to certify and enforce compliance with ECBC?<br>• Is there a budget assigned to government authorities for the above EE activities? | 2 | • Entity to develop capacity & provide technical expertise = 0.5, else 0<br>• Government authority to certify and enforce compliance with ECBC = 1, else 0<br>• Budget assigned to government authorities for the above EE activities = 0.5, else 0 |
| **Adoption of EE Measures** | | | |
| 5 | Green building penetration in the state<br>• How many certified green buildings are there in the State? | 2 | Green certified buildings per million connected consumers:<br>if 0 = 0 points;<br>if (≥1 & ≤ 10) = 0.5 points;<br>if (≥11 & ≤ 20) = 1 point;<br>if (≥21 & ≤ 30) = 1.5 points;<br>if (>30) = 2 points |
| 6 | Adoption/penetration of ECBC in new construction<br>• What is the percentage of buildings approved for construction in the reporting period that are latest ECBC-compliant?<br>• What is the percentage of buildings completed in the reporting period that are latest ECBC-compliant? | 2 | List of ECBC-compliant buildings = 1;<br>List of ECBC-compliant buildings in the reporting period = 1.5;<br>% of ECBC-compliant buildings = 2 |

| Sl. No. | Indicator | Max Score | Scoring Criteria |
|---|---|---|---|
| 7 | Neerman Awards<br>Has the state received any Neerman awards for commercial buildings, residential buildings, or the SDA? | 0.5 | Yes = 0.5, else 0 |
| **State Programme** | | | |
| 8 | Programme(s) for EE in public buildings:<br>Does the state have any programme(s) for EE in public buildings?<br>• What is the objective of the programme? (2 sentences)<br>• What is the target set under the programme?<br>• What is the timeline?<br>• How much money has been allocated & utilised to date?<br>• Who is running the programme? (list all actors, e.g. SDA, state dept., municipality, industry association, PPP, etc.)<br>• What is the progress to date?<br>• What are the energy savings (deemed or measured)?<br>• What quantity of emissions was avoided (based on energy savings)? | 5 | <br><br><br>0.5<br>0.5<br>0.5<br><br>0.5<br><br>0.5<br>1<br>1<br><br>0.5 |
| 9 | Programme(s) for EE in commercial buildings:<br>Does the state have any programme(s) for EE in commercial buildings?<br>• What is the objective of the programme? (2 sentences)<br>• What is the target set under the programme?<br>• What is the timeline?<br>• How much money has been allocated & utilised to date?<br>• Who is running the programme? (list all actors, e.g. SDA, state dept., municipality, industry association, PPP, etc.)<br>• What is the progress to date?<br>• What are the energy savings (deemed or measured)?<br>• What quantity of emissions was avoided (based on energy savings)? | 5 | <br><br><br><br>0.5<br>0.5<br>0.5<br>0.5<br><br>0.5<br>1<br>1<br><br>0.5 |
| 10 | Programme(s) for EE in residential buildings:<br>Does the state have any programme(s) for EE in residential buildings?<br>• What is the objective of the programme? (2 sentences)<br>• What is the target set under the programme?<br>• What is the timeline?<br>• How much money has been allocated & utilised to date?<br>• Who is running the programme? (list all actors, e.g. SDA, state dept., municipality, industry association, PPP, etc.)<br>• What is the progress to date?<br>• What are the energy savings (deemed or measured)?<br>• What quantity of emissions was avoided (based on energy savings)? | 5 | <br><br><br>0.5<br>0.5<br>0.5<br>0.5<br><br>0.5<br>1<br>1<br><br>0.5 |

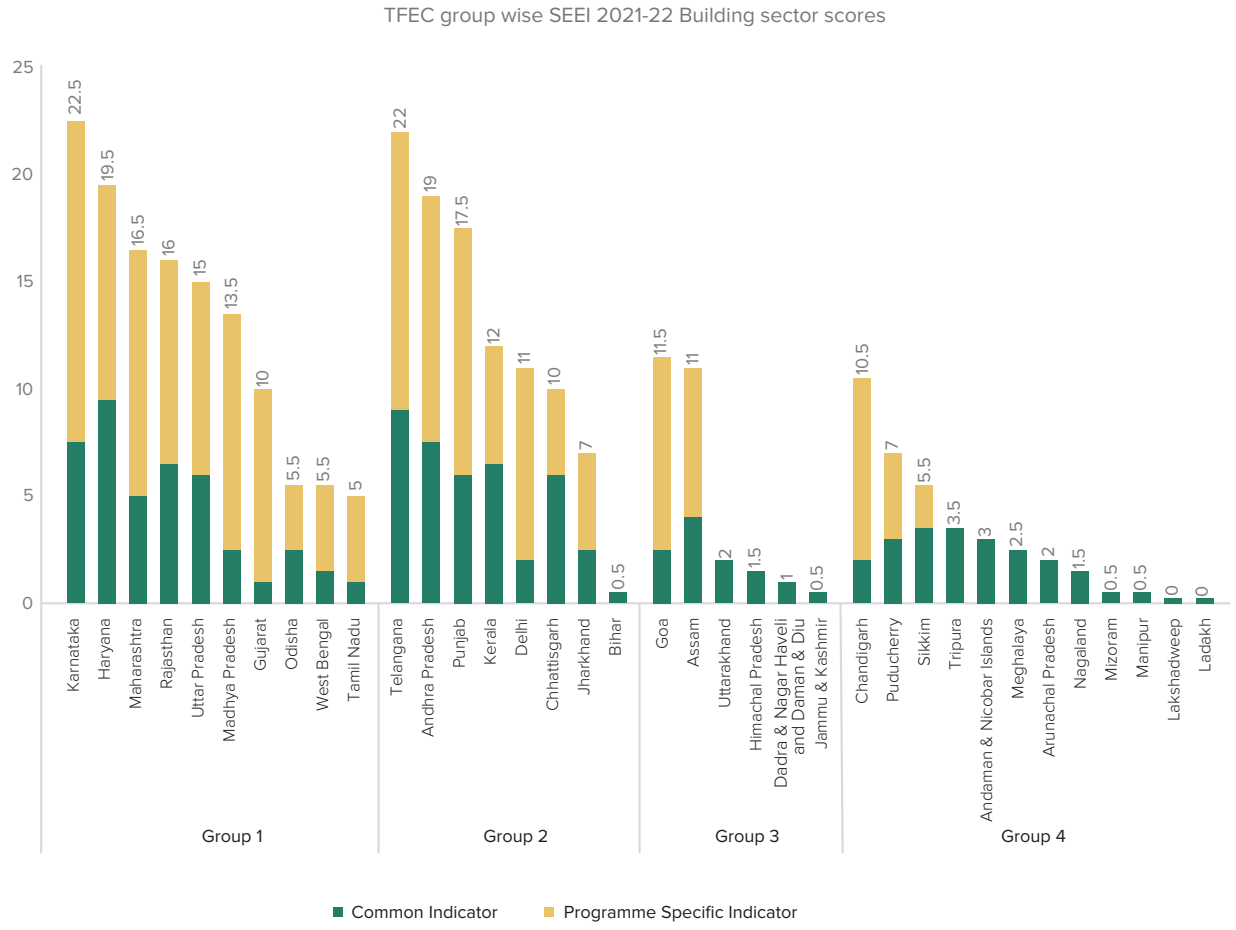



**Figure 3.4: TFEC group-wise building sector state scores**

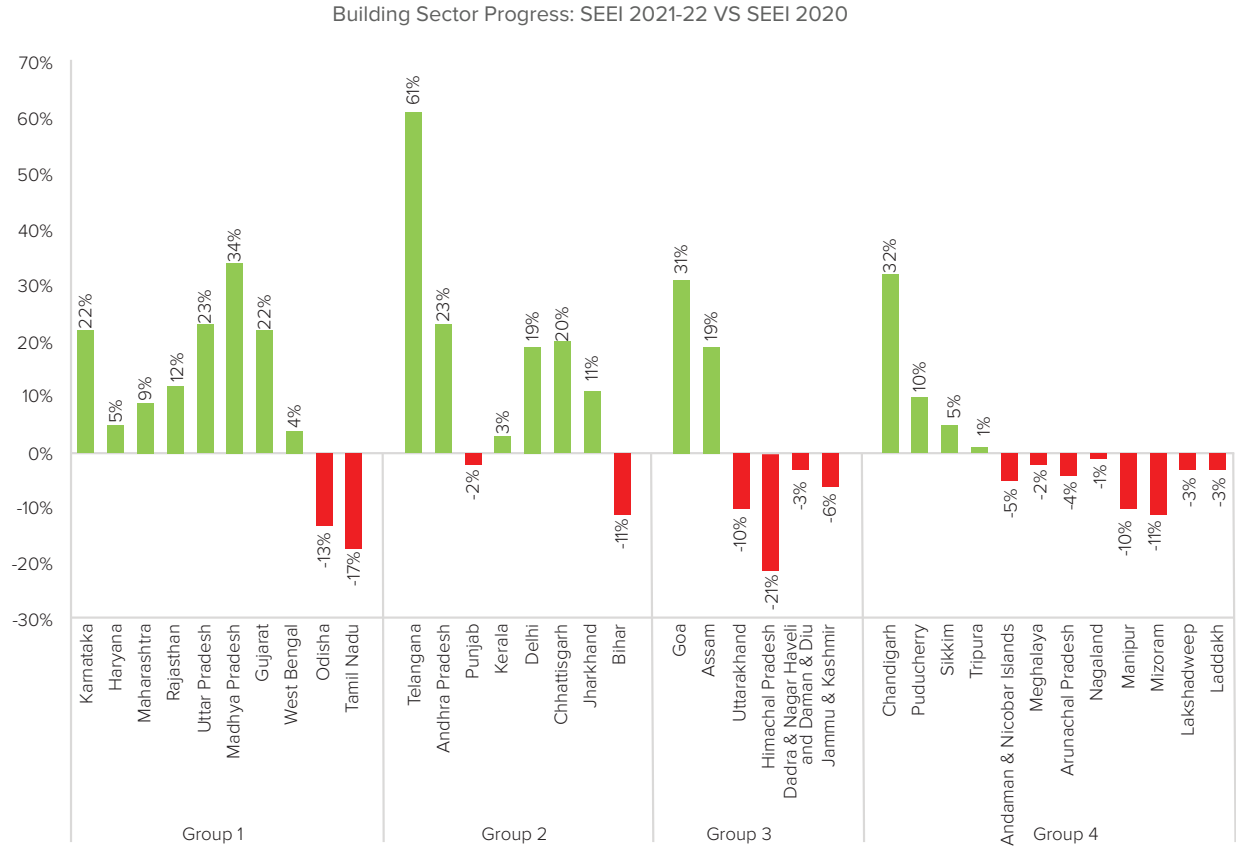



**Figure 3.5: TFEC group-wise state progress in building sector – SEEI 2021-22 vs. SEEI 2020**

# SEEI 2021–22 BUILDINGS SECTOR SCORE HIGHLIGHTS

**Karnataka is the top-performing state in the buildings sector**

With a score of 22.5 out of a maximum total score of 25, Karnataka is the top-performing state in the buildings sector. Other top performers include Haryana, Maharashtra, Rajasthan, Uttar Pradesh, Telangana, Andhra Pradesh, and Punjab. In SEEI 2021-22, 20 states and UTs have improved their scores in the buildings sector from SEEI 2020. The most improved state, Telangana, has increased its score by 61% in comparison to SEEI 2020. The scores of Himachal Pradesh and Tamil Nadu have decreased the most among the states.

## 1. Common Indicator

### Policy

In SEEI 2021-22, the states have shown marginal progress on policy making pertaining to building energy codes.

- ECBC 2017 has been notified in six (6) additional states, taking the total number of states with ECBC 2017 notification to eighteen (18).
- The twelve (12) states that have adopted the ECBC in municipal byelaws are the same as in SEEI 2020.
- Seventeen (17) states have conducted training and awareness programmes on ENS.
- Ten (10) states have drafted the ENS or ECBC-Residential (ECBC-R) 2021.

**18 states and UTs have notified ECBC 2017 and 10 have drafted ENS or ECBC-Residential 2021**

Table 3.3 shows the states and UTs that have implemented the above policy measures.

**Table 3.3: States and UTs with policy progress on building energy codes**

| State | States have notified ECBC 2017 | States where ECBC 2017 draft is in progress | States adopted ECBC in bye-laws of one or more cities | States conducted training and awareness on ENS/ ECBC-R | States that have draft ECBC-R 2021 |
|---|---|---|---|---|---|
| Andaman & Nicobar Islands | ✓ | * | ✓ | * | * |
| Andhra Pradesh | ✓ | * | ✓ | ✓ | ✓ |
| Arunachal Pradesh | ✓ | * | * | ✓ | ✓ |
| Assam | ✓ | * | * | ✓ | ✓ |
| Bihar | * | ✓ | * | * | * |
| Chandigarh | * | ✓ | * | * | * |
| Chhattisgarh | * | ✓ | * | ✓ | * |
| Dadra & Nagar Haveli and Daman & Diu | * | ✓ | * | * | * |
| Delhi | * | ✓ | * | * | * |
| Goa | ✓ | * | * | * | * |
| Gujarat | * | ✓ | * | * | * |
| Haryana | ✓ | * | ✓ | ✓ | ✓ |

| State | States have notified ECBC 2017 | States where ECBC 2017 draft is in progress | States adopted ECBC in bye-laws of one or more cities | States conducted training and awareness on ENS/ ECBC-R | States that have draft ECBC-R 2021 |
|---|---|---|---|---|---|
| Himachal Pradesh | ✓ | * | * | * | * |
| Jammu & Kashmir | * | ✓ | * | * | ✓ |
| Jharkhand | ✓ | * | * | ✓ | ✓ |
| Karnataka | ✓ | * | ✓ | ✓ | ✓ |
| Kerala | ✓ | * | ✓ | ✓ | * |
| Ladakh | * | ✓ | * | * | * |
| Lakshadweep | * | ✓ | * | * | * |
| Madhya Pradesh | ✓ | * | * | ✓ | ✓ |
| Maharashtra | * | ✓ | * | * | * |
| Manipur | * | ✓ | * | * | * |
| Meghalaya | * | ✓ | * | ✓ | * |
| Mizoram | * | ✓ | * | * | * |
| Nagaland | * | ✓ | * | ✓ | ✓ |
| Odisha | * | ✓ | ✓ | * | * |
| Puducherry | ✓ | * | * | ✓ | * |
| Punjab | ✓ | * | ✓ | * | * |
| Rajasthan | * | ✓ | ✓ | ✓ | * |
| Sikkim | ✓ | * | ✓ | ✓ | * |
| Tamil Nadu | * | ✓ | * | * | * |
| Telangana | ✓ | * | ✓ | ✓ | ✓ |
| Tripura | ✓ | * | * | ✓ | ✓ |
| Uttar Pradesh | ✓ | * | ✓ | ✓ | ✓ |
| Uttarakhand | * | ✓ | ✓ | * | * |
| West Bengal | ✓ | * | * | * | * |

**No data reported by states.*
*Note: States with no data reported across all fields have been excluded from the table*

Only four (4) states have taken any noticeable steps regarding data disclosure of energy and emission intensity for energy-intensive buildings:

- Chhattisgarh State Renewable Energy Development Agency (CREDA) conducted a study and prepared a techno-commercial feasibility report for Super Specialty Hospital, Jagdalpur.
- The Energy Department, Government of Rajasthan has released a notification to conduct an energy audit once every three years for all commercial buildings having a connected load ≥ 100 kW, contract demand ≥ 120 kVA, or conditioned area ≥ 1000 square meter.

- In Sikkim, energy audits and reporting has been made mandatory for all commercial buildings defined under the scope of ECBC 2020 with a connected load greater than 40 kW/50 kVA once every two (2) years.
- Telangana SDA (Telangana State Renewable Energy Development Corporation Limited (TSREDCO)) conducted a high-level committee meeting with all the stakeholders in the state on 'ECBC and ENS' to discuss the existing scenario and future course of action for adoption of ECBC and ENS in the state.

## Institutional Capacity

The states and UTs are yet to make a concerted effort to develop institutional capacity on EE in the buildings sector. Only thirteen (13) states have an entity to develop capacity and provide technical expertise on EE in buildings to the building stakeholders' ecosystem at the state level. In most states, the ECBC cell of the SDA is the designated entity for this purpose.

Eleven (11) states have a government authority to certify and enforce compliance with ECBC. Availability of a dedicated state budget assigned to government authorities for EE activities in buildings has been reported by five (5) states. Table 3.4 shows the institutional capacity across the states and UTs for EE in buildings.

**Table 3.4: States and UTs with institutional capacity for EE in buildings sector**

| State | Entity to develop capacity and provide technical expertise on EE in buildings for architects, engineers, building facility managers, city officials, and other stakeholders | Government authority to certify and enforce compliance with ECBC | State budget assigned to government authorities for EE activities |
|---|---|---|---|
| Andhra Pradesh | ✓ | ✓ | ✓ |
| Assam | ✓ | ✓ | * |
| Chhattisgarh | ✓ | ✓ | ✓ |
| Haryana | ✓ | ✓ | ✓ |
| Karnataka | ✓ | ✓ | * |
| Kerala | ✓ | ✓ | ✓ |
| Maharashtra | ✓ | * | * |
| Meghalaya | ✓ | * | * |
| Odisha | ✓ | * | ✓ |
| Puducherry | ✓ | * | * |
| Punjab | ✓ | ✓ | * |
| Rajasthan | ✓ | ✓ | * |
| Telangana | ✓ | ✓ | * |
| Tripura | * | ✓ | * |
| Uttar Pradesh | * | ✓ | * |

**No data reported by states.*
*Note: States with no data reported across all fields have been excluded from the table*

## Adoption of EE Measures

Adoption of EE measures in states and UTs is assessed based on penetration of certified green buildings, adoption of ECBC in new construction, and winners of BEE's National Energy Efficiency Roadmap for Movement towards Affordable & Natural Habitat (NEERMAN) awards.

An optimal measure of green building penetration would be the ratio of green building built-up area to the total built-up area in the state. However, in the absence of data on the state-wise built-up area, the indicator on green buildings has been normalised as the number of certified green buildings per million connected residential and commercial building consumers (i.e. electricity connections) in the state. IGBC, GRIHA, and GBCI Leadership in Energy and Environmental Design (LEED) ratings have been aggregated for the total number of certified green buildings. Out of 36 states and UTs, 29 states and UTs have a total of 3950 certified green buildings. Table 3.5 and Table 3.6 show the top five states with the highest number of normalised and absolute certified green buildings, respectively.

**3,950 certified green buildings across 29 states and UTs**

**Table 3.5: States with highest number of normalised certified green buildings**

| | |
|---|---|
| Haryana | 43 |
| Delhi | 39 |
| Maharashtra | 34 |
| Chandigarh | 31 |
| Karnataka | 24 |

**Table 3.6: States with highest number of certified green buildings**

| | |
|---|---|
| Maharashtra | 922 |
| Karnataka | 534 |
| Tamil Nadu | 432 |
| Uttar Pradesh | 315 |
| Telangana | 277 |

In SEEI 2021-22, ten (10) states reported adopting ECBC compliance in new construction and provided details of such buildings in the state. BEE constituted the NEERMAN Awards to acknowledge and encourage exemplary building designs complying with BEE's ECBCs. Awards are given for two categories of buildings: 1) 'Commercial', based on ECBC, 2017 (Revised: April 2018), and 2) 'Residential', based on ENS 2018[10]. Five (5) states received awards in the first ever NEERMAN Awards, hosted by BEE in 2022, in recognition of their efforts in EE in the buildings sector. Table 3.7 provides lists of the states and UTs that have ECBC compliance and that were 2022 NEERMAN award recipients

**Table 3.7: States and UTs with ECBC compliance and NEERMAN awards**

| Indicator | Names of states (Number of states) |
|---|---|
| States that have adopted ECBC compliance in new construction and reported details of such buildings in the state in SEEI 2021-22 | Andhra Pradesh, Chhattisgarh, Haryana, Karnataka, Kerala, Maharashtra, Punjab, Rajasthan, Telangana, Uttar Pradesh (10) |
| States that won BEE's NEERMAN awards in 2022 for exemplary building designs complying with BEE's ECBC | Andaman & Nicobar Islands, Haryana, Karnataka, Maharashtra, Telangana (5) |

## 2. Programme-Specific Indicators – State Programme

In SEEI 2021-22, three programme-specific indicators are included to track and assess the implementation of programmes/projects by the SDAs and other state government entities, individually or through interdepartmental collaboration, in collaboration with BEE or industry associations, or in PPPs to achieve EE in the buildings sector, as detailed below.

### Programme(s) for EE in public buildings

In SEEI 2021-22, twenty-two (22) states reported having EE programmes in public buildings.

- Seventeen (17) states have the Building Energy Efficiency Programme (BEEP) for the retrofit of existing fixtures with EE fixtures. The programme is being implemented through a collaboration between EESL and various government entities, such as NITI Aayog, Public Works Department (PWD), Indian Railways, Airports Authority of India (AAI), and state and central public sector undertakings (PSUs). One hundred and thirty (130) projects in public buildings have been completed under BEEP, with total energy savings of 213 million units (MU) in FY 2020-21 and 2021-22 and avoided emissions of 3.72 million tonnes of carbon dioxide ($MtCO_2$).
- In Maharashtra, EESL implemented EE measures in various premises, namely, Railway Division, PWD, Railway Workshop, and AAI in the energy services company (ESCO) mode in fifty-nine (59) different projects.
- In Andhra Pradesh, EE measures were implemented in 547 court buildings under the Building Judiciary Energy Efficiency Project. The project was run by Andhra Pradesh State Energy Efficiency Development Corporation Limited (APSEEDCO), in collaboration with EESL and the judiciary dept. The total energy savings from this collaborative effort is 2.66 MU and avoided emissions, 2263 $tCO_2$.
- In Kerala, under the CHAITHANYAM scheme for improving EE in government hospitals, schools, and other buildings, eighteen projects have been completed, resulting in a total energy savings of 0.44 MU.
- Puducherry SDA undertook replacement of existing conventional lights and fans with EE light-emitting diode (LED) lights and brushless direct current (BLDC) fans in government buildings/hospitals/schools, resulting in 1.32 MU in energy savings in the last two years.
- In Sikkim, the Energy Efficient Building (EEB) cell of Sikkim SDA prepared an ECBC Compliance Report for Sikkim Civil Officers Institute, East Sikkim, Gangtok.

**22 states reported EE programmes in public buildings**

### Programme(s) for EE in commercial buildings

In SEEI 2021-22, only eleven (11) states—Andhra Pradesh, Chandigarh, Delhi, Gujarat, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Punjab, Telangana, and Uttar Pradesh—reported having EE programmes in commercial buildings.

- The BEEP programme is reported to be in operation in seven (7) states. Forty-nine (49) projects under BEEP have been completed in commercial buildings in FY 2020-22. These programmes, driven by partnerships between EESL and various commercial buildings like state PSU offices, banks, AAI, commercial offices, etc., resulted in energy savings of 82.1 MU and emission reduction of 0.07 $MtCO_2$.
- In Andhra Pradesh, Andhra Pradesh State Energy Conservation Mission (APSECM) implemented demonstration projects at Government General Hospital (Old & New) and Dental College and hostels in Vijayawada.

- Haryana Renewable Energy Development Agency (HAREDA) implemented EE measures in government schools, jails, hospitals, and offices. The total energy savings from these measures in FY 2021-22 was 9 MU and avoided emissions, 0.007 $MtCO_2$.
- In Madhya Pradesh, 'Urja Saksharta Abhiyan' was launched to sensitise citizens on energy savings to combat the effects of global warming and climate change[11] .
- In Telangana, EE programmes were implemented in various commercial buildings like Infosys Ltd. and Srinivasa Resorts Ltd.

### Programme(s) for EE in residential buildings

In SEEI 2021-22, eleven (11) states—Andhra Pradesh, Assam, Goa, Haryana, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Punjab, Rajasthan, and Telangana—reported having EE programmes in residential buildings.

- Karnataka Renewable Energy Development Limited (KREDL) implemented a demonstration project on EE electrical gadgets at hostels in Madhugiri town, resulting in annual energy savings of 69941 kilowatt-hours (kWh) and avoided emissions of 57 $tCO_2$.
- Kerala Energy Management Centre (EMC) has introduced a scheme called the Residential Building Energy Indexing (RBEI) programme, to be conducted with the support of Building Energy Efficiency Experts. The objective of the programme is to identify residential accommodations (single dwelling and multiple dwelling) for relevant information to conduct an energy simulation on parameters such as building envelope characteristics, required lighting and air conditioning, and standard appliances used on a daily basis and compare the standard/base model with a proposed/existing model.
- The SDAs of Andhra Pradesh and Punjab have organised trainings on ECBC-R for architects, engineers, government officials, etc.
- Under the BEEP programme in Goa, the SDA has collaborated with EESL to convert a village to an EE village, resulting in energy savings of 0.05 MU in FY 2021-22.
- In Rajasthan, Rajasthan Housing Board is in the process of constructing an EE residential complex for MLAs to achieve a 3-star GRIHA rating.
- In Telangana, under the Energy Efficiency in Residential Buildings (EERB) programme, the SDA distributed one 28 W BLDC fan each to 7204 households in FY 2021-22.
- ECBC demonstration project in residential building has been undertaken by Assam and Haryana SDA to adopt and promote energy efficiency in residential building sector.
- In Maharashtra, SDA initiated Save Energy Programme for residential building to identify the energy saving potential.

**11**
**states reported EE programmes in residential buildings**

**Table 3.8: BEEP programme reported in states and UTs**

| BEEP programme | Names of states (Number of states) |
|---|---|
| BEEP in public buildings | Assam, Chandigarh, Chhattisgarh, Delhi, Goa, Gujarat, Haryana, Jharkhand, Karnataka, Madhya Pradesh, Odisha, Punjab, Rajasthan, Tamil Nadu, Telangana, Uttar Pradesh, and West Bengal (17) |
| BEEP in commercial buildings | Chandigarh, Delhi, Gujarat, Karnataka, Maharashtra, Punjab, and Uttar Pradesh (7) |
| BEEP in residential buildings | Goa (1) |

## BUILDINGS SPOTLIGHT

Rajasthan Housing Board is in the process of constructing an EE residential complex for MLAs in Jaipur, consisting of 160 flats, to achieve a 3-star GRIHA rating for this project. This is an exemplary demonstration of EE adoption in public buildings, led by the state government.

# 3.2 INDUSTRY

The industry sector accounted for the highest share of energy consumption, 41% of total electricity consumption in India, in FY 2020-2021[12] . As per NITI Aayog's India Energy Security Scenarios (IESS) model, this sector is projected to have the highest energy savings potential in India by 2047[13] through EE management and innovative technology deployment.

In SEEI 2021-22, there are five (5) indicators to evaluate EE initiatives in the industry sector. Out of the five indicators, two (2) are common indicators for institutional capacity and adoption of EE measures, and the other three (3) are programme-specific indicators to assess the performance of EE programmes developed and implemented in the state. The maximum score in this sector is 21, out of which 4 points are for the common indicators, and 17 points are allotted to the programme-specific indicators.

In SEEI 2021-22, the overall scores of eleven states have increased in the industry sector from SEEI 2020 due to improvements in reporting the common indicators and the data furnished for the programme-specific indicators.

The summary of the indicators in the industry sector is provided in Table 3.9. Figure 3.6 depicts each state's score for the industry sector across the two different indicator categories – common and programme-specific indicators, grouping states based on their TFEC. The states' progress in percentage in the SEEI 2021-22 compared to SEEI 2020 is shown in Figure 3.7.

**Table 3.9: Industry sector indicators**

| Sl. No. | Indicator | Max Score | Scoring Criteria |
|---|---|---|---|
| Institutional Capacity | | | |
| 1 | Advisory, certification, and enforcement capacity in state government<br>• Does the state have an entity to develop capacity and provide technical expertise on EE in industry for engineers, managers, business owners, city officials, and other stakeholders?<br>• Does the state have a government authority to enforce EC/EE regulations or measures for industry?<br>• Is there a budget assigned to government authorities for the above EE activities? | 2 | • Entity to develop capacity & provide technical expertise = 0.5, else 0<br>• Government authority to enforce EC/EE regulations = 1, else 0<br>• Budget assigned to government authorities for the above EE activities = 0.5, else 0 |
| Adoption of EE Measures | | | |
| 2 | Energy conservation awards<br>• How many industrial units have won energy conservation awards through state/national/industry association awards? | 2 | If total EC awards = 0, then 0 points;<br>(≥1 & ≤ 10) = 0.5 points;<br>(≥ 11 & ≤ 20) = 1 point |
| State Programme | | | |
| 8 | Programme(s) for EE in large industries:<br>Does the state have any programme(s) for EE in large industries?<br>• What is the objective of the programme? (2 sentences)<br>• What is the target set under the programme?<br>• What is the timeline?<br>• How much money has been allocated & utilised to date?<br>• Who is running the programme? (list all actors, e.g. SDA, state dept., municipality, industry association, PPP, etc.)<br>• What is the progress to date?<br>• What are the energy savings (deemed or measured)?<br>• What quantity of emissions was avoided (based on energy savings)? | 5 | <br><br>0.5<br>0.5<br>0.5<br>0.5<br>0.5<br>1<br>1<br>0.5 |
| 9 | Programme(s) for EE in micro, small, and medium-sized enterprises (MSMEs):<br>Does the state have any programme(s) for EE in MSMEs?<br>• What is the objective of the programme? (2 sentences)<br>• What is the target set under the programme?<br>• What is the timeline?<br>• How much money has been allocated & utilised to date?<br>• Who is running the programme? (list all actors, e.g. SDA, state dept., municipality, industry association, PPP, etc.)<br>• What is the progress to date?<br>• What are the energy savings (deemed or measured)?<br>• What quantity of emissions was avoided (based on energy savings)? | 7 | <br><br>0.5<br>1<br>1<br>1<br>1<br>1<br>1<br>0.5 |

| Sl. No. | Indicator | Max Score | Scoring Criteria |
|---|---|---|---|
| 10 | Programme(s) for EE in PSUs (whole/part state ownership):<br>Does the state have any programme(s) for EE in PSUs (whole/part state ownership)?<br>• What is the objective of the programme? (2 sentences)<br>• What is the target set under the programme?<br>• What is the timeline?<br>• How much money has been allocated & utilised to date?<br>• Who is running the programme? (list all actors, e.g. SDA, state dept., municipality, industry association, PPP, etc.)<br>• What is the progress to date?<br>• What are the energy savings (deemed or measured)?<br>• What quantity of emissions was avoided (based on energy savings)? | 5 | <br><br><br>0.5<br>0.5<br>0.5<br>0.5<br>0.5<br>1<br>1<br>0.5 |

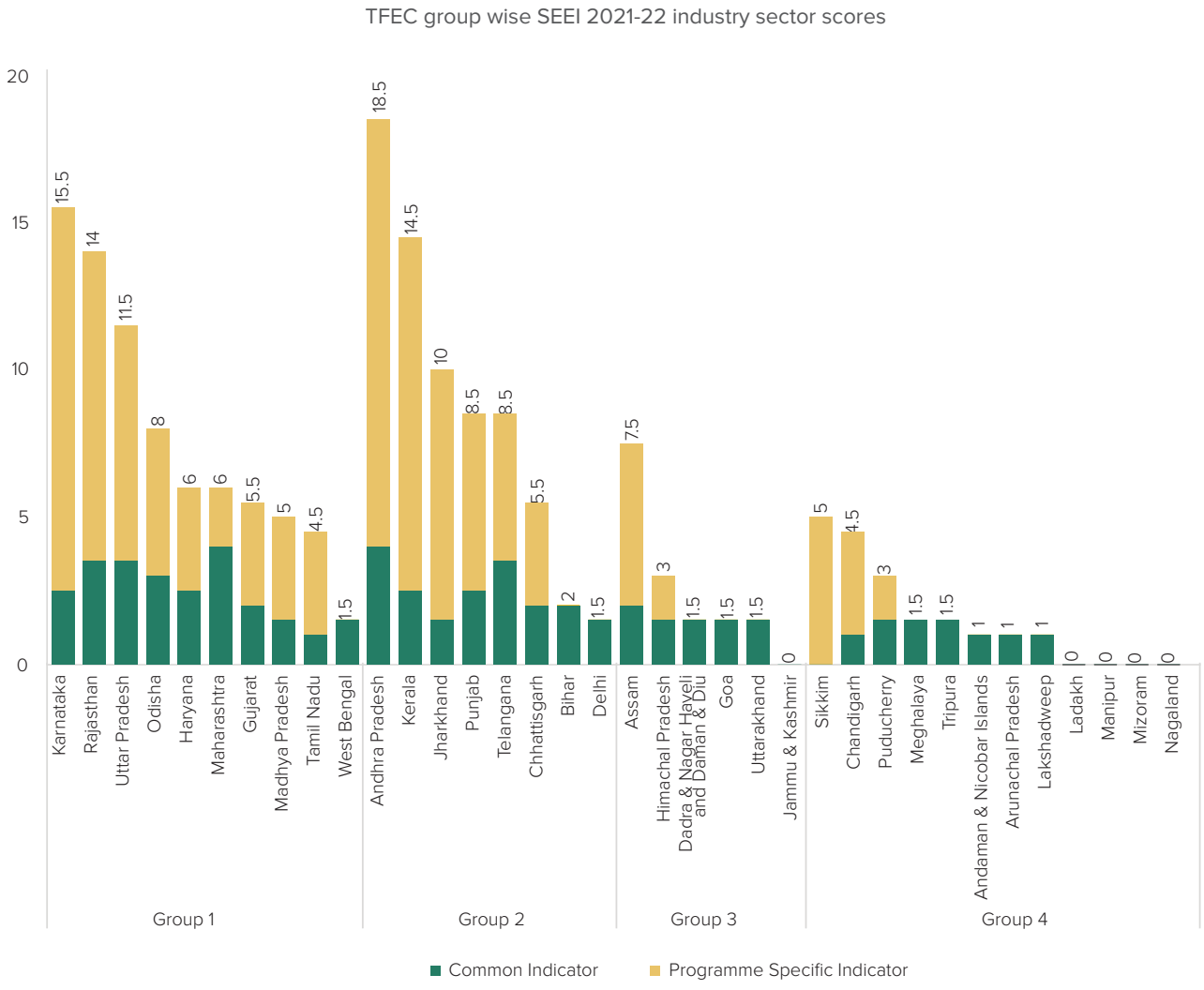



**Figure 3.6: TFEC group-wise industry sector state scores**

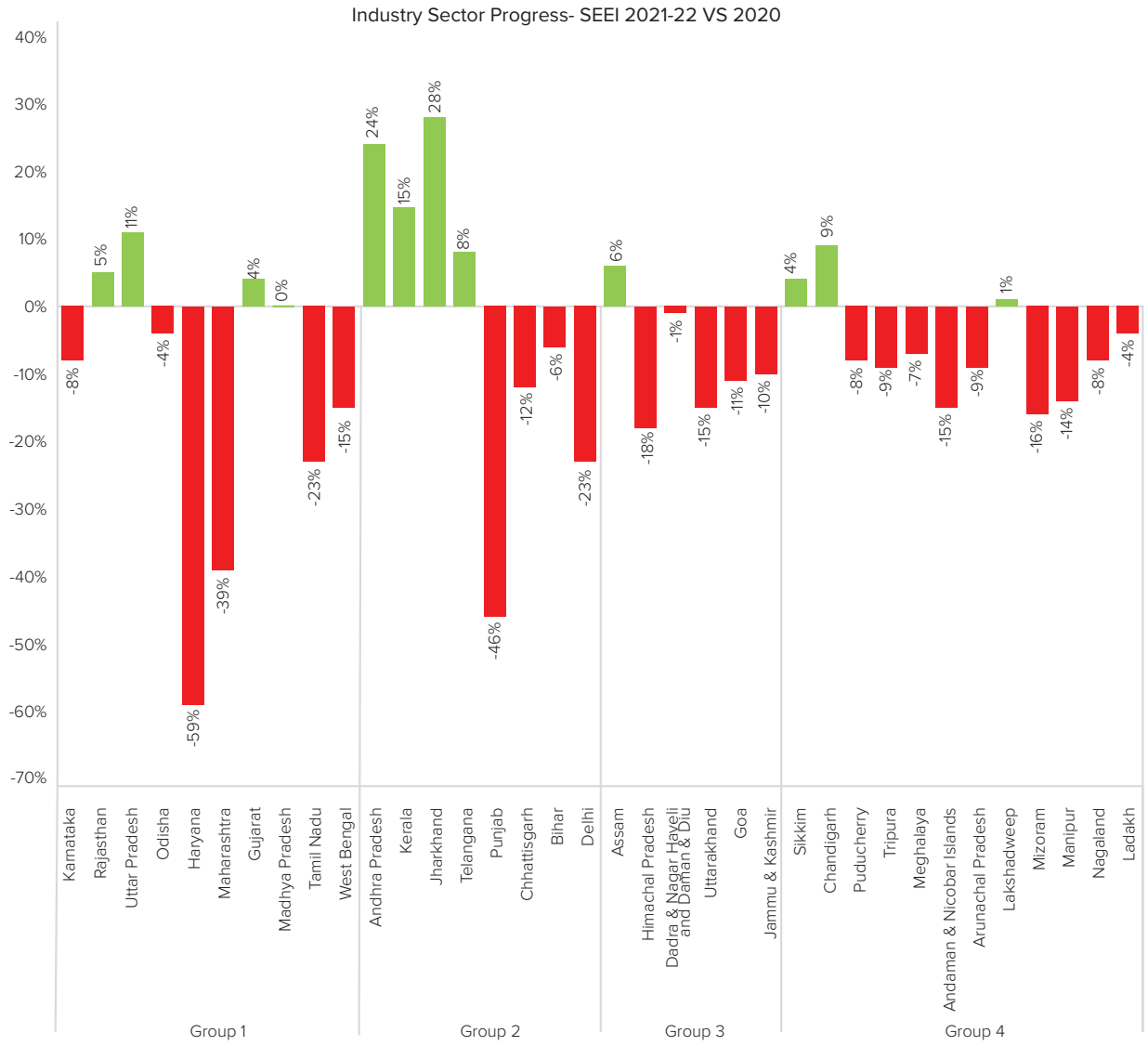



**Figure 3.7: TFEC group-wise state progress in industry sector — SEEI 2021-22 vs. SEEI 2020**

# SEEI 2021–22 INDUSTRY SECTOR SCORE HIGHLIGHTS

With a score of 18.5 out of a maximum score of 21, Andhra Pradesh is the top-performing state in the industry sector. Other top-performing states include Karnataka, Rajasthan, Uttar Pradesh, and Kerala. In SEEI 2021-22, eleven (11) states and UTs improved their scores in the industry sector from SEEI 2020. Jharkhand is the most improved state in the sector, increasing its score by 28% compared to SEEI 2020. The scores of Punjab and Haryana have declined the most among all the states.

## 1. Common Indicator

### Institutional Capacity

The institutional capacity of the states and UTs in this sector is still not well-established. Only thirteen (13) states reported the existence of an entity to develop capacity and provide technical expertise on EE in industry for engineers, managers, business owners, city officials, and other stakeholders at the state level.

- In most states, the PAT cell of the SDA is the designated entity to develop capacity and provides technical expertise on EE in industry.
- On the capacity development front, Kerala EMC, in association with Kerala State Productivity Council (KSPC) and the Federation of Indian Chambers of Commerce & Industry (FICCI), conducted 28 workshops on industrial EE for officials and higher management of selected industrial estates.
- Maharashtra Energy Development Agency (MEDA) carried out extensive capacity building of the energy professionals of designated consumers (DCs) and small and medium-sized enterprises (SMEs), including webinars for industry professionals, in FY 2021-22.
- Rajasthan Renewable Energy Corporation Limited (RRECL) conducted webinars on EE technologies in pumping, waste heat recovery applications, and EE motors for DCs and energy professionals in Rajasthan.

Twenty-nine (29) states reported having a designated government authority to enforce EC/EE regulations or measures for the industry sector.

- Twenty-seven (27) states have an adjudicating officer (AO) in their respective state electricity regulatory commission (SERC)/joint electricity regulatory commission (JERC).
- In Maharashtra, MEDA and Meghalaya, the SDA inspecting officer is the government authority responsible for enforcing EC/EE regulations for industry in the state.

Six (6) states have a state budget assigned to these government authorities for EE activities in industry. This is a solid improvement from SEEI 2020, where only two states reported having a state budget for the entity supporting EE in industry. Table 3.10 shows the institutional capacity across the states and UTs for EE in industry.

**Andhra Pradesh is the top-performing state in the industry sector**

Table 3.10: States and UTs with institutional capacity for EE in industry

| State | Entity to develop capacity and provide technical expertise on EE in industry for engineers, managers, business owners, city officials, and other stakeholders | Government authority to enforce EC/EE regulations or measures for industry | State budget assigned to government authorities for EE activities |
|---|---|---|---|
| Andaman & Nicobar Islands | * | ✓ | * |
| Andhra Pradesh | ✓ | ✓ | ✓ |
| Arunachal Pradesh | * | ✓ | * |
| Assam | ✓ | ✓ | * |
| Bihar | ✓ | ✓ | * |
| Chandigarh | * | ✓ | * |
| Chhattisgarh | * | ✓ | ✓ |
| Dadar Nagar Haveli & Daman and Diu | * | ✓ | * |
| Delhi | * | ✓ | * |
| Goa | * | ✓ | * |
| Gujarat | * | ✓ | * |
| Haryana | ✓ | ✓ | * |
| Himachal Pradesh | * | ✓ | * |
| Jharkhand | * | ✓ | * |
| Karnataka | ✓ | ✓ | ✓ |
| Kerala | ✓ | ✓ | ✓ |
| Lakshadweep | * | ✓ | * |
| Madhya Pradesh | * | ✓ | * |
| Maharashtra | ✓ | ✓ | ✓ |
| Meghalaya | ✓ | ✓ | * |
| Odisha | ✓ | ✓ | ✓ |
| Puducherry | * | ✓ | * |
| Punjab | ✓ | ✓ | * |
| Rajasthan | ✓ | ✓ | * |
| Telangana | ✓ | ✓ | * |
| Tripura | * | ✓ | * |
| Uttar Pradesh | ✓ | ✓ | * |
| Uttarakhand | * | ✓ | * |
| West Bengal | * | ✓ | * |

**No data reported by states.*
*Note: States with no data reported across all fields have been excluded from the table*

## Adoption of EE Measures

Energy conservation awards are given to industries and establishments in recognition of their commendable efforts to reduce energy consumption while maintaining their production.

In SEEI 2021-22, industrial units in twenty-four (24) states and UTs won energy conservation awards through state/national/industry association awards. In Maharashtra, 59 industrial units won energy conservation awards, the highest number among all states. Out of 59, 30 awards came from the state energy conservation award, 26 awards from CII, and 3 awards from

NECA. Figure 3.8 shows the states and UTs with energy conservation awards for industrial units through state/national/industry association awards.

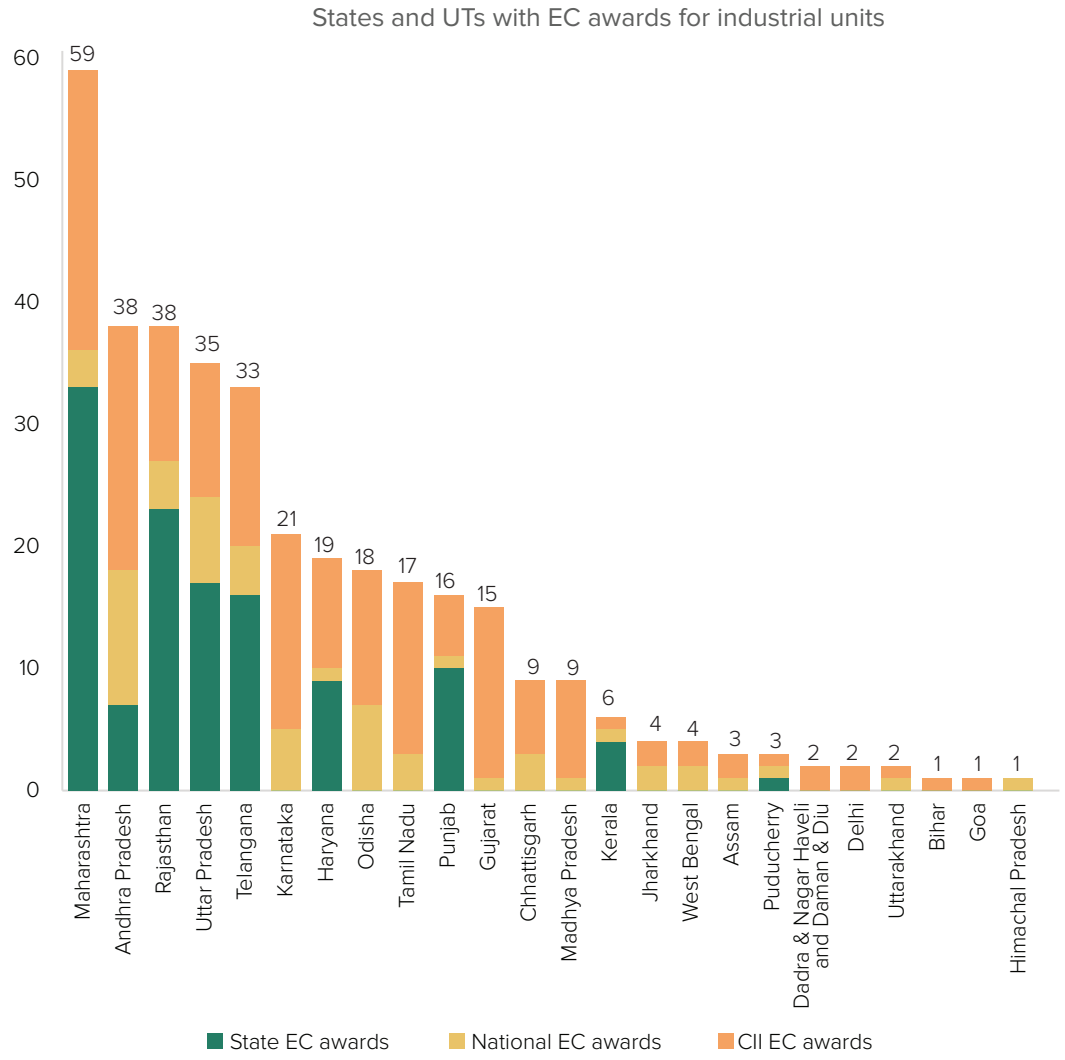



**Figure 3.8: States and UTs with EC awards for industrial units**

## 2. Programme-Specific Indicator – State Programme

### Programme(s) for EE in large industries

In SEEI 2021-22, thirteen (13) states reported having EE programmes in large industries.

- BEE's PAT programme is underway in nine (9) states—

  Andhra Pradesh, Assam, Karnataka, Kerala, Maharashtra, Odisha, Puducherry, Telangana, and Uttar Pradesh—to promote EE improvements in energy-intensive industries by notifying specific energy consumption (SEC) reduction targets for mandatory compliance within a time period of three (3) years. Energy consumption norms and standards are set for selected units of the energy-intensive industrial sectors, identified as DCs. The excess energy savings achieved by a DC is converted into tradable instruments called Energy Saving Certificates (ESCerts) and are tradable at the power exchanges in India[14].

**13 states reported EE programmes in large industries**

- Department of Industries, Himachal Pradesh has notified the Himachal Pradesh Industrial Investment Policy, 2019 and 'Rules Regarding Grant of Incentives, Concessions and Facilities for Investment Promotion in Himachal Pradesh-2019'. The vision is to create an enabling ecosystem for enhanced investment to ensure balanced growth of the industrial and service sectors, augment the scale of economic development and employment opportunities, ensure sustainable development, and achieve the Sustainable Development Goals (SDGs). Eligible enterprises are entitled to a rebate on energy charges.
- In Jharkhand, EESL has collaborated with the Heavy Engineering Cooperation (HEC), Government of India on the Industrial Energy Efficiency programme to enable the transition from producer gas-based heating furnaces to liquified petrol gas (LPG)-based heating furnaces. Two new furnaces have been installed, and two installations are in progress.
- In Rajasthan, 470 motors have been replaced for large industries under National Motor Replacement Programme (NMRP) in FY 2020-21 and 2021-22, with deemed annual energy savings of 20000 units and avoided emissions of 16.4 $CO_2$. This programme is being executed through a collaboration between EESL and industrial units.
- In Punjab, Punjab Energy Development Agency (PEDA) has conducted a 'One day conference on Investment Bazar for Energy Efficiency' for industries, original equipment manufacturers (OEMs), ESCOs, and financial institutions to create awareness among the industry stakeholders on different financing schemes, EE products and services, and ESCO modes of implementation of EE projects, as well to convene a common platform for OEMs, ESCOs, financial institutions, and industries to interact and discuss the investment and financial potential.

## Programme(s) for EE in MSMEs

In SEEI 2021-22, seventeen (17) states reported having EE programmes in MSMEs.

- Fourteen (14) states—Assam, Chandigarh, Chhattisgarh, Gujrat, Haryana, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Odisha, Punjab, Rajasthan, Tamil Nadu, and Uttar Pradesh—have implemented the NMRP programme, through a collaboration between EESL and industrial units, to replace inefficient motors with EE ones. Under the programme, 543 motors in 27 industrial units in FY 2020-21 and 1,506 motors in 80 industrial units in FY 2021-22 were replaced.

**17 states reported EE programmes in MSME industries**

- In Andhra Pradesh, TERI carried out a situational analysis and prepared detailed project reports (DPRs) in three clusters, namely, the spinning cluster, cold storage cluster, and dal processing cluster. The deemed annual energy savings potential as per the DPRs is 0.4 MU.
- Kerala EMC conducted an energy optimisation study at ten selected bakery units in the Ernakulam district. The deemed annual energy savings potential is 0.08 MU. Furthermore, Kerala Development and Innovation Strategic Council (KDISC) introduced the One District-One Idea MSME Innovation Cluster programme, which is an innovation challenge for manufacturing clusters and micro-enterprise clusters. KDISC provides seed money for the innovation component and support on the latest EE technology to foster innovation.
- In Sikkim, the SDA conducted an awareness programme to promote EE and renewable energy technology in selected MSME clusters.
- In Telangana, 5 MSME units showed willingness to SDA towards adoption of energy efficiency. Accordingly, Telangana SDA in collaboration with BEE provided financial assistance to MSME units to reduce the energy consumption.

### Programme(s) for EE in PSUs (whole/part state ownership)

In SEEI 2021-22, only four (4) states—Andhra Pradesh, Karnataka, Kerala, and Odisha—reported having EE programmes in PSUs (whole/part state ownership).

- The PAT programme is underway in the PSU units of Andhra Pradesh and Karnataka. In Andhra Pradesh, there are a total of 15 PSUs under PAT IV and V, resulting in an overall energy savings of 0.38 MTOE. In Karnataka, the PAT programme in 6 PSUs yielded energy savings of 0.04 MTOE.
- Kerala EMC has introduced the Energy Audit Subsidy Scheme (EASS) for PSUs.
- In Odisha, Odisha Power Transmission Corporation Limited (OPTCL), a state-owned PSU, has undertaken an energy conservation programme focused on the replacement of conventional lighting with LED lights in switch yards and installing BEE star-rated ACs.

**4 states reported EE programmes in PSUs**

## INDUSTRY SPOTLIGHT

KDISC has introduced the One District-One Idea MSME Innovation Cluster programme for innovation promotion and local economic development. KDISC will provide monetary support to MSMEs for the innovation component and technology support for fostering innovation through green energy techniques, including DSM, sustainable development strategies, capacity building, and productivity enhancement[15].

# 3.3 MUNICIPAL SERVICES

Municipal services sector/urban local bodies (ULBs) consume electricity for various utility services like street lighting, water pumping, and sewage treatment in various public buildings. Currently, around 30% of the Indian population lives in urban areas, and continuous migration from rural areas is burdening the ULBs[16]. Municipal EE limits use of scarce commodities and stretches tight budgets, giving citizens improved access to electricity, water, heat, and air conditioning. Energy efficiency in municipal water supply systems can save water and energy while simultaneously reducing costs and improving the service.

In the SEEI 2021-22, there are three (3) indicators to evaluate EE initiatives in the municipal services sector, specifically in street lighting and water/sewerage systems. One (1) is a common indicator on institutional capacity, and two (2) are programme-specific indicators to assess programmes for EE street lighting and water/sewerage systems. The maximum score in this sector is 10. Out of a total of 10 points, the maximum score for the common indicators is 2, and that for the programme-specific indicators is 8. The overall scores of twenty states have increased in the municipal services sector compared to SEEI 2020.

The summary of the indicators in the municipal services sector is provided in Table 3.11. Figure 3.9 depicts each state's score for the municipal services sector across the two different indicator categories—common and programme-specific— grouping states based on their TFEC. The states' progress in percentage in SEEI 2021-22 compared to SEEI 2020 is shown in Figure 3.10.

**Table 3.11: Municipal services sector indicators**

| Sl. No. | Indicator | Max Score | Scoring Criteria |
|---|---|---|---|
| **Institutional Capacity** | | | |
| 1 | Advisory, certification, and enforcement capacity in state government<br>• Does the state have an entity to develop capacity and provide technical expertise on EE in municipal services for engineers, city officials, and other stakeholders?<br>• Does the state have a government authority to enforce EC/EE regulations or measures for municipalities?<br>• Is there a budget assigned to local authorities for EE activities? | 2 | Entity to develop capacity & provide technical expertise = 0.5, else 0<br>Government authority to enforce EC/ EE regulations = 1, else 0<br>Budget assigned to government authorities for EE activities = 0.5, else 0 |
| **State Programme** | | | |
| 2 | Programme(s) for EE street lighting:<br>Does the state have programme(s) for EE street lighting?<br>• What is the objective of the programme? (2 sentences)<br>• What is the target set under the programme?<br>• What is the timeline?<br>• How much money has been allocated & utilised to date?<br>• Who is running the programme? (list all actors, e.g. SDA, state dept., municipality, industry association, PPP, etc.)<br>• What is the progress to date?<br>• What are the energy savings (deemed or measured)?<br>• What quantity of emissions was avoided (based on energy savings)? | 4 | <br><br>0.5<br>0.5<br>0.5<br>0.5<br>0.5<br>0.5<br>0.5<br>0.5 |
| 3 | Programme(s) for EE water/sewerage:<br>Does the state have programme(s) for EE water/sewerage?<br>• What is the objective of the programme? (2 sentences)<br>• What is the target set under the programme?<br>• What is the timeline?<br>• How much money has been allocated & utilised to date?<br>• Who is running the programme? (list all actors, e.g. SDA, state dept., municipality, industry association, PPP, etc.)<br>• What is the progress to date?<br>• What are the energy savings (deemed or measured)?<br>• What quantity of emissions was avoided (based on energy savings)? | 4 | <br><br>0.5<br>0.5<br>0.5<br>0.5<br>0.5<br>0.5<br>0.5<br>0.5 |

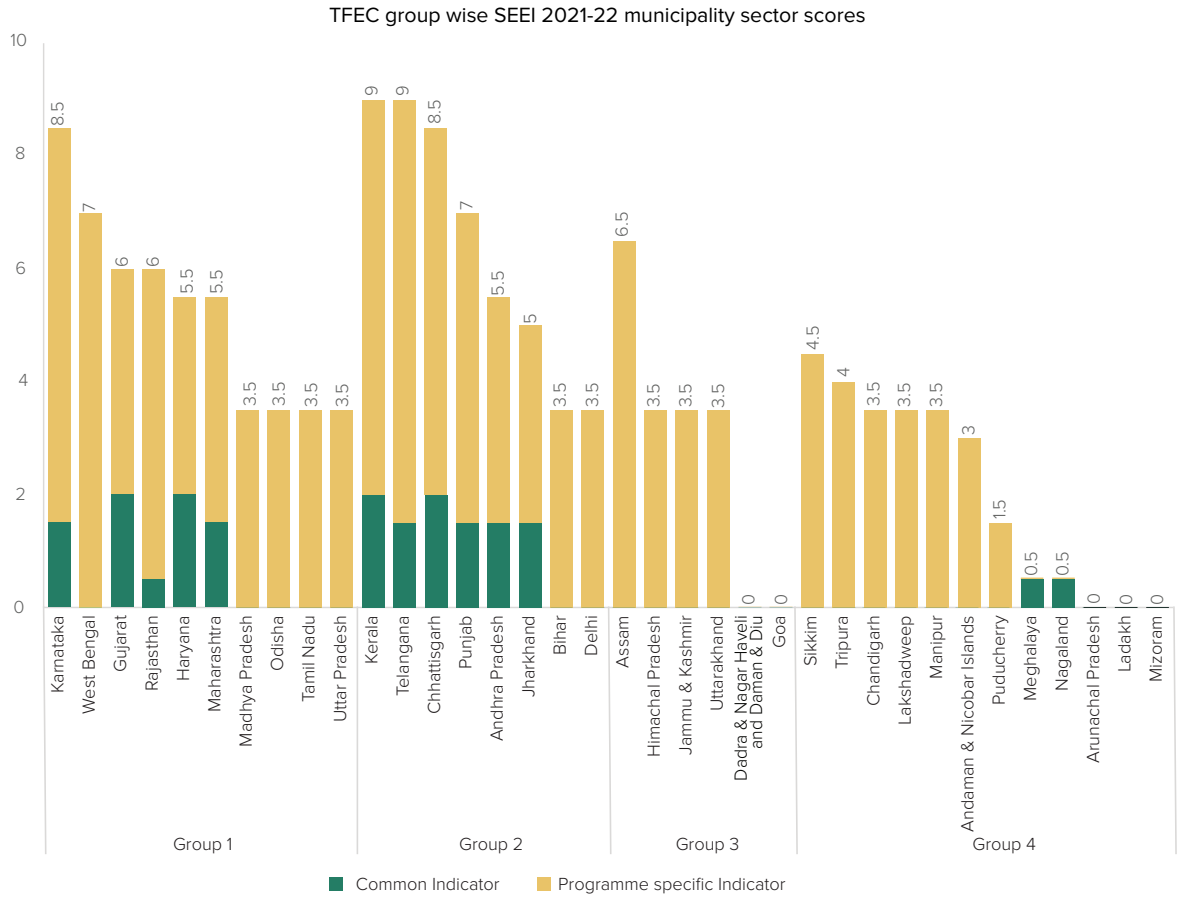



**Figure 3.9: TFEC group-wise municipal services sector state scores**

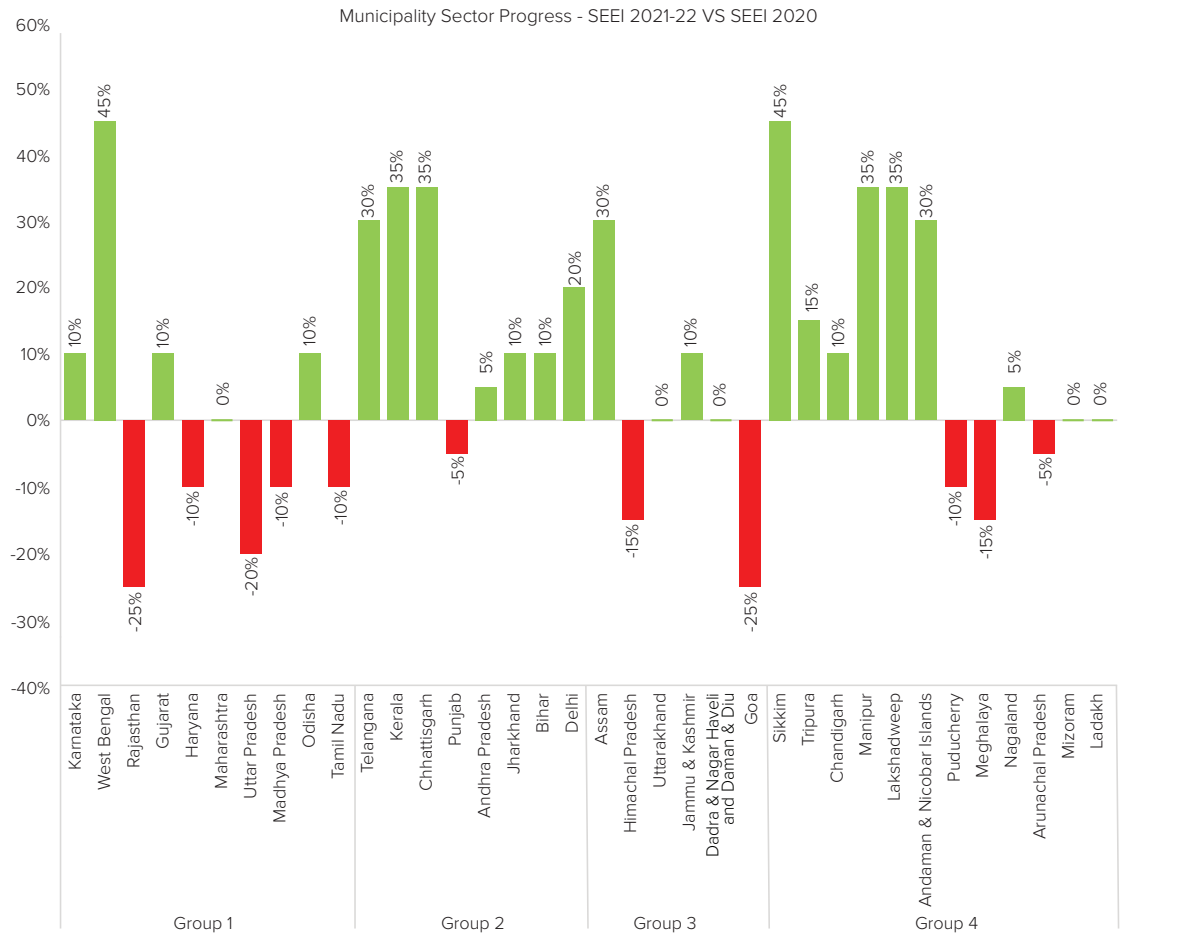



**Figure 3.10: TFEC group-wise state progress in municipal services sector — SEEI 2021-22 vs. SEEI 2020**

# SEEI 2021–22 MUNICIPAL SERVICES SECTOR SCORE HIGHLIGHTS

With 9 each out of the max total score of 10, Kerala and Telangana are the top-performing states in the municipal services sector. Other top-performing states include Karnataka and Chhattisgarh. In SEEI 2021-22, twenty states and UTs improved their scores in the municipality sector compared to SEEI 2020. The most improved states, Sikkim and West Bengal, saw an increase in score by 45% compared to SEEI 2020. Meanwhile, the scores of Rajasthan and Goa declined the most in this sector among all the states.

## 1. Common Indicator

### Institutional Capacity

Only twelve (12) states reported having an entity to develop capacity and provide technical expertise on EE in municipal services for engineers, city officials, and other stakeholders at the state level: Andhra Pradesh, Chhattisgarh, Gujarat, Haryana, Jharkhand, Karnataka, Kerala, Maharashtra, Meghalaya, Nagaland, Punjab, and Telangana. In most of these states, the SDA is the entity responsible for developing capacity and providing technical expertise on EE in municipal services.

- In Gujarat, Gujarat Urban Development Company Ltd. conducted various EE programmes for the municipal bodies in the state.
- In Haryana, HAREDA (SDA) conducted eight (8) webinars for the officials of ULBs, Urban Development Departments (UDDs), municipal corporations (MCs), Jal Nigam, and other relevant stakeholders.
- In Telangana, TSREDCO conducted ten (10) awareness programmes under BEE's Municipal Demand Side Management (MuDSM) programme in 2021.

Furthermore, eleven (11) states provided relevant information regarding the presence of a government authority to enforce EC/EE regulations or measures for the municipal services sector.

- The SDAs of nine (9) states—Andhra Pradesh, Chhattisgarh, Haryana, Jharkhand, Kerala, Maharashtra, Punjab, Rajasthan, and Telangana—act as the designated government authority to enforce EC/EE regulations or measures for municipalities.
- In Gujarat, Gujarat Urban Development Company Ltd. has been designated as the nodal agency for Municipal Energy Efficiency Programme (MEEP).
- In Karnataka, a State High Level Committee (SHLC) has been constituted under Karnataka Energy Conservation and Energy Efficiency Policy 2022-2027 under the chairmanship of the Chief Secretary/Principal Secretary to the Government Energy Department.

Only four (4) states, Chhattisgarh, Gujarat, Haryana, and Kerala, provided details about the assignment of the state budget to the authorities mentioned above for EE activities in the municipal services sector.

**Kerala and Telangana are the top-performing states in the municipality sector**

**Table 3.12:States and UTs with institutional capacity for EE in municipal services**

| State | Entity to develop capacity and provide technical expertise | Government authority to enforce EC/EE regulations | Budget assigned to state government authorities |
|---|---|---|---|
| Andhra Pradesh | ✓ | ✓ | * |
| Chhattisgarh | ✓ | ✓ | ✓ |
| Gujarat | ✓ | ✓ | ✓ |
| Haryana | ✓ | ✓ | ✓ |
| Jharkhand | ✓ | ✓ | * |
| Karnataka | ✓ | ✓ | * |
| Kerala | ✓ | ✓ | ✓ |
| Maharashtra | ✓ | ✓ | * |
| Meghalaya | ✓ | * | * |
| Nagaland | ✓ | * | * |
| Punjab | ✓ | ✓ | * |
| Telangana | ✓ | ✓ | * |

**No data reported by states.*
*Note: States with no data reported across all fields have been excluded from the table*

## 2. Programme-Specific Indicator – State Programme

In SEEI 2021-22, two programme-specific indicators are included to track and assess the implementation of programmes/projects by the SDAs and other state government entities, individually, through interdepartmental collaboration, in conjunction with BEE or industry associations, or in PPPs, to achieve EE in the municipal services sector. The highlights from these indicators are summarised below.

### Programme(s) for EE street lighting

In SEEI 2021-22, twenty-nine (29) states have EE programmes in street lighting. Out of these states, the Street Lighting National Programme (SLNP) and/or Atal Jyoti Yojana (AJAY) Programme are reported to be in progress in twenty-seven (27) states. The objective of the SLNP is to replace conventional street lights with LEDs, to reduce energy and maintenance costs for the municipality. On the other hand, AJAY is a sub-scheme under the Ministry of New and Renewable Energy's (MNRE) off-grid and decentralised solar application scheme. Under AJAY, solar LED lights are being installed in rural, semi-urban, and urban areas to help increase citizens' access to electric lighting. EESL is collaborating with UDDs, ULBs, and MCs to implement this programme.

**29 states reported EE programmes in street lighting**

- Under SLNP, 373 projects have been implemented across the country. The total cumulative energy savings for FY 2020-21 and 2021-22 was 2,345 MU, with 2 $MtCO_2$ of emissions avoided.
- Under AJAY, 21 projects have been implemented in rural, semi-urban and urban areas with less than 50% grid connectivity in various states. The total cumulative energy savings for FY 2020-21 & 2021-22 was 12 MU, with 0.01 $MtCO_2$ of emissions avoided.
- In Karnataka, the City Corporation and District Administration undertook EE programmes for street lighting, replacing existing streetlights with 8,95,116 LED streetlights across 266 ULBs.

- In Kerala, the NILAAVU scheme envisages the replacement of all conventional streetlights with LED streetlights in all local bodies. As per SEEI 2021-22 data, 4,33,979 LED streetlights have already been installed.
- In Puducherry, the UT's Municipality and Electricity Department has undertaken the LED streetlight programme.
- In Sikkim, the SDA has completed a demonstration project for the replacement of conventional streetlights with LED streetlights in Rongli, East Sikkim and Sombaria, West Sikkim.

**Table 3.13: States and UTs with SLNP and AJAY programmes for EE street lighting**

| Programme(s) | Names of states (Number of states) |
|---|---|
| SLNP and AJAY | Andaman & Nicobar Islands, Andhra Pradesh, Assam, Bihar, Chandigarh, Chhattisgarh, Delhi, Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Karnataka, Lakshadweep, Madhya Pradesh, Maharashtra, Manipur, Odisha, Punjab, Rajasthan, Tamil Nadu, Telangana, Tripura, Uttar Pradesh, Uttarakhand, and West Bengal (26) |

## Programme(s) for EE water/sewerage

In SEEI 2021-22, only nine (9) states reported having EE programmes in water/sewerage systems.

- Three (3) states, namely, Chhattisgarh, Punjab, and West Bengal, are participating in the Atal Mission for Rejuvenation and Urban Transformation (AMRUT) programme. The programme's main objective is to replace existing energy-inefficient pumps with EE ones.
- In Assam, Japan International Cooperation Agency (JICA) provides financial assistance to Guwahati Metropolitan Drinking Water and Sewerage Board for the Guwahati Sewerage Project. The programme's objective is to provide reliable sewerage services by constructing EE sewerage facilities and an extensive network of sewers in South and East Guwahati, thereby considerably improving sanitation and the living conditions of people in Guwahati City.
- In Karnataka, Bangalore Water Supply and Sewerage Board has undertaken the Cauvery Water Supply Scheme Stage V projects at TK Halli, Harohalli, and Tataguni. This project consists of designing, constructing, and commissioning a pump station & reservoir, with operation and maintenance for seven years.
- In Kerala, EMC conducted a detailed energy audit of 16 high-tension (HT) installations of the Kerala Water Authority to improve energy efficiency. The estimated annual energy savings from the implemented recommendations is 3.9 MU. The estimated yearly emission reduction is 0.003 $MtCO_2$.
- In Rajasthan, the upgradation of a 125 million litre per day (MLD) sewage treatment plant (STP) and construction of a new 90 MLD STP, along with a solar power plant and biogas power generation plant, is planned in order to meet post-treatment wastewater disposal standards. Treatment would remove the various contaminants present in sewage to produce effluent and sludge, which can be disposed of in the environment without causing health hazards or nuisance.
- In Sikkim, a demonstration project was undertaken for the replacement of eighty (80) energy-inefficient pumps with BEE star-rated pumps in Jorethang Town.



**9 states reported EE programmes in water/sewerage systems**

- In Telangana, the SDA conducted an investment grade energy audit of selected pumpsets at the Hyderabad Metropolitan Water Supply and Sewerage Board (HMWS&SB) Kalabgoor pumping station in Sangareddy District, Telangana. For FY 2020-21 & 2021-22, the estimated energy savings per annum is 4.6 MU, with 0.0038 $MtCO_2$ emissions avoided.

## MUNICIPAL SERVICES SPOTLIGHT

Sikkim SDA has undertaken a demonstration project for the replacement of conventional streetlights with LED streetlights in Rongli, East Sikkim and Sombaria, West Sikkim. 250 streetlights were identified and replaced with LED streetlights. The power consumption of the individual existing streetlights was 70 watts (W), compared to 45 W for the replacement LED lights.

# 3.4 TRANSPORT

The transport sector has the third-highest TFEC in India. The total energy consumed by the transport sector was 48,842 kilotonnes of oil equivalent (KTOE), nearly 9% of the country's total energy consumption. Most of the energy demand in this sector is met through crude oil.

In SEEI 2021-22, there are ten (10) indicators to evaluate EE initiatives in the transport sector. Out of these indicators, eight (8) are common indicators spanning policy, institutional capacity, adoption of EE measures, and energy savings, and two (2) are programme-specific indicators. The maximum score in this sector is 16. Out of 16, the maximum possible score is eight (8) each for the common and programme-specific indicator categories.

The overall scores of twenty-one (21) states and UTs have improved in the transport sector from SEEI 2020 to SEEI 2021-22.

The summary of the indicators in the transport sector is provided in Table 3.14. Figure 3.11 depicts each state's score for the transport sector across the two different indicator categories—common and programme-specific—, grouping states based on their TFEC. The states' progress in percentage in the SEEI 2021-22 compared to SEEI 2020 is shown in Figure 3.12.

**Table 3.14: Transport sector indicators**

| Sl. No. | Indicator | Max Score | Scoring Criteria |
|---|---|---|---|
| **Policy** | | | |
| 1 | State transport policy or guidelines to advocate fuel efficiency<br>Does the state have transport policy/guidelines to advocate fuel efficiency? | 0.5 | Yes = 0.5, else 0 |
| 2 | State electric mobility policy<br>Does the state have an electric mobility policy? | 1 | e-mobility policy notified = 1 pt.<br>if draft policy is issued = 0.5, else =0 |
| **Institutional Capacity** | | | |
| 3 | Advisory, certification, and enforcement capacity in state government<br>• Does the state have an entity to develop capacity and provide technical expertise on EE in transport for city officials, engineers, transport planners, fleet operators, and other stakeholders?<br>• Does the state have a government authority to enforce EC/EE regulations or measures for transport?<br>• Is there a budget assigned to state government authorities for EE activities? | 2 | Entity to develop capacity & provide technical expertise = 0.5, else 0<br>Government authority to enforce EC/EE regulations = 1, else 0<br>Budget assigned to government authorities for the above EE activities = 0.5, else 0 |
| **Adoption of EE Measures** | | | |
| 4 | Adoption of electric vehicles (EVs) for government use<br>• Does the state have a policy for procuring electric vehicles for government use?<br>• How many electric vehicles have been procured for government use? | 1 | State policy for procuring electric vehicles for government use = 0.5<br>Electric vehicles for government use = 0.5 |
| 5 | Penetration of hybrid and electric passenger vehicles<br>• What is the proportion of hybrid and electric passenger vehicles among passenger vehicles registered during the reporting period in the state? | 1.5 | 0.5 points if <= 1%<br>1 point if >1% and <2%<br>1.5 points if >=2% |
| 6 | Availability of charging infrastructure for electric mobility<br>• Has the state started rolling out charging infrastructure for all types of electric vehicles?<br>• Please give the number of charging stations installed through state initiative | 1 | If State has started rolling out charging infrastructure for EVs, then 0.5 points, else 0<br>If number of EV charging stations ≥ 1, then 0.5 points, else 0 |
| 7 | Adoption of biofuels in the state<br>• What is the proportion of ethanol blended fuel in petrol/diesel sales in the state? | 0.5 | Data provided = 0.5, else 0 |
| **Energy Savings** | | | |
| 8 | Fuel efficiency of SRTC fleet<br>• What is the fuel efficiency achieved by SRTCs in the state in terms of kilometre/litre? | 2 | Data provided = 0.5, else 0 |

| Sl. No. | Indicator | Max Score | Scoring Criteria |
|---|---|---|---|
| **State Programme** | | | |
| 9 | Programme(s) for EE public transport:<br>Does the state have any programme(s) for EE public transport?<br>• What is the objective of the programme? (2 sentences)<br>• What is the target set under the programme?<br>• What is the timeline?<br>• How much money has been allocated & utilised to date?<br>• Who is running the programme? (list all actors, e.g. SDA, state dept., municipality, industry association, PPP, etc.)<br>• What is the progress to date?<br>• What are the energy savings (deemed or measured)?<br>• What quantity of emissions was avoided (based on energy savings)? | 5 | <br><br>0.5<br>0.5<br>0.5<br><br><br>0.5<br>0.5<br>0.5<br>0.5<br><br>0.5 |
| 10 | Programme(s) for EE private transport:<br>Does the state have any programme(s) for EE private transport?<br>• What is the objective of the programme? (2 sentences)<br>• What is the target set under the programme?<br>• What is the timeline?<br>• How much money has been allocated & utilised to date?<br>• Who is running the programme? (list all actors, e.g. SDA, state dept., municipality, industry association, PPP, etc.)<br>• What is the progress to date?<br>• What are the energy savings (deemed or measured)?<br>• What quantity of emissions was avoided (based on energy savings)? | 5 | <br><br>0.5<br>0.5<br>0.5<br><br><br>0.5<br>0.5<br>1<br>1<br><br>0.5 |

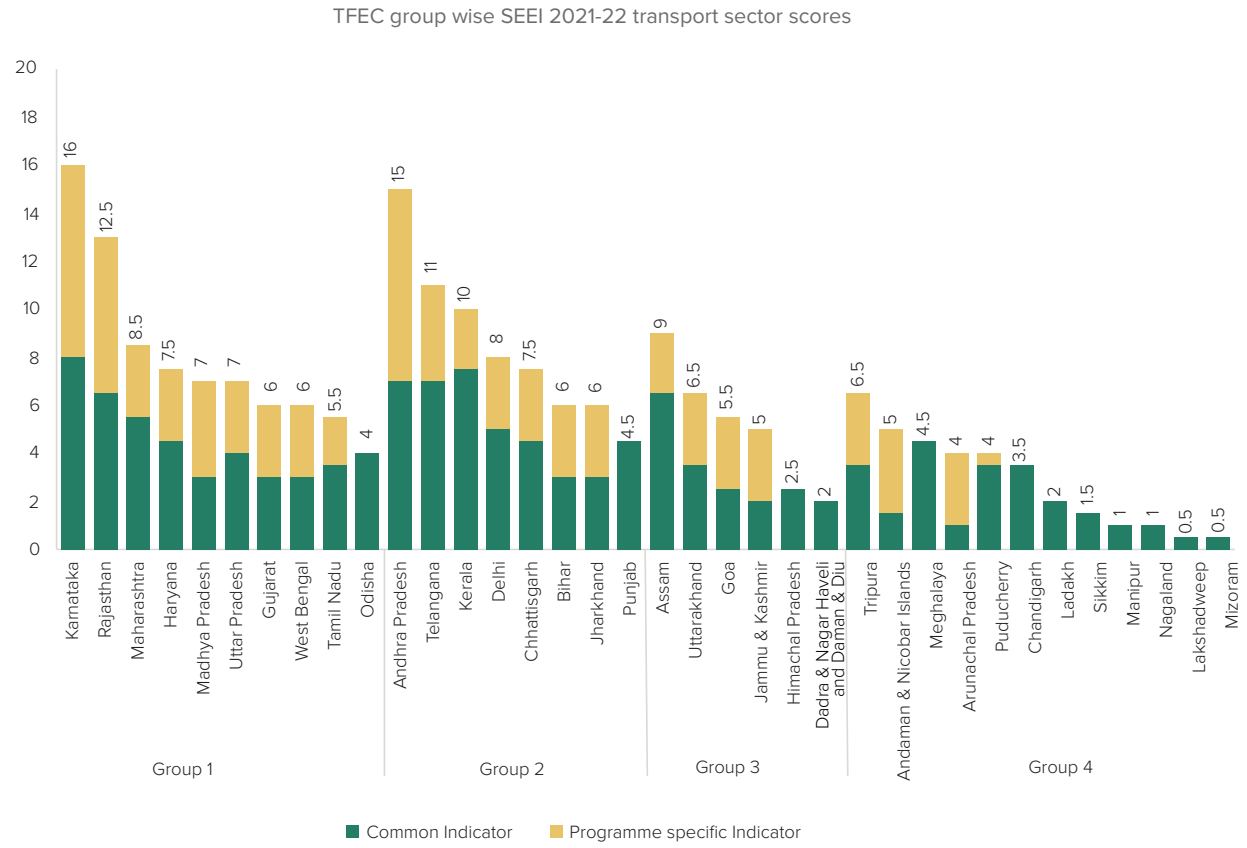



**Figure 3.11: TFEC group-wise transport sector state scores**

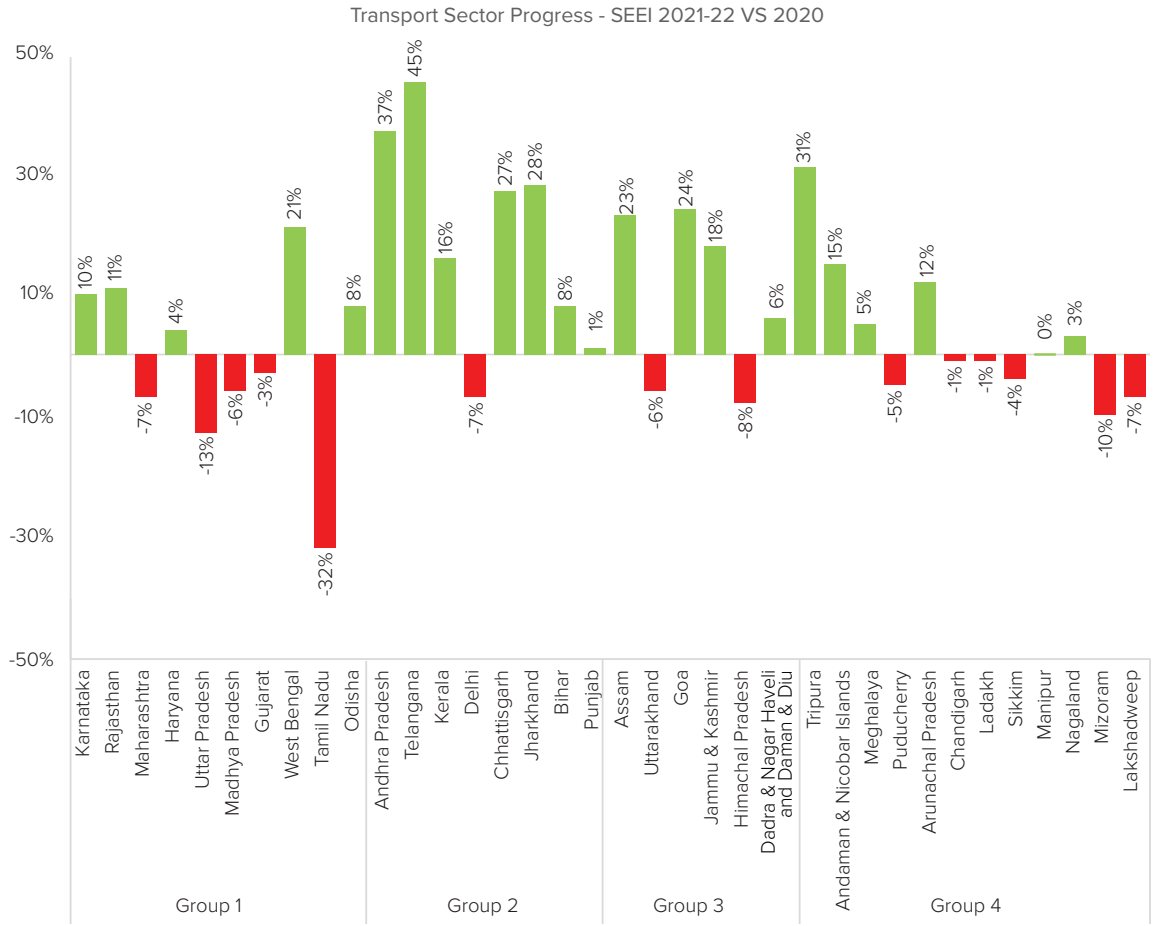



**Figure 3.12: TFEC group-wise state progress in transport sector — SEEI 2021-22 vs. SEEI 2020**

# SEEI 2021–22 TRANSPORT SECTOR SCORE HIGHLIGHTS

With a score of 16 out of the maximum total score of 16, Karnataka is the top-performing state in the transport sector. Other top-performing states include Andhra Pradesh, Rajasthan, Telangana, Kerala, Assam, Maharashtra, and Delhi. In SEEI 2021-22, 21 states and UTs improved their scores in the transport sector from SEEI 2020. The most improved state, Telangana, has increased its score by 45% in SEEI 2021-22 compared to SEEI 2020. Other improved states, namely, Andhra Pradesh, Tripura, Jharkhand, Chhattisgarh, Goa, Assam, and West Bengal, have improved their scores by over 20 percent.

**Karnataka is the top-performing state in the transport sector**

## 1. Common Indicator

### Policy

The states and UTs have performed well in this indicator category. In SEEI 2021-22, thirteen (13) more states have reported having a state electric mobility policy, bringing the total number of states that have notified such policies in the state for EV promotion and penetration to twenty-two (22), up from nine (9) in SEEI 2020. Draft electric mobility policies have been released in two (2) states, Bihar and Punjab. Furthermore, eleven (11) states have reported having transport policies/guidelines to advocate fuel efficiency.

Table 3.15 shows the states and UTs that have implemented the above-mentioned policy measures.

**22 states have notified state EV policy, up from 9 in SEEI 2020**

**Table 3.15: States and UTs with policies for EE in transport**

| State | States have Transport Policy or Guidelines to Advocate Fuel Efficiency | States have a notified Electric Mobility Policy |
|---|---|---|
| Andhra Pradesh | ✓ | ✓ |
| Assam | * | ✓ |
| Bihar | * | ✓ |
| Chandigarh | * | ✓ |
| Chhattisgarh | * | ✓ |
| Delhi | ✓ | ✓ |
| Gujarat | * | ✓ |
| Haryana | ✓ | ✓ |
| Himachal Pradesh | ✓ | ✓ |
| Jharkhand | ✓ | * |
| Karnataka | ✓ | ✓ |
| Kerala | ✓ | ✓ |
| Ladakh | * | ✓ |
| Madhya Pradesh | ✓ | ✓ |
| Maharashtra | ✓ | ✓ |
| Meghalaya | * | ✓ |
| Odisha | * | ✓ |
| Punjab | * | ✓ |
| Rajasthan | ✓ | ✓ |

| State | States have Transport Policy or Guidelines to Advocate Fuel Efficiency | States have a notified Electric Mobility Policy |
|---|---|---|
| **Tamil Nadu** | * | ✓ |
| **Telangana** | ✓ | ✓ |
| **Tripura** | * | ✓ |
| **Uttar Pradesh** | * | ✓ |
| **Uttarakhand** | * | ✓ |
| **West Bengal** | * | ✓ |

**No data reported by states.*
*Note 1: Yellow boxes signify draft EV policies notified*
*Note 2: States with no data reported across all fields have been excluded from the table*

## Institutional Capacity

The states and UTs are yet to meet the desired pace of institutional capacity development in the sector. Only eleven (11) states reported the presence of an entity to build capacity and provide technical expertise on EE in transport to the ecosystem stakeholders.

- In Andhra Pradesh, New and Renewable Energy Development Corporation Ltd. (NREDCAP), and in Haryana, Uttar Haryana Bijli Vitran Nigam Limited (UHBVNL), is the nodal agency for electric mobility and carrying out capacity building programmes, in coordination with the SDA.
- The transport departments of Haryana, Rajasthan, and Telangana have signed memorandums of understanding (MoUs) with Petroleum Conservation Research Association (PCRA) to organise training programmes related to EE in the transport sector.
- In Karnataka, Smart Grid and Electric Vehicle cell was set up under Karnataka Electric Vehicle and Energy Storage Policy 2017 for all issues related to EV charging infrastructure.
- In Assam, Meghalaya, and Punjab, the state transport departments are nodal agencies for providing capacity building and technical expertise on EE.
- In Chhattisgarh and Kerala, the SDAs are the responsible entities for the purpose.
- Maharashtra's National Mass Transit Training and Research Institute (NaMTTRI) in Mumbai, under the auspices of Mumbai Metropolitan Region Development Authority (MMRDA), provides training on EE within environmental sustainability.

Seven (7) states have a government authority to enforce EC/EE regulations or measures for transport. In most cases, the respective transport department or SDA is the enforcing authority for EC/EE regulations. However, only three (3) states, Karnataka, Kerala, and Telangana, reported dedicated line items in state budgets for EE activities in the transport sector. Table 3.16 shows the institutional capacity across the states and UTs for EE in transport.

**Table 3.16: States and UTs with institutional capacity for EE in transport**

| State | Entity to develop capacity and provide technical expertise | Government authority to enforce EC/EE regulations | Budget assigned to state government authorities |
|---|---|---|---|
| Andhra Pradesh | ✓ | ✓ | * |
| Assam | ✓ | ✓ | * |
| Chhattisgarh | ✓ | * | * |
| Haryana | ✓ | * | * |
| Karnataka | ✓ | ✓ | ✓ |
| Kerala | ✓ | ✓ | ✓ |
| Maharashtra | ✓ | * | * |
| Meghalaya | ✓ | * | * |
| Punjab | ✓ | ✓ | * |
| Rajasthan | ✓ | ✓ | * |
| Telangana | ✓ | ✓ | ✓ |

**No data reported by states.*
*Note: States with no data reported across all fields have been excluded from the table*

## Adoption of EE Measures

The states and UTs have shown progress in this indicator category over SEEI 2020. Three (3) new states have reported having a policy on EV procurement for government use, bringing the total up to fourteen (14). Table 3.17 highlights the states and UTs and the number of EVs in government use.

- In Andhra Pradesh, NREDCAP has formulated a scheme with funding support from National Thermal Power Corporation (NTPC), EESL, and other agencies to supply two-wheeler EVs on an equated monthly installment (EMI) basis to government employees without any investment from the state government to encourage EV adoption.
- Seven (7) states, Assam, Chhattisgarh, Haryana, Karnataka, Kerala, Meghalaya, and Telangana, have a provision for procuring EVs for government use in the state EV policies.
- In Delhi, the finance department has released an office memorandum for all departments, autonomous bodies, and grantee institutions to replace all existing petrol/diesel/CNG cars with EVs through a lease/hiring model within six months from April 2021.
- Jharkhand and Puducherry SDAs collaborated with EESL for the procurement of EVs for government use through the e-mobility programme.
- The Madhya Pradesh, Maharashtra, and Uttarakhand governments have standalone policies on EV procurement for government use.

**14 states reported a policy for procuring EVs for government use**

**Table 3.17: States with EVs reported for government use**

| State | Number of EVs in government use |
|---|---|
| **Andhra Pradesh** | 296 |
| **Kerala** | 54 |
| **Punjab** | 40 |
| **Chhattisgarh** | 9 |
| **Karnataka** | 7 |
| **Meghalaya** | 1 |
| **Sikkim** | 1 |

The proportion of hybrid and electric passenger vehicles among passenger vehicles registered in the reporting period (FY 2020-21 & 2021-22) in the state has been calculated from the VAHAN dashboard. Lakshadweep and Madhya Pradesh have been excluded due to a lack of data available in the VAHAN dashboard. Figure 3.13 depicts each state's penetration of hybrid and electric passenger vehicles, grouping states based on their TFEC.

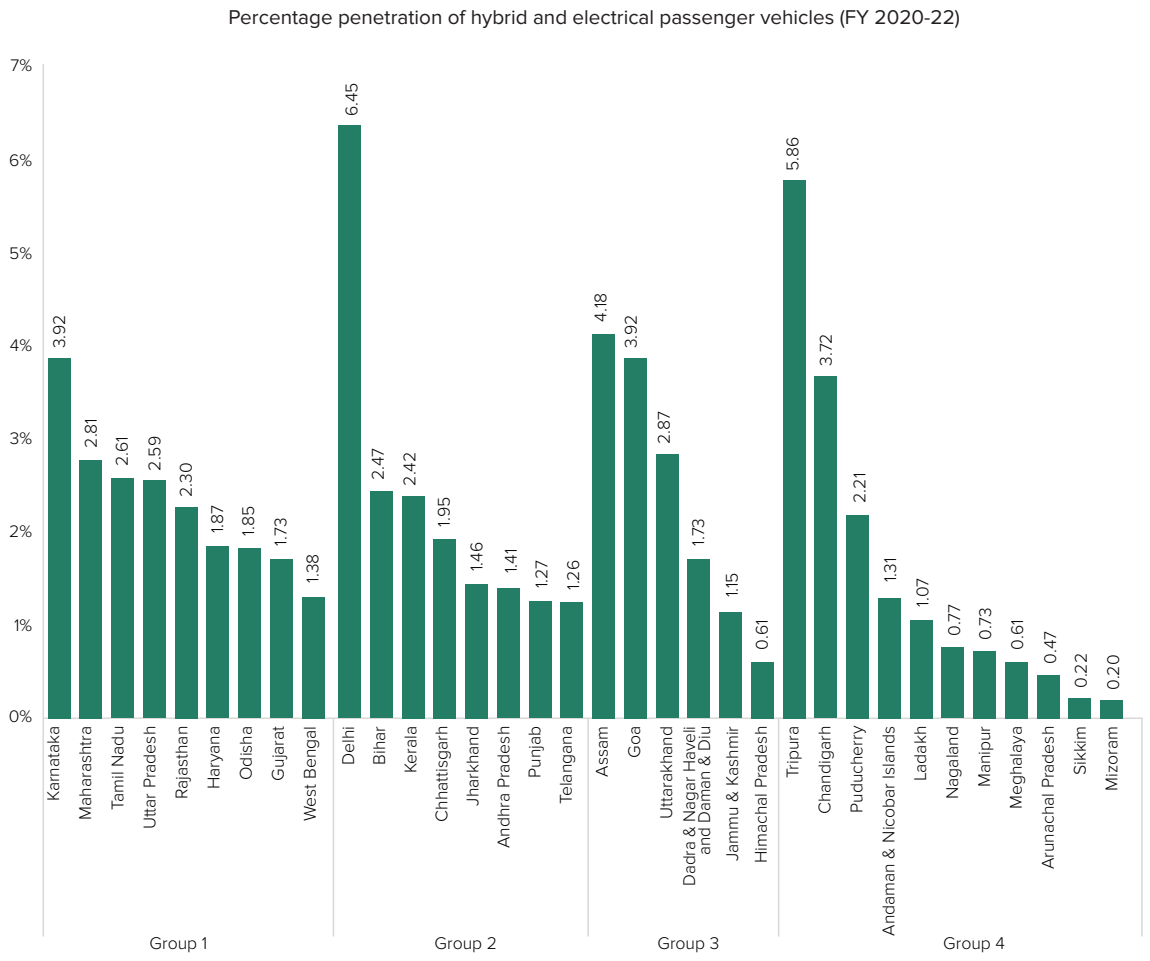



**Figure 3.13: Percentage penetration of hybrid and electric passenger vehicles in states and UTs group-wise for FY 2020–22**

**Table 3.18: Group-wise highest proportion of hybrid and electric passenger vehicle in the state**

| Group | State | Proportion of hybrid and electric vehicles |
|---|---|---|
| **Group 1** | Karnataka | 3.92% |
| **Group 2** | Delhi | 6.45% |
| **Group 3** | Assam | 4.18% |
| **Group 4** | Tripura | 5.86% |

Nine (9) states—Andhra Pradesh, Assam, Delhi, Karnataka, Kerala, Meghalaya, Odisha, Rajasthan, and Telangana—have started rolling out charging infrastructure for all types of electric vehicles in the state.

- Andhra Pradesh has rolled out charging infrastructure for all types of EVs through NREDCAP.
- The transport departments in Assam, Delhi, Kerala, Odisha, Rajasthan, and Telangana, BESOM in Karnataka, and Power Grid in Meghalaya have installed EV charging infrastructure.

For low-carbon development of the transport sector, India has a definitive focus on increased use of biofuels, especially ethanol blending in petrol. Figure 3.14 depicts each state's proportion of ethanol blending in petrol, grouping states based on their TFEC.

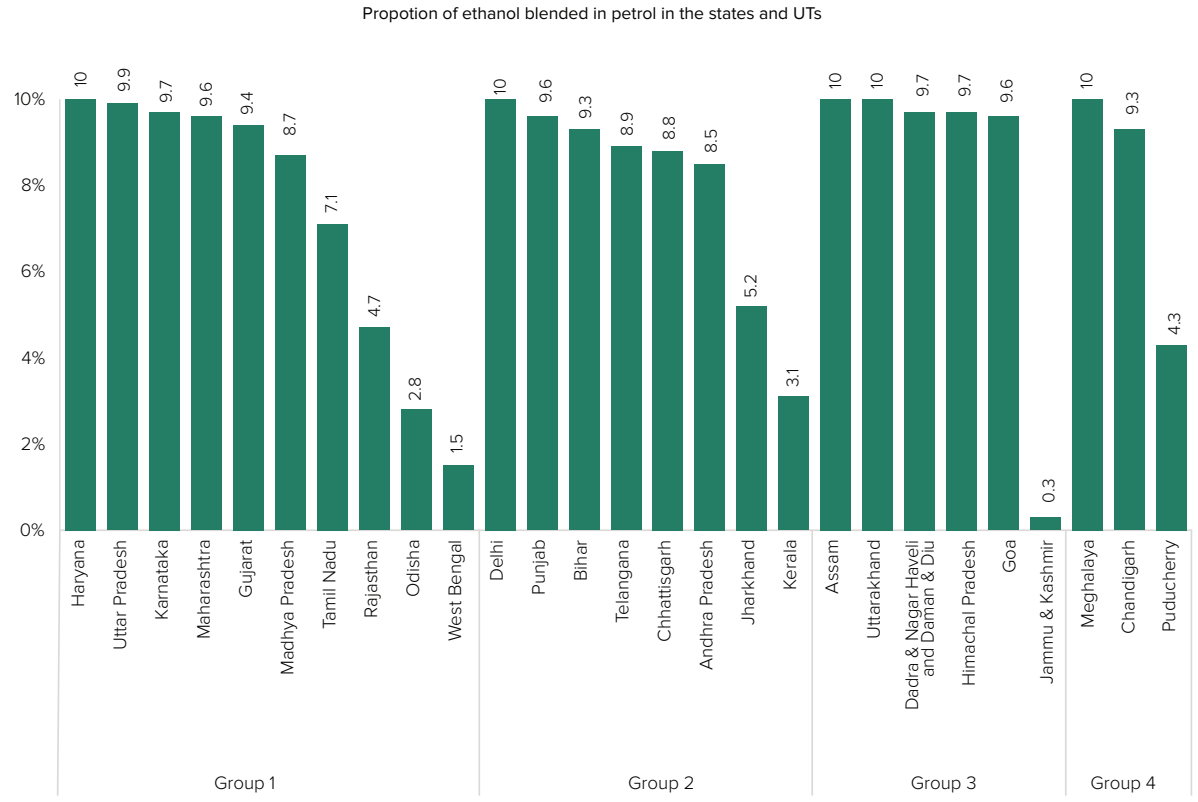



**Figure 3.14: Group-wise state proportion of ethanol blended in petrol across the state and UTs**

As observed from the graph above, the proportion of ethanol blending in petrol is 10% in five (5) states, namely, Assam, Delhi, Haryana, Meghalaya, and Uttarakhand. It is over 7% in fifteen states and UTs. It is pertinent to mention that in December 2022, the Government of India amended the National Policy on Biofuels 2018, which has advanced the target of 20% blending of ethanol in petrol to ESY 2025-26 from 2030.

### Energy Savings

Compared to four (4) states in SEEI 2020, nine (9) states reported the fuel efficiency achieved by their SRTCs in SEEI 2021-22. Figure 3.19 lists the states and fuel efficiency achieved by SRTCs in kilometre (km)/litre (L).

**Table 3.19: Fuel efficiency of SRTCs reported by states**

| State | Fuel efficiency (km/L) |
|---|---|
| **Andhra Pradesh** | 5.25 |
| **Assam** | 4.30 |
| **Karnataka** | 5.03 |
| **Maharashtra** | 4.42 |
| **Puducherry** | 4.62 |
| **Rajasthan** | 5.20 |
| **Tripura** | 5.20 |
| **Telangana** | 5.75 |
| **Uttar Pradesh** | 5.26 |

**22 states have EE programmes in public transport while only 6 reported in private transport**

## 2. Programme-Specific Indicator – State Programme

In SEEI 2021-22, there are two (2) programme-specific indicators to track and assess the implementation of programmes/projects by the SDAs and other state government entities, individually, through interdepartmental collaboration, in conjunction with BEE or industry associations, or in PPPs to achieve EE in the transport sector. The highlights from these indicators are summarised below.

### Programme(s) for EE public transport

In SEEI 2021-22, twenty-two (22) states have programmes for EE public transport.

- Fifteen (15) states have reported the implementation of the national e-mobility programme for EE public transport, shown in Table 3.20. The programme provides an impetus for Indian vehicle manufacturers, charging infrastructure companies, fleet operators, and service providers to gain efficiencies of scale, drive down costs, create local manufacturing facilities, and enhance technical expertise[17]. EESL and the state government run the programme. 1,820 EVs have been deployed across the states, saving 57.6 million L of fuel up to FY 2021-22.
- In Puducherry, the SDA has organised an awareness rally under the 'Go-Electric Campaign' in collaboration with the DISCOM.
- The Andhra Pradesh State Road Transport Corporation (APSRTC) collaborated with PCRA to conduct the Oil & Gas Conservation Awareness Drive 2021 in all depots and zonal workshops to emphasise the importance of conserving petrol products and gas. These drives resulted in total cumulative diesel savings of 52,282 L and an emission avoidance of 181 $tCO_2$ in FY 2021-22.

- The Karnataka State Road Transport Corporation (KSRTC) and Bengaluru Metropolitan Transport Corporation (BMTC) procured 440 EV buses for public transport to reduce fuel consumption and achieve zero tailpipe emissions. The total cumulative diesel savings due to this programme were 68,339 L, and the avoided emissions are 34 $tCO_2$ per year.
- Kerala State Road Transport Corporation procured 100 CNG buses to improve the energy efficiency of the public transport system and reduce the funds spent on fuel purchases.
- Rajasthan and Telangana SRTC collaborated with PCRA to train drivers, officials, and fleet operators on fuel efficiency.

### Programme(s) for EE private transport

In SEEI 2021-22, only six (6) states reported on EE for private transport.

- Andhra Pradesh, Delhi, and Goa have EV car lease programmes for EE private transport shown in Table 3.20. The main objective of this programme is to replace existing petrol and diesel cars with EVs on a lease basis. The programme is run jointly by EESL and the state government departments.
- In Karnataka, Bangalore Electricity Supply Company Limited (BESCOM), with the help of the transport department, installed 61 public charging stations for private EVs. This programme aims to offer flexible charging opportunities for EV promotion and penetration in the state. The programme resulted in a total cumulative diesel/petrol savings of 1,79,591 L and avoided emissions of 156 $tCO_2$ in FY 2020-21 and 2021-22.
- In Rajasthan, the transport department has released a notification to reimburse the state component of the Goods and Services Tax (SGST) paid to all new private EV purchasers. The objective of this programme is to increase private EV penetration through upfront incentives.
- In Telangana, the 12$^{th}$ EV trade exposition in India was held in December 2021 in Hyderabad, Telangana to disseminate awareness on EE in transport and promote EE for private use in the state.

**Table 3.20: States and UTs with national E-mobility programme**

| Programme | Names of states (Number of states) |
|---|---|
| National e-Mobility Programme for public transport | Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Gujarat, Haryana, Jharkhand, Madhya Pradesh, Maharashtra, Tamil Nadu, Tripura, Uttar Pradesh, Uttarakhand, and West Bengal (15) |
| National e-Mobility Programme for private transport | Andhra Pradesh, Delhi, and Goa (3) |

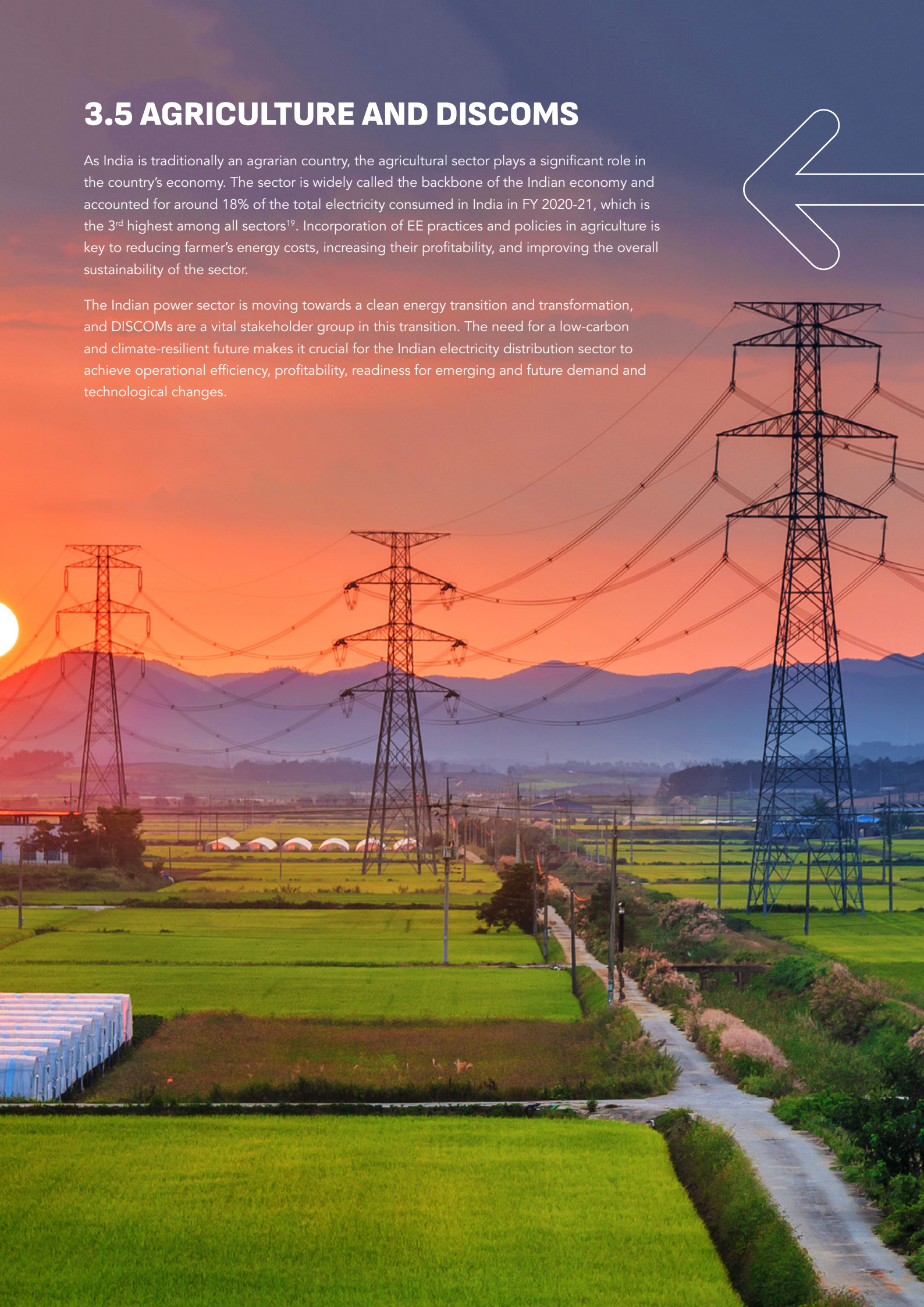
## TRANSPORT SPOTLIGHT

The transition towards EVs is challenging due to the high upfront purchase cost, range anxiety, and lack of awareness. To overcome these challenges, there are financial incentives for all eligible EVs in the Rajasthan EV Policy[18]. Financial incentives are given upfront to vehicles based on the battery capacity and retrofit kit for two-, three-, and four-wheeler vehicles and buses. Further, in a commendable step, the transport department of Rajasthan has released an order to reimburse 100% SGST to EV vehicle owners to increase EV penetration.

# 3.5 AGRICULTURE AND DISCOMS

As India is traditionally an agrarian country, the agricultural sector plays a significant role in the country's economy. The sector is widely called the backbone of the Indian economy and accounted for around 18% of the total electricity consumed in India in FY 2020-21, which is the 3rd highest among all sectors[19]. Incorporation of EE practices and policies in agriculture is key to reducing farmer's energy costs, increasing their profitability, and improving the overall sustainability of the sector.

The Indian power sector is moving towards a clean energy transition and transformation, and DISCOMs are a vital stakeholder group in this transition. The need for a low-carbon and climate-resilient future makes it crucial for the Indian electricity distribution sector to achieve operational efficiency, profitability, readiness for emerging and future demand and technological changes.



Unlike in the previous indices, in SEEI 2021-22, the agriculture and DISCOM sectors are treated independently, with separate indicator sets and analyses. SEEI 2021-22 has four (4) and five (5) total indicators in the agriculture and DISCOM sectors, respectively. The indicators in the agriculture sector seek to evaluate policies on cold chain infrastructure, policies on integrated water and energy savings, and relevant EE initiatives in the sector. The agriculture sector has three (3) common indicators and one (1) programme-specific indicator. The maximum score in the agriculture sector is 6, of which the maximum score for common indicators is 2 and that for programme-specific indicators is 4.

The DISCOM sector consists of indicators pertaining to T&D losses, time of day (ToD)/time of use (ToU) tariffs, energy audits, smart metering, and DSM programmes. In the DISCOM sector, there are four (4) common indicators and one (1) programme-specific indicator. The maximum score in the DISCOM sector is 10, out of which the maximum score for common indicators is 6 and that for programme-specific indicators is 4.

For comparison with SEEI 2020 scores, the aggregated scores in the states in the agriculture and DISCOM sectors have been added in SEEI 2021-22. It is observed that the overall scores of 24 states in SEEI 2021-22 have increased in these two sectors in comparison with SEEI 2020.

Figure 3.15 depicts each state's combined score for the agriculture and DISCOM sectors across the two different indicator categories—common & programme-specific indicators—grouping states based on their TFEC. The states' progress in percentage in the SEEI 2021-22 compared to SEEI 2020 is shown in Figure 3.16.

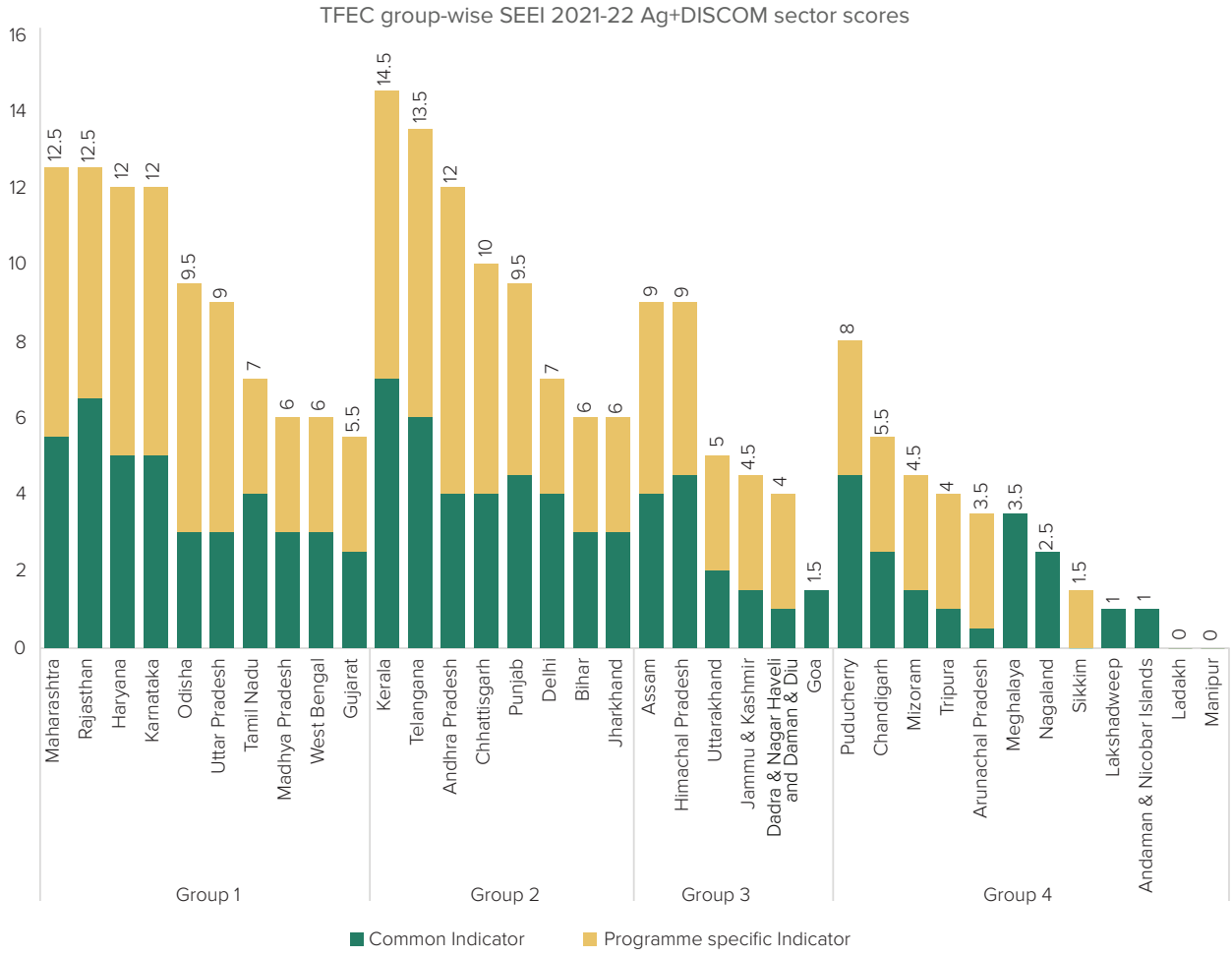



**Figure 3.15: TFEC group-wise Ag+DISCOM sector state scores**

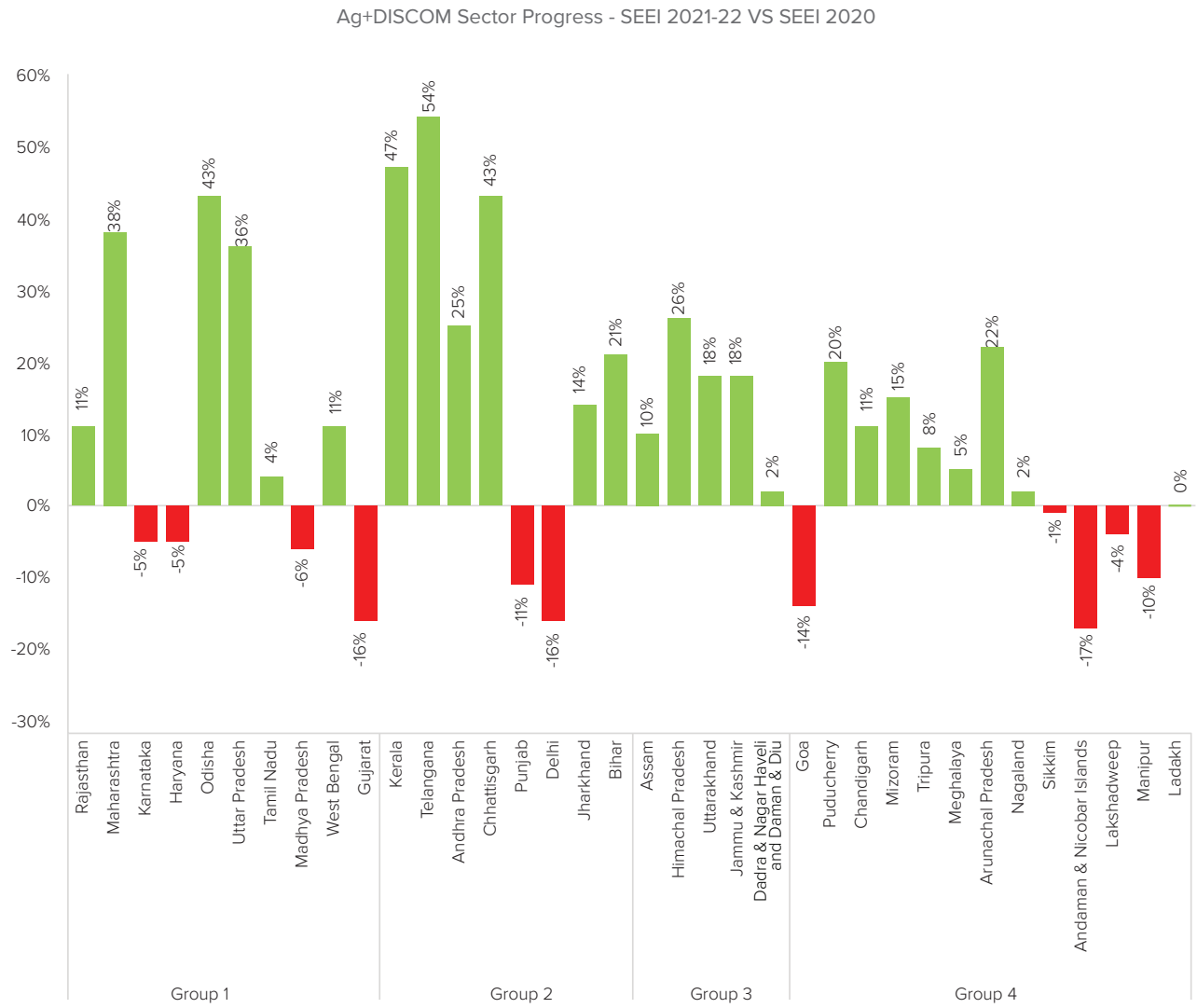



**Figure 3.16: TFEC group-wise state progress in Ag+DISCOM sector — SEEI 2021-22 vs SEEI 2020**

## 3.5.1 AGRICULTURE SECTOR

As mentioned earlier, in SEEI 2021-22, the agriculture sector is treated as an independent sector for the first time to evaluate the EE initiatives in the states and UTs.

The summary of the indicators in the agriculture sector is provided in Table 3.21. Figure 3.17 depicts each state's score for the agriculture sector across the two indicator categories—common and programme-specific— grouping states based on their TFEC.

**Table 3.21: Agriculture sector indicators**

| Sl. No. | Indicator | Max Score | Scoring Criteria |
|---|---|---|---|
| **Policy** | | | |
| 1 | Policy for encouraging EE and climate-friendly cold chain infrastructure development in the state<br>Does the state have guidelines/regulations to incorporate EE/EC measures in the development of integrated cold chain infrastructure?<br>If 'Yes', mention if any progress has been made in the form of workshops, pilots, etc. | 0.5 | If Yes = 0.5, else 0 |
| 2 | Policy for integrated water and energy savings in the agriculture sector in the state<br>Does the state have a policy for integrated water and energy savings in the agriculture sector?<br>If 'Yes', mention if any progress has been made in the form of workshops, pilots, etc. | 0.5 | If Yes = 0.5, else 0 |
| **Institutional Capacity** | | | |
| 3 | Advisory capacity in the state government<br>• Does the state have an entity to develop capacity and provide technical expertise on EC/EE in agriculture for farmers, producer organisations, government officials, or other stakeholders in the value chain?<br>• Is there a budget assigned for developing capacity to implement EE measures in agriculture? | 1 | Entity to develop capacity and provide technical expertise = 0.5<br>Budget assigned for developing capacity to implement EE measures in agriculture = 0.5 |
| **State Programme** | | | |
| 4 | Programme(s) for EE in agriculture:<br>Does the state have programme(s) for EE in agriculture?<br>• What is the objective of the programme? (2 sentences)<br>• What is the target set under the programme?<br>• What is the timeline?<br>• How much money has been allocated & utilised to date?<br>• Who is running the programme? (list all actors, e.g. SDA, state dept., municipality, industry association, PPP, etc.)<br>• What is the progress to date?<br>• What are the energy savings (deemed or measured)?<br>• What quantity of emissions was avoided (based on energy savings)? | 4 | <br><br>0.5<br>0.5<br>0.5<br>0.5<br>0.5<br>0.5<br>0.5<br>0.5 |

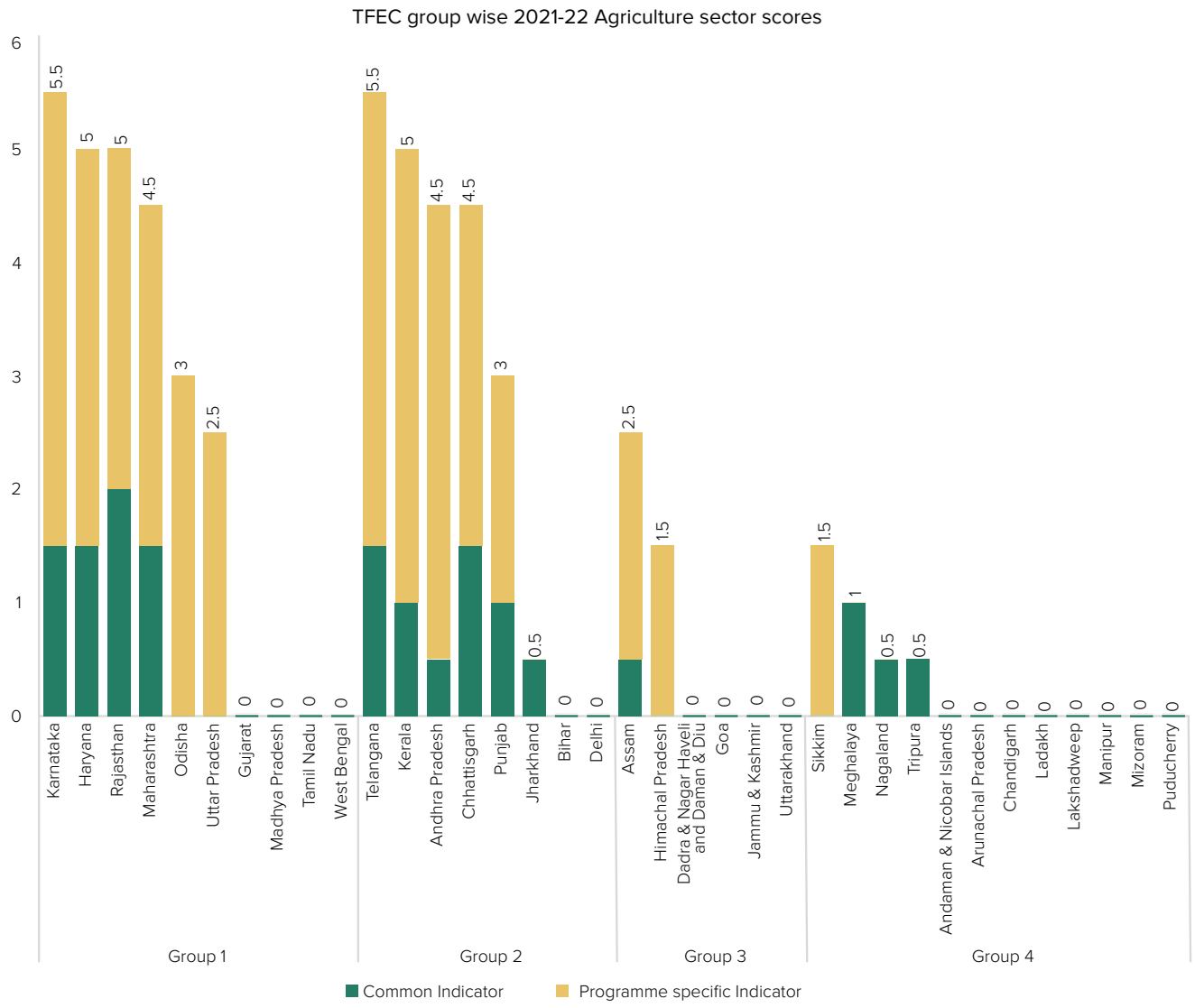



**Figure 3.17: TFEC group-wise agriculture sector state scores**

# SEEI 2021-22 AGRICULTURE SECTOR SCORE HIGHLIGHTS

With a score of 5.5 out of a maximum total score of 6, Karnataka and Telangana are the top-performing states in the agriculture sector. Other top-performing states include Haryana, Rajasthan, Kerala, Maharashtra, Andhra Pradesh, Chhattisgarh, Punjab, and Odisha.

## 1. Common Indicator

### Policy

The performance of the states and UTs is fairly minimal in this indicator category. Only four (4) states have reported having policies to encourage EE and climate-friendly cold chain infrastructure development in the state. States must leverage policy interventions with government-supported investment and financing models to ensure the development of an EE cold chain from its inception. An integrated cold chain policy with a strong focus on promoting EE end-to-end cold chain infrastructure must be developed and implemented in all states. Regarding the policy for integrated water and energy savings in the agriculture sector in the state, only nine (9) states provided relevant information. In SEEI 2020, the number of such states was five (5).

**Karnataka and Telangana are the top-performing states in the agriculture sector**

**Table 3.22: States and UTs with policies for EE in agriculture**

| Indicator | Names of states (Number of states) |
|---|---|
| States that have a policy for encouraging EE and climate-friendly cold chain infrastructure development | Assam, Maharashtra, Rajasthan, and Telangana (4) |
| States that have policy support for integrated water and energy savings in the agriculture sector | Chhattisgarh, Haryana, Karnataka, Maharashtra, Meghalaya, Punjab, Rajasthan, Telangana, and Tripura (9) |

## Institutional Capacity

Twelve (12) states reportedly have a state designated entity to develop capacity and provide technical expertise on EC/EE in agriculture for farmers, producer organisations, government officials, and other stakeholders in the value chain.

- The SDAs of Andhra Pradesh, Chhattisgarh, Haryana, Jharkhand, Karnataka, Kerala, Maharashtra, Meghalaya, Punjab, and Rajasthan have conducted capacity building and training programmes for farmers, pump technicians, etc. under BEE's Agriculture Demand Side Management (AgDSM).
- In Nagaland, the Directorate of Agriculture provides departmental technical expertise in solar-powered water pumps and gravitational force water pumps for micro-irrigation, home-scale solar-powered packaging and processing units, and zero energy cold storage.
- In Telangana, the Directorate of Agriculture conducted a training programme using Rythu Vedikas[20] as a platform on EE technologies for cold storage, direct seeding, organic farming, and soil and water conservation.

Only five (5) states reportedly have budgets allocated for developing capacity to implement EE measures in agriculture.

**Table 3.23: States and UT with institutional capacity for EE in agriculture**

| State | Entity to develop capacity and provide technical expertise | Budget assigned to state government authorities |
|---|---|---|
| **Andhra Pradesh** | ✓ | * |
| **Chhattisgarh** | ✓ | ✓ |
| **Haryana** | ✓ | ✓ |
| **Jharkhand** | ✓ | * |
| **Karnataka** | ✓ | ✓ |
| **Kerala** | ✓ | ✓ |
| **Maharashtra** | ✓ | * |
| **Meghalaya** | ✓ | * |
| **Nagaland** | ✓ | * |
| **Punjab** | ✓ | * |
| **Rajasthan** | ✓ | ✓ |
| **Telangana** | ✓ | * |

**No data reported by states.*
*Note: States with no data reported across all fields have been excluded from the table*

## 2. Programme-Specific Indicator – State Programme

In SEEI 2021-22, a programme-specific indicator has been included to track and assess the implementation of programmes/projects undertaken by SDA and other state entities to achieve EE in the agriculture sector.

### Programme(s) for EE in agriculture

In SEEI 2021-22, fourteen (14) states reported having EE programmes in agriculture: Andhra Pradesh, Assam, Chhattisgarh, Haryana, Himachal Pradesh, Karnataka, Kerala, Maharashtra, Odisha, Punjab, Rajasthan, Sikkim, Telangana, and Uttar Pradesh.

- In Andhra Pradesh and Uttar Pradesh, Andhra Pradesh Eastern Power Distribution Company Limited (APEPDCL) and UPPCL, respectively, collaborated with EESL to replace old conventional pumps with EE ones in the states. These projects resulted in total energy savings of 210 MU and avoided emissions of 1.25 $MtCO_2$.
- In Chhattisgarh, CREDA is running the Saur Sujla scheme for retrofitting conventional pumps with EE pumps. This project resulted in total energy saving of 3.7 MU and avoided emission of 2964 $tCO_2$.
- Haryana has various programmes like solar pumps, youth farmer training, mandatory BEE 4-star-rated pumps, and sprinkler system installation to promote and enhance awareness about EE in the agriculture sector.
- EMC Kerala and the Department of Agriculture jointly undertook a programme to make the state's dewatering pump sets energy-efficient.
- In Maharashtra, Mukhyamantri Saur Krushi Pump Yojna, an initiative focused on replacing all diesel agricultural pumps with solar pumps, is being implemented by Maharashtra State Electricity Distribution Company Limited (MSEDCL) to reduce energy consumption and emissions.
- The PM-KUSUM scheme is underway in Himachal Pradesh and Karnataka.
- The SDAs of Assam, Karnataka, Odisha, Punjab, and Sikkim have conducted awareness and capacity building programmes on EE for farmers under BEE's AgDSM programme.
- Odisha has undertaken a feeder separation project for agricultural feeders.
- In Rajasthan, an agricultural feeder segregation programme is being rolled out by DISCOMs under Revamped Public Distribution System (RPDS).
- In Telangana, the Horticulture Department has introduced the Telangana Micro Irrigation Project for small and marginal farmers for effective and efficient use of energy and water.

**14 states have reported having programmes on EE in agriculture**

## AGRICULTURE SPOTLIGHT

The Telangana Horticulture Department has introduced the Telangana Micro Irrigation Project for small and marginal farmers. Under this programme, all small and marginal farmers, irrespective of economic status, are eligible for a subsidy for drip irrigation/ micro-irrigation systems for up to 12.5 acres of land. Effective water utilisation through micro-irrigation is crucial to improve crop productivity, cost of production, and the living standards of small and marginal farmers. This is achieved through enhanced water-use efficiency through micro-irrigation, resulting in less energy used for pumping. This unique programme is being implemented in 32 districts in Telangana[21].

## 3.5.2 DISCOM SECTOR

In SEEI 2021-22, the DISCOM sector is treated as an independent sector for the first time to evaluate related EE initiatives in the states and UTs.

The summary of the indicators in the DISCOM sector is provided in Table 3.24. Figure 3.18 depicts each state's score for the DISCOM sector across the two indicator categories—common and programme-specific—, grouping states based on their TFEC.

**Table 3.24: DISCOM sector indicators**

| Sl. No. | Indicator | Max Score | Scoring Criteria |
|---|---|---|---|
| **Policy** | | | |
| 1 | T&D Losses<br>• Has the State set a target for T&D losses (technical losses only) in DISCOMs?<br>• Indicate the target and actual % T&D losses (technical only) | 1.5 | Target set = 0.5, else 0;<br>1 point if actual <=15%;<br>0.5 points if actual >15 &<=20%;<br>0 points if actual >20% |
| 2 | ToD/ToU Tariff<br>• Have DISCOMs in the state implemented ToD/ToU tariff for the following consumers:<br>- Domestic<br>- Commercial<br>- Industrial | 1 | 0.5 points for industrial/commercial ToD tariff;<br>0.5 points for domestic ToD tariff |
| **Institutional Capacity** | | | |
| 3 | Bureau of Energy Efficiency (Manner and Intervals for Conduct of Energy Audit (Accounting) in Electricity Distribution Companies) Regulations, 2021<br>• Has the state appointed a nodal officer for conducting energy audits (accounting) in DISCOMs?<br>• Has the state submitted the mandated periodic energy audit/accounting report?<br>• What is the status of feeder metering?<br>• What is the status of distribution transformer metering? | 1.5 | Nodal officer appointed = 0.5, else 0;<br>At least one periodic audit report submitted = 0.5, else 0;<br>Status of feeder and/or DT metering submitted = 0.5, else 0; |
| **Adoption of EE Measures** | | | |
| 4 | Smart metering<br>• What is the proportion of consumers with smart metering?<br>• Is the smart meter data analysed or used for consumer awareness to enhance DISCOM operational efficiency? | 2 | 0.5 points for number of consumers with smart metering, 1 point for % of consumers with smart metering.<br>1 point for smart meter data analysed & used for consumer awareness, to enhance DISCOM operational efficiency |

| Sl. No. | Indicator | Max Score | Scoring Criteria |
|---|---|---|---|
| **State Programme** | | | |
| 5 | Programme(s) for DSM:<br>Does the state have DSM programme(s)?<br>• What is the objective of the programme? (2 sentences)<br>• What is the target set under the programme?<br>• What is the timeline?<br>• How much money has been allocated & utilised to date?<br>• Who is running the programme? (stakeholders & departments engaged in the programme)<br>• What is the progress to date?<br>• What are the energy savings (deemed or measured)?<br>• What quantity of emissions was avoided (based on energy savings)? | 4 | 0.5<br>0.5<br>0.5<br>0.5<br>0.5<br>0.5<br>0.5<br>0.5 |

TFEC group wise 2021-22 DISCOM sector scores

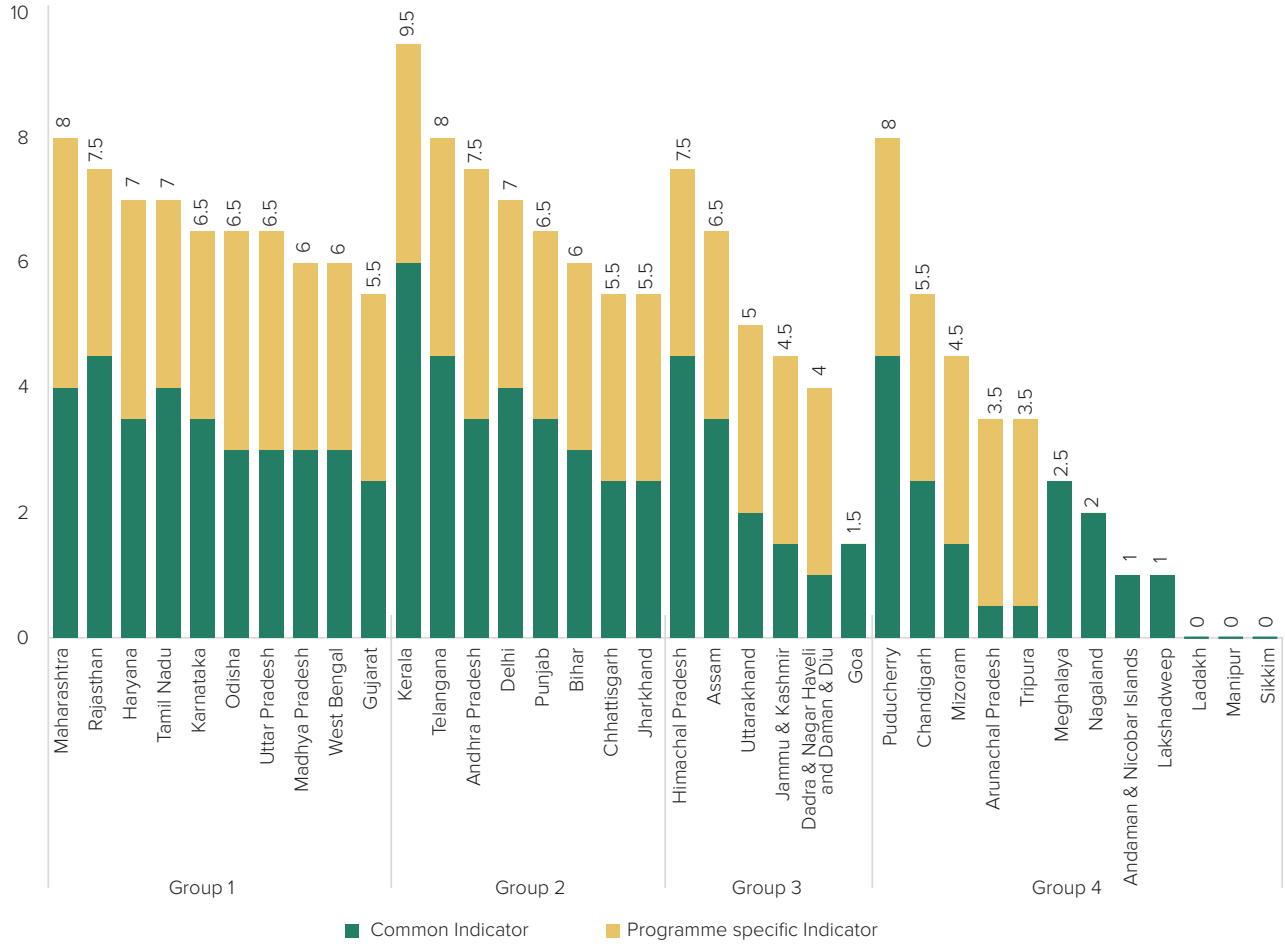



**Figure 3.18: TFEC group-wise DISCOM sector state scores**

# SEEI 2021–22 DISCOM SECTOR SCORE HIGHLIGHTS:

With a score of 9.5 out of a maximum total score of 10, Kerala is the top-performing state in the DISCOM sector. Other top-performing states include Maharashtra, Telangana, Puducherry, Andhra Pradesh, Himachal Pradesh, Rajasthan, Delhi, Haryana, and Tamil Nadu.

## 1. Common Indicator

### Policy

The states and UTs exhibited satisfactory performance in this indicator category in the DISCOM sector. T&D loss is an important yardstick to measure DISCOMs' operational efficiency. The Ministry of Power (MoP), Government of India, in consultation with BEE, has set a target for T&D loss percentage for 95 DISCOMs under PAT Cycle VII. Based on BEE data, Figure 3.19 depicts the T&D losses of states and UTs for FY 2020-21.

**Kerala is the top-performing state in the DISCOM sector**

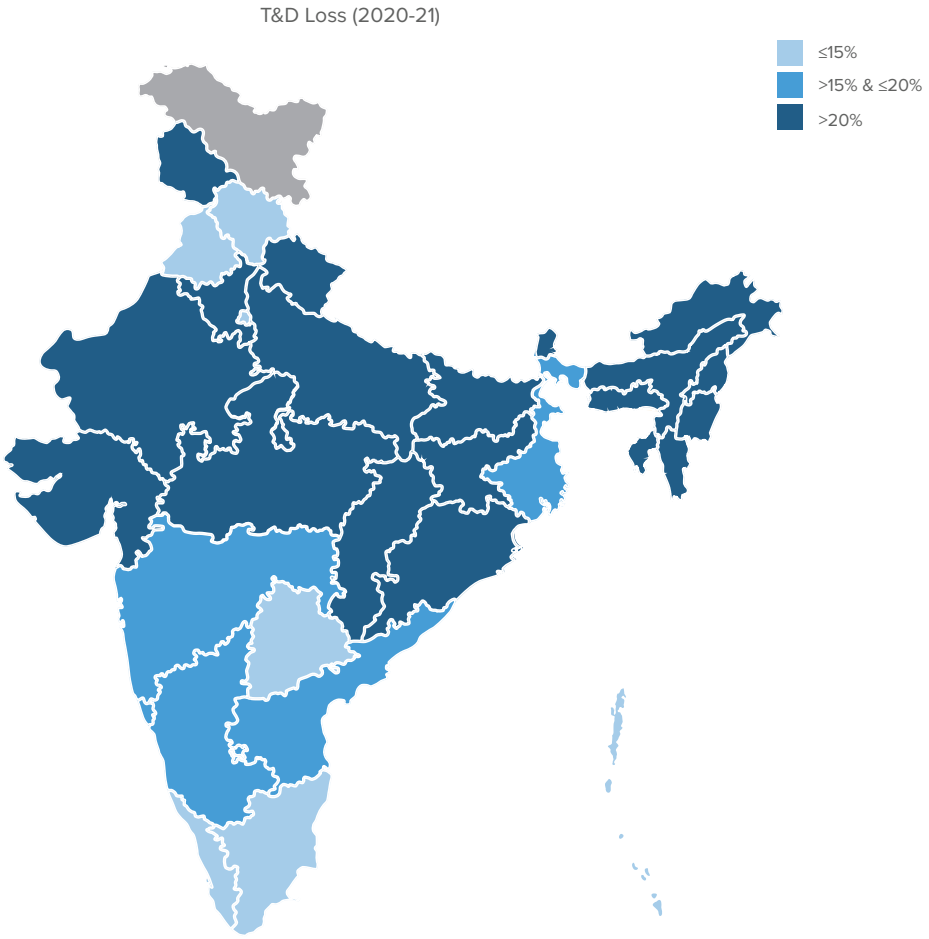



**Figure 3.19: T&D losses in Indian states and UTs**

**25 states have ToD tariffs for commercial/ industrial consumers**

ToD tariffs are a common DSM measure in the DISCOM tariff structure, through which different rates are applicable for use of electricity at different times of the day. Since the unit cost of electricity is different during peak and off-peak periods, ToD tariffs are implemented to reduce the consumption of electricity during peak hours through a higher peak tariff and a lower off-peak tariff to incentivise consumption during off-peak periods. Twenty-five (25) states have ToD/ToU tariffs for commercial and/or industrial. Furthermore, seven (7) states have ToD/ToU tariffs for domestic consumers. Two (2) states/UTs have reported optional ToD/ ToU tariffs for HT consumers. Table 3.25 provides the list of states having ToD/ToU tariffs.

Table 3.25: States and UTs with ToD/ToU tariffs

| State | ToD/ToU for commercial/ industrial consumers | ToD/ToU for commercial/ industrial & residential consumers | Optional ToD/ToU for HT consumers |
|---|---|---|---|
| Andhra Pradesh | ✓ | ✓ | * |
| Assam | ✓ | * | * |
| Bihar | ✓ | * | * |
| Chandigarh | * | * | ✓ |
| Chhattisgarh | ✓ | * | * |
| Delhi | ✓ | ✓ | * |
| Goa | * | * | ✓ |
| Gujarat | ✓ | * | * |
| Haryana | ✓ | * | * |
| Himachal Pradesh | ✓ | * | * |
| Jammu & Kashmir | ✓ | * | * |
| Jharkhand | ✓ | * | * |
| Karnataka | ✓ | * | * |
| Kerala | ✓ | ✓ | * |
| Madhya Pradesh | ✓ | ✓ | * |
| Maharashtra | ✓ | * | * |
| Meghalaya | ✓ | * | * |
| Odisha | ✓ | ✓ | * |
| Puducherry | ✓ | * | * |
| Punjab | ✓ | * | * |
| Rajasthan | ✓ | * | * |
| Tamil Nadu | ✓ | ✓ | * |
| Telangana | ✓ | * | * |
| Tripura | ✓ | * | * |
| Uttar Pradesh | ✓ | * | * |
| Uttarakhand | ✓ | * | * |
| West Bengal | ✓ | ✓ | * |

**No data reported by states.*

*Note: States with no data reported across all fields have been excluded from the table*

## Institutional Capacity

BEE has issued regulations on conducting mandatory annual energy audits and periodic energy accounting in all DISCOMs having distribution licences issued by the SERCs/JERCs. This regulation mandates all DISCOMs to appoint a nodal officer for conducting energy audits (accounting) in the utilities. DISCOMs in twenty (20) states have appointed such nodal officers. As per BEE data, DISCOMs in twenty-four (24) states have submitted the mandatory periodic energy audit/accounting reports to BEE. Twenty-six (26) states have provided pertinent information on the status of feeder metering for their state DISCOM(s). However, only seven (7) reported the distribution transformer (DT) metering status of their DISCOM(s). Table 3.26 shows the state-wise institutional capacity status for EE in the DISCOM sector.

Table 3.26: State-wise institutional capacity for EE in DISCOM sector

| State | State appointed a nodal officer to conduct energy audits (accounting) in DISCOMs | State submitted the mandated periodic energy audit/ accounting report | State submitted status of feeder/DT metering |
|---|---|---|---|
| Andhra Pradesh | ✓ | ✓ | ✓ |
| Arunachal Pradesh | * | * | ✓ |
| Assam | ✓ | ✓ | ✓ |
| Bihar | ✓ | ✓ | ✓ |
| Chhattisgarh | ✓ | ✓ | ✓ |
| Delhi | ✓ | ✓ | ✓ |
| Gujarat | ✓ | ✓ | ✓ |
| Haryana | ✓ | ✓ | ✓ |
| Himachal Pradesh | ✓ | ✓ | ✓ |
| Jammu and Kashmir | * | ✓ | * |
| Jharkhand | ✓ | ✓ | ✓ |
| Karnataka | ✓ | ✓ | ✓ |
| Kerala | ✓ | ✓ | ✓ |
| Madhya Pradesh | ✓ | ✓ | ✓ |
| Maharashtra | ✓ | ✓ | ✓ |
| Meghalaya | * | * | ✓ |
| Mizoram | * | ✓ | ✓ |
| Nagaland | ✓ | ✓ | ✓ |
| Odisha | ✓ | ✓ | ✓ |
| Puducherry | ✓ | * | ✓ |
| Punjab | ✓ | ✓ | ✓ |
| Rajasthan | ✓ | ✓ | ✓ |
| Tamil Nadu | ✓ | ✓ | ✓ |
| Telangana | ✓ | ✓ | ✓ |
| Uttar Pradesh | * | ✓ | ✓ |
| Uttarakhand | * | ✓ | ✓ |
| West Bengal | * | ✓ | ✓ |

*No data reported by states.

*Note: States with no data reported across all fields have been excluded from the table*

**20 states appointed a nodal officer to conduct energy audits in DISCOMs**

## Adoption of EE Measures

Smart meters enable real-time access to information on energy usage by consumers at different times of the day. This data helps customers manage their energy use more proactively and DISCOMs make informed decisions on load management and grid stability. Thirteen (13) states furnished data on the number of utility consumers with smart meters. Smart meter data are reported to be analysed and used for consumer awareness to enhance

DISCOM operational efficiency only in DISCOM(s) in three (3) states. The data is analysed for energy consumption patterns, future trends, and improving collection efficiency and peak load management. Table 3.27 shows the status of smart meter installation in the states and UTs.

**Table 3.27: State-wise smart meter status**

| Indicator | Names of states (Number of states) |
|---|---|
| States with smart meters | Assam, Bihar, Chandigarh, Haryana, Himachal Pradesh, Karnataka, Kerala, Maharashtra, Meghalaya, Puducherry, Rajasthan, Telangana, Uttar Pradesh (13) |
| States that have analysed smart meter data | Kerala, Puducherry, Rajasthan (3) |

## 2. Programme-Specific Indicator – State Programme

In SEEI 2021-22, one (1) programme-specific indicator has been included to track and assess the implementation of programmes/projects undertaken by SDA and other state entities to achieve EE in the DISCOM sector.

### Programme(s) for DSM

DSM refers to initiatives and technologies adopted by the utilities beyond the meter to encourage consumers to optimise their energy use. The benefits from DSM are potentially two-fold: first, consumers can reduce their electricity bills by adjusting the timing and amount of electricity use, and second, utilities are able to not only reduce their peak electricity demand but also defer high investments in generation, transmission, and distribution networks. In the recent past, DSM has gained unprecedented importance and has become an integral part of almost all the central and state missions on EE promotion. In SEEI 2021-22, the following achievements have been identified:

- **Twenty-eight (28) states have reported undertaking DSM programmes for utility consumers:** Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chandigarh, Chhattisgarh, Dadra & Nagar Haveli and Daman & Diu, Delhi, Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Mizoram, Odisha, Puducherry, Punjab, Rajasthan, Tamil Nadu, Telangana, Tripura, Uttar Pradesh, Uttarakhand, and West Bengal. Most of the states have the Unnat Jyoti by Affordable LEDs for All (UJALA) scheme that the Hon'ble Prime Minister launched on 5th January 2015. Under the scheme, LED bulbs, tube lights, and EE fans are being provided at subsidised costs to domestic consumers for the replacement of conventional and inefficient variants. This programme is being administered by EESL. These projects resulted in total energy savings of 1.04 MU and avoided emissions of 88.7 $tCO_2$ in FY 2020-21 and 2021-22.
- In Andhra Pradesh, the state DISCOM implemented various DSM activities, including the Domestic Efficiency Lighting Programme (DELP), AgDSM project, Energy Efficient LED Tube Light (EETL) programme, Domestic Efficient Fans Programme (DEFP), and charging infrastructure for EVs to manage the peak demand. These projects resulted in energy savings of 145 MU and avoided emissions of 0.013 $MtCO_2$.
- In Delhi, Tata Power-Delhi Distribution Limited (TPDDL), in collaboration with Voltas, is executing a discount-based scheme for star-rated ACs, with or without replacement of old ACs, for all customers.
- Haryana has several DSM programmes, like the AC replacement programme, use of EE lights in government buildings, and use of solar water heating systems and pumps.

**28 states reported undertaking DSM programmes for the utility consumers**

These projects resulted in energy savings of 144 MU and avoided emissions of 0.05 $MtCO_2$ in FY 2020-21.

- Kerala State Electricity Board (KSEB) and Kerala EMC are implementing the Filament Free Kerala scheme through collaborative efforts to replace all domestic consumers' incandescent and compact fluorescent lamps in the state with LED bulbs. KSEB has distributed 1 crore 9 W LED bulbs to domestic consumers in Kerala, resulting in energy savings of 477 MU.
- In Maharashtra, a subsidy scheme for 5-star ceiling fans and refrigerators have been introduced to promote EE among domestic consumers. These projects resulted in energy savings of 3.06 MU in FY 2020-21 and 2021-22.
- The Electricity Department, Puducherry has implemented the DSM-based DELP in the entire UT with technical and financial support from EESL. Under this programme, 0.6 million 7 W LED bulbs have been distributed to 2 lakh households, resulting in energy savings of 40 MU and avoided emissions of 0.04 $MtCO_2$.

## DISCOM SPOTLIGHT

'Filament Free Kerala' is one of the projects envisaged in the Urja Kerala Mission announced by the Government of Kerala to replace the incandescent lamps & CFLs among the entire population of domestic consumers in the state with LED bulbs. The project is being jointly implemented by the KSEB and Kerala EMC. Under this scheme, domestic consumers get a branded 9 W LED bulb at a discounted price of Rs. 65, and CFLs and incandescent bulbs are collected for disposal. All consumers under KSEB have to apply for replacement. KSEB has distributed one (1) crore 9 W LED bulbs to domestic consumers so far[22].

# 3.6 CROSS-SECTOR

In SEEI 2021-22, the cross-sector category consists of thirteen (13) indicators, all of which are common indicators. The indicators are related to EE/energy savings targets, annual action plans, SEEAPs, state energy conservation funds (SECFs), promotion of research & development (R&D) in EE, state level steering committees, collaboration with government and private entities, inspecting officers, energy conservation awards, energy intensity, and emission intensity. The total score of cross-sector indicators is 12.

With a score of 10 out of a max total score of 12, Telangana is the top-performing state in the cross-sector category. Other top-performing states include Kerala, Karnataka, Andhra Pradesh, Assam, Chhattisgarh, Punjab, and Rajasthan. In SEEI 2021-22, 15 states and UTs improved their scores in the cross-sector compared to SEEI 2020. Telangana has improved the most, increasing its score by 53% compared to SEEI 2020. However, the performance in the sector has decreased in Rajasthan, Maharashtra, Himachal Pradesh, and Odisha.

The summary of the cross-sector indicators is provided in Table 3.28. Figure 3.20 depicts each state's score for the cross-sector, grouping states based on their TFEC. The states' progress in percentage in the SEEI 2021-22 compared to SEEI 2020 is shown in Figure 3.21.

**Table 3.28: Cross-sector indicators**

| Sl. No. | Indicator | Max Score | Scoring Criteria |
|---|---|---|---|
| **Policy** | | | |
| 1 | Targets for EE/energy savings<br>• What are the targets for EE/energy savings at the state level?<br>• What are the targets for EE/energy savings at the sector level? | 1 | • Targets for EE/energy savings at the state level = 0.5, else 0<br>• Targets for EE/energy savings at the sector level = 0.5, else 0 |
| 2 | Development of annual action plan by SDAs<br>• Has the SDA developed the annual action plan that is approved by the state government? | 1 | • Annual action plan developed by SDA = 0.5<br>• Annual action plan developed by SDA & approved by state govt = 1 |
| 3 | State Energy Efficiency Action Plan<br>• Has the state taken any steps taken towards development of the SEEAP, e.g. stakeholder consultation? | 0.5 | Step taken for development of SEEAP = 0.5, else 0 |
| 4 | Scheme for electrification of end-use applications<br>• Are there any schemes for electrification of end-use applications (e.g. clean cooking, industrial heat, etc.)? | 0.5 | Yes = 0.5, else 0 |
| 5 | Promotion of innovation and R&D in EE<br>• Does the state have any policy, programme, or financial instrument for promotion of innovation and R&D in EE? | 0.5 | Yes = 0.5, else 0 |
| **Finance** | | | |
| 6 | Dedicated state budget and adequate manpower<br>• Is there a dedicated budget provided by the state for the SDA?<br>• Is adequate manpower provided by the state for the SDA? | 1 | • Dedicated budget provided by state for the SDA = 0.5, else 0<br>• Adequate manpower provided by state for the SDA = 0.5, else 0 |
| 7 | Establishment and utilisation of SECF<br>• Has the state allocated matching funds for SECF?<br>• Has the SECF been utilised by the SDA for EE adoption in the state? | 1 | • Matching funds allocated by state to SECF = 0.5, else 0<br>• SECF utilised by SDA for EE adoption = 0.5, else 0 |
| **Institutional Capacity** | | | |
| 8 | Formation of state level steering committee<br>• Is the state level steering committee headed by the Chief Secretary for the energy transition formed in the state?<br>• Does the SDA periodically communicate/report the status of its ongoing/planned EE activities to the respective energy/power departments and Department of Environment, Forest and Climate Change (DoEFCC)?<br>• Is there any collaboration between the SDA & the state departments to promote EE adoption in different sectors? | 2 | • State level steering committee headed by Chief Secretary for energy transition formed in state = 0.5, else 0<br>• Formal reporting of SDA to Energy/Power Dept/DoEFCC = 1, else 0<br>• Collaboration on EE between SDA & state depts = 0.5, else 0 |

| Sl. No. | Indicator | Max Score | Scoring Criteria |
|---|---|---|---|
| 9 | Collaboration with the private sector<br>• Is there any collaboration of the SDA with the private sector to promote EE in different sectors? | 0.5 | Yes = 0.5, else 0 |
| **Adoption of EE Measures** | | | |
| 10 | Activities undertaken by the SDA Inspecting Officer<br>• What activities have been undertaken by the SDA Inspecting Officer in the period under consideration (FY 2020-22)? | 0.5 | Yes = 0.5, else 0 |
| 11 | Standard practice for collection of end-use energy data<br>• Is there any standard practice for collection of end-use energy data at the SDA?<br>• How are the end-use energy data utilised to enhance EE in the state? | 1 | • Standard practice for collection of end-use energy data by SDA = 0.5, else 0<br>• End-use energy data used for EE adoption = 0.5, else 0 |
| 12 | State Energy Conservation Awards<br>• Do the SDAs or other state organisations administer state-level energy conservation awards to recognise outstanding performers in any one or more of the following sectors – buildings categories such as offices, hotels, hospitals, etc., industrial categories such as MSMEs, or any other sector? | 0.5 | Yes = 0.5, else 0 |
| **Energy Savings** | | | |
| 13 | Energy Intensity<br>• What is the state's energy intensity (TFEC in TOE per unit GSDP)? | 2 | States scored for each TFEC group:- Range: Maximum-Minimum(Max - Min) for each TFEC Group divided into 3 segments for scoring (lower third - 1.5, middle third - 1, highest third - 0.5); 1.5 points for state scores = Min to (Min + (Max-Min)/3) in each TFEC group; 1 point for state scores = ( Min + (Max-Min)/3) to (Min + 2(Max-Min)/3) in each TFEC group; 0.5 points for state scores = Min + (2(Max-Min)/3) to Max in each TFEC group.<br>Additional 0.5 points for decreasing trend in energy intensity |

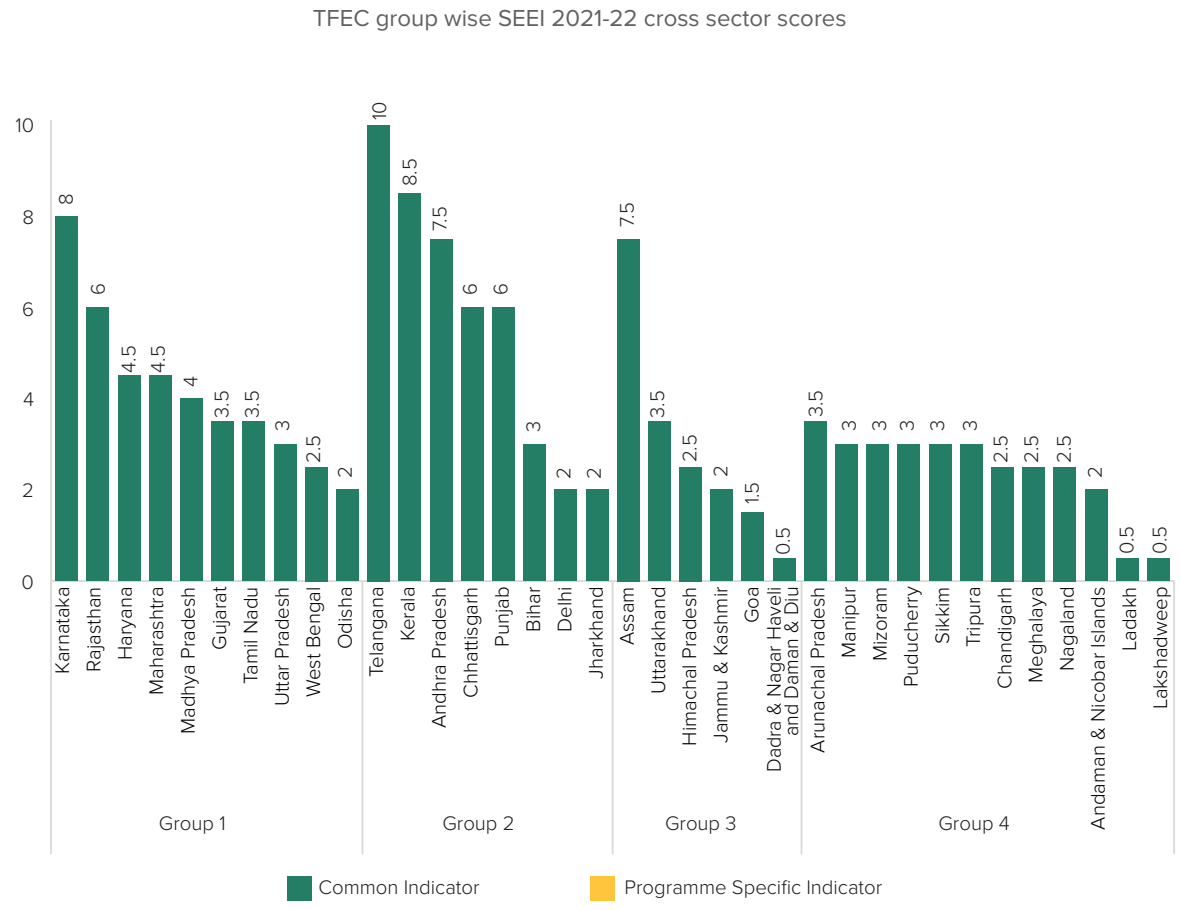



**Figure 3.20: TFEC group-wise cross-sector state scores**

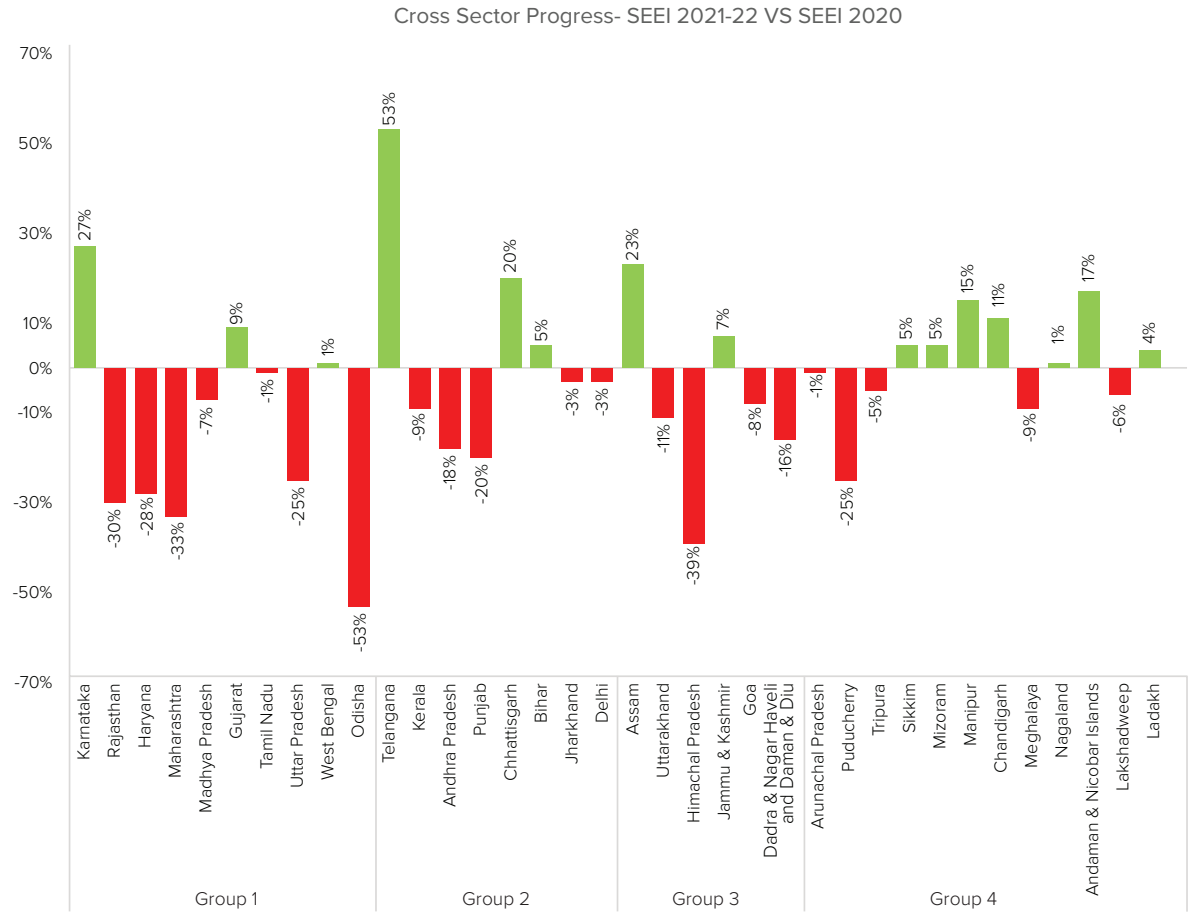



**Figure 3.21: TFEC group-wise state progress in cross-sector – SEEI 2021-22 vs SEEI 2020**

## 1. Common Indicators

### Policy

Only Assam and Karnataka have reported EE/energy savings targets at the state and sector levels.

- Assam's Energy Action Plan lays out strategic activities to achieve the energy savings targets set in the plan for eight (8) sectors, namely, power, industrial, agriculture, commercial, renewable energy, cooking, transport, and residential.
- Karnataka Government notified the Karnataka Energy Conservation and Energy Efficiency Policy 2022-2027 to ensure energy security and large-scale deployment of EE measures in the state. The policy sets energy savings targets for five (5) significant sectors: domestic, commercial, industries, agriculture, and municipal street lighting and water supply.

Furthermore, only eleven (11) SDAs prepared an annual action plan for EE/EC activities. Of these, only the Karnataka and Kerala SDAs got their annual action plans approved by the respective state governments before implementation. However, all 36 states and UTs have conducted stakeholder inception workshops for developing SEEAPs, initiated by BEE.

Only three (3) states have schemes for the electrification of end-use applications (e.g. clean cooking, industrial heat, etc.).

- The Chhattisgarh Government has implemented two schemes—Mukhyamantri Majratola Yojana and New National Biogas and Organic Manure Programme—to promote clean energy use.
- Meghalaya SDA has secured BEE-sanctioned funds for demonstration projects on clean cooking in the Anganwadi Kendra.
- Telangana SDA has implemented steam-generating systems for cooking applications in three different locations: police training schools in Karimnagar, Engineering Staff College of India, and Devnar School for the Blind in Hyderabad.

Five (5) states, as detailed below, reported having a state policy, programme, or financial instrument on the promotion of innovation and R&D in EE, which is less than that in SEEI 2020.

- APSEEDCO and Andhra University College of Engineering have signed an MoU to develop a methodology for efficient submersible water pumps. This also includes designing a compact drive and efficient control system and developing a EE motor drive technology prototype.
- State Innovation and Transformation Aayog (SITA), Government of Assam has provided financial assistance to the Department of Energy Tezpur University for research projects on efficient energy use in the sector.
- In Karnataka, BEE has sanctioned funds to SDA (KREDL) for innovative EE/EC projects. A new project proposal approval committee has been constituted within KREDL to evaluate innovative project proposals and select eight (8). INR 1 lakh was allocated to 4 engineering colleges up to the reporting period of SEEI 2021-22.
- In Kerala, Clean Energy Incubation and Business Incubation Centre (CEIBIC) has been set up to develop a green energy ecosystem. The focus areas of CEIBIC are household, industry, transport, building, infrastructure, and utility. Furthermore, a tripartite MoU was signed between Kerala EMC, KDISC, and CEIBIC, along with the constitution of a technical committee.

- In Telangana, an MoU was signed between TSREDCO and M/s Nanosol Energy Pvt. Ltd. to design and supply a customised, efficient hydrogen generator, proton exchange membrane (PEM) water electrolyser.

Table 3.29 lists the states that have taken measures in the abovementioned policy indicators.

**6 states reported having a dedicated state budget for the SDAs**

**Table 3.29: States with reported progress under select cross-sector policy indicators**

| Indicator | Names of states (Number of states) |
|---|---|
| States with EE/energy savings targets at the state and sector levels | Assam, Karnataka (2) |
| SDAs that prepared an annual action plan for EE/EC activities | Andhra Pradesh, Assam, Chhattisgarh, Gujarat, Jharkhand, Karnataka, Kerala, Maharashtra, Meghalaya, Punjab, and Telangana (11) |
| States that have a policy, programme, or financial instrument for promoting innovation and R&D in EE | Andhra Pradesh, Assam, Karnataka, Kerala, Telangana (5) |
| States that have schemes for the electrification of end-use applications | Chhattisgarh, Meghalaya, Telangana (3) |

## Finance

Only six (6) states namely Chhattisgarh, Haryana, Karnataka, Kerala, Madhya Pradesh, Telangana reported having a dedicated state budget for the SDAs to undertake EE/EC activities. Furthermore, a severe resource crunch in the SDAs has been identified, as again, only six (6) states namely Andhra Pradesh, Chandigarh, Haryana, Karnataka, Kerala, and Telangana, reported having adequate manpower to coordinate, regulate, and enforce provisions of the EC Act 2001 within the state. Out of these states, EMC Kerala has the most manpower dedicated to EE activities. Notably, only Kerala and Andhra Pradesh have established standalone SDAs. The remaining 34 states and UTs have assigned the additional responsibility of SDA to one of their existing agencies/departments, such as renewable energy development agencies (16), state government power departments (5), electrical inspectorates (7), and DISCOMs (6). This shared focus can decrease the pace of EE/EC efforts in the state.

**31 states and UTs have established SECFs, of which 5 SDAs reported using SECF for EE implementation**

The SECF has been constituted under section 16 (1) of the Energy Conservation Act 2001 to promote EE and EC within the state. In this context, MoP approved a scheme titled Contribution to State Energy Conservation Fund (SECF) of BEE during the XI plan, wherein the SDA is the implementing agency. The scheme provides a ceiling of Rs. 4.00 crores for BEE's endowment for each state and UT. This is provided in two installments of Rs. 2.00 crores each. The second contribution installation is released only after the states have provided a matching contribution of Rs. 2.0 Crores (Rs. 25 lakhs for UTs and Northeastern states) to BEE's first installment. A major portion of the SECF is required to be used as a Revolving Investment Fund for undertaking EE/EC initiatives (RIF). In SEEI 2021-22, thirty-one (31) states and UTs have established SECFs. Twenty-six (26) of these states and UTs reported contributing matching funds to the SECF. However, only five (5) SDAs have used the SECF for EE adoption in the state in FY 2020-21 and 2021-22. Table 3.30 lists the states and UTs that have taken measures in establishment and utilisation of SECF.

Table 3.30: States and UTs that reported progress in establishment and utilisation of SECF

| State | States that have constituted the SECF | States that have contributed matching funds to SECF | States that have utilised the SECF for EE adoption |
|---|---|---|---|
| Andaman & Nicobar Islands | * | * | * |
| Andhra Pradesh | ✓ | ✓ | ✓ |
| Arunachal Pradesh | ✓ | ✓ | ✓ |
| Assam | ✓ | ✓ | * |
| Bihar | ✓ | ✓ | * |
| Chandigarh | * | * | * |
| Chhattisgarh | ✓ | ✓ | * |
| Dadra & Nagar Haveli and Daman & Diu | ✓ | * | * |
| Delhi | * | * | * |
| Goa | ✓ | ✓ | * |
| Gujarat | ✓ | ✓ | * |
| Haryana | ✓ | ✓ | * |
| Himachal Pradesh | ✓ | ✓ | * |
| Jammu & Kashmir | ✓ | * | * |
| Jharkhand | ✓ | ✓ | * |
| Karnataka | ✓ | ✓ | * |
| Kerala | ✓ | ✓ | ✓ |
| Ladakh | * | * | * |
| Lakshadweep | ✓ | * | * |
| Madhya Pradesh | ✓ | ✓ | * |
| Maharashtra | ✓ | ✓ | * |
| Manipur | ✓ | ✓ | * |
| Meghalaya | * | * | * |
| Mizoram | ✓ | ✓ | * |
| Nagaland | ✓ | ✓ | * |
| Odisha | ✓ | ✓ | * |
| Puducherry | ✓ | ✓ | * |
| Punjab | ✓ | ✓ | * |
| Rajasthan | ✓ | ✓ | ✓ |
| Sikkim | ✓ | ✓ | * |
| Tamil Nadu | ✓ | * | * |
| Telangana | ✓ | ✓ | ✓ |
| Tripura | ✓ | ✓ | * |
| Uttar Pradesh | ✓ | ✓ | * |
| Uttarakhand | ✓ | ✓ | * |
| West Bengal | ✓ | * | * |

*No data reported by states.
Note: States with no data reported across all fields have been excluded from the table

## Institutional Capacity

The states and UTs have made adequate progress in developing the institutional capacity for cross-sectoral initiatives. Table 3.31 below shows the states and UTs that have taken measures across various indicators under the category.

MoP and MNRE asked the Chief Ministers of all states and Lieutenant Governors of UTs to set up state level steering committees for the energy transition. These steering committees will work under the chairmanship of the Chief Secretaries of the respective states/UTs. As of October 2022, sixteen (16) states have formed a state level steering committee headed by the Chief Secretary for the energy transition. The process of committee formation is in progress in two (2) more states, Arunachal Pradesh and Chhattisgarh.

Six (6) states reported periodic communication of the status of their ongoing/planned EE activities to the state energy/power departments and DoEFCC. Meanwhile, eight (8) states reported collaboration with other state departments to promote EE adoption in different sectors.

- In Andhra Pradesh, EC cells have been created in all the state government head of department offices, district offices, and corporation/society offices. The EC cells act as a nodal agency to coordinate with the SDA on EC/EE measures.
- Chhattisgarh SDA, CREDA has signed an MoU with Chhattisgarh Swami Vivekananda Technical University (CSVTU) to develop a Centre of Excellence (COE) in green buildings.
- The SDAs of the remaining states have collaborated with their state government departments to conduct capacity building programmes, workshops, and training programmes.

**6 states reported collaboration with private sector entities to promote EE in different sectors**

Six (6) states also reported collaboration with private sector entities to promote EE in different sectors.

- In Andhra Pradesh, APSEEDCO and Tata Power Company Limited signed an MoU on technical collaboration to promote EE technologies and global best practices among industries and other key sectors.
- In Chhattisgarh, CREDA collaborated with Vivekananda Global University (VGU) to conduct four retailer training programmes (RTPs) under BEE's S&L programme in four cities.
- In Karnataka, KREDL partnered with engineering colleges on innovative EE/EC projects.
- Kerala EMC, in collaboration with FICCI, conducted a workshop cum tabletop exhibition on industrial EE in rice mill clusters.
- In Punjab, the SDA signed an MoU with the Association of Professional Social Workers and Development Practitioners (APSWDP) Chandigarh to promote social work education for sustainable development to meet the 2030 SDGs.
- Telangana SDA empanelled five energy consultancy firms/ESCOs to promote EE in the state.

Table 3.31 shows the cross-sector institutional capacity across the states and UTs for EE.

Table 3.31: State-wise institutional capacity for EE across sectors

| State | State level steering committee headed by the Chief Secretary for energy transition formed | Periodic communication of the status of ongoing/planned EE activities to energy/power departments and DoEFCC | Collaboration with other state departments to promote EE adoption in different sectors | Collaboration with the private sector to promote EE in different sectors |
|---|---|---|---|---|
| Andaman & Nicobar Islands | ✓ | * | * | * |
| Andhra Pradesh | ✓ | * | ✓ | ✓ |
| Arunachal Pradesh | ✓ | * | * | * |
| Assam | * | ✓ | ✓ | * |
| Bihar | ✓ | * | * | * |
| Chandigarh | ✓ | ✓ | ✓ | ✓ |
| Chhattisgarh | ✓ | * | * | * |
| Jharkhand | ✓ | * | * | * |
| Karnataka | ✓ | * | ✓ | ✓ |
| Kerala | ✓ | ✓ | ✓ | ✓ |
| Maharashtra | * | * | ✓ | * |
| Meghalaya | ✓ | * | * | * |
| Odisha | ✓ | * | * | * |
| Puducherry | ✓ | ✓ | ✓ | ✓ |
| Rajasthan | * | ✓ | * | * |
| Sikkim | ✓ | * | * | * |
| Telangana | ✓ | * | * | * |
| Tripura | ✓ | ✓ | * | ✓ |
| Uttar Pradesh | ✓ | * | * | * |
| Uttarakhand | ✓ | * | * | * |

*No data reported by states.
Note: States with no data reported across all fields have been excluded from the table

## Adoption of EE Measures

SEEI 2021-22 evaluates the states and UTs on adopting EE measures in cross-sector domains based on activities undertaken by the SDA Inspecting Officer (IO), use of standard practices on end-use energy data collection, and institutionalisation of state-level energy conservation awards.

Only eight (8) states furnished information on activities undertaken by the SDA IO, which is appointed under section 17 of the EC Act 2001 to enforce the provisions of the Act within the state. These activities include visiting electrical shops to identify non-compliant or inefficient LED bulbs in some states or visiting and requesting documentation from non-compliant DCs in others.

The SDAs in only four (4) states have a standard practice to collect end-use energy data, and only Assam and Rajasthan have utilised end-use energy data to enhance EE in the state. Assam SDA collected data on energy-intensive hotels in Guwahati to identify and enable inclusion in the PAT cycle. In Telangana, TSREDCO has established Unit Offices in each district to collect end-user energy data to implement different EE programmes based on end-use data analysis.

**4 states have a standard practice to collect end-use energy data, while only 2 states utilise this data for EE adoption**

Nine (9) states had state-level energy conservation awards in SEEI 2021-22. The SDAs or other state organisations give awards to recognise outstanding performers in buildings categories such as offices, hotels, or hospitals or industrial categories such as MSMEs, among other sectors. Table 3.32 provides details of the states that have taken measures in the aforementioned indicator category.

**Table 3.32: States with key measures taken by SDAs**

| Indicator | Names of states (Number of states) |
|---|---|
| States that provided information on activities undertaken by the SDA IO | Andhra Pradesh, Assam, Chhattisgarh, Maharashtra, Puducherry, Punjab, Rajasthan, and Telangana (8) |
| States in which SDAs have a standard practice to collect end-use energy data | Assam, Haryana, Rajasthan, and Telangana (4) |
| States that have state-level energy conservation awards. | Andhra Pradesh, Haryana, Kerala, Madhya Pradesh, Maharashtra, Puducherry, Rajasthan, Telangana, and Uttar Pradesh (9) |

## Energy Savings

Energy intensity is the total energy consumption normalised per unit of economic value, calculated as the TFEC in TOE per unit of GSDP for a state. The energy intensity was calculated for all states and UTs for FY 2019-20 and compared with the energy intensity in 2017-18 used in SEEI 2020. Figure 3.22 depicts each state's energy intensity, grouping states based on their TFEC.

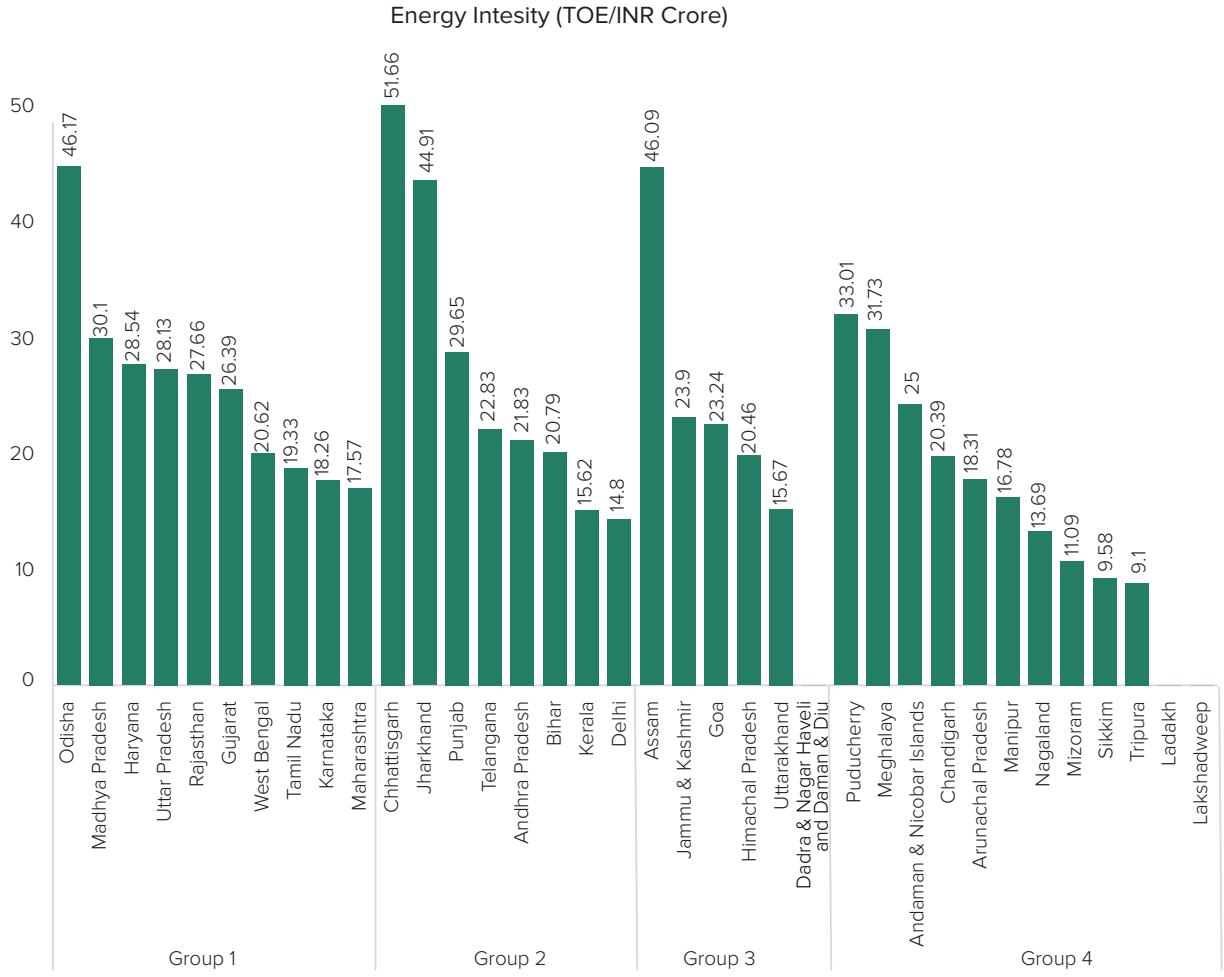



**Figure 3.22: TFEC group-wise state energy intensity**

As can be seen in the graph, Chhattisgarh from Group 2 is the state/UT with the highest energy intensity at 51.66 toe/INR crore and Tripura from Group 4 at 9.1 toe/INR crore has the lowest.

However, this energy intensity is linked to the structure of the state/UT in terms of commercial, industrial and domestic share in the GSDP.

The energy intensity of four (4) states, Assam, Sikkim, Nagaland, and Goa, has increased from 2017-18 to 2019-20 (the years considered for energy intensity data in SEEI 2020 and SEEI 2021-22). Meghalaya's energy intensity decreased the most, by 29.91 TOE/INR Crore compared to SEEI 2020, due to a decrease in TFEC and an increase in GSDP. In contrast, Goa's energy intensity has increased the most, by 1.70 TOE/INR Crore compared to SEEI 2020. The absolute TFEC of twenty-one (21) states increased over the same duration. Thus, the overall reduction in energy intensity for most states is driven by the relatively higher increase in GSDP rather than a reduction in absolute energy use.

## CROSS-SECTOR SPOTLIGHT

- EC cells have been constituted in all state government head of department offices, district offices, and corporation/society offices in Andhra Pradesh under APSECM, and EC unit offices have been constituted in all districts of Telangana under TSREDCO for effective implementation of EC/EE measures and collection of end-use energy data.
- Telangana SDA has implemented a pilot project on steam generating systems for cooking applications in three locations: Police Training Centre Karimnagar, Engineering Staff College of India, and Devnar School for Blind in Hyderabad.

# 4. CONCLUDING REMARKS

The most crucial takeaway in SEEI 2021-22 is the increase in overall participation of all the states in the index. The SDAs of all the thirty six (36) states and UTs made efforts to collect and submit relevant data for the index within a much shorter timeframe. Furthermore, the states and UTs demonstrated overall improvement in performance. Twenty-eight (28) states have higher total scores in SEEI 2021-22 than in SEEI 2020. Out of these, three (3) states have shown a significant improvement, increasing their score by over 20 points, and eight (8) states have improved their score by a lower margin of 10-20 points.

**The key findings regarding the state performance, based on the SEEI 2021-22 results, are summarised below:**

- States and UTs boosting their efforts to gather the necessary data and submit it within a pressing schedule suggests a growing awareness of the need to undertake EE actions in relation to the national climate commitments. There is also emerging competition among states on reporting EE practices. The states and UTs effectively provided data related to policy, institutional capacity, and various sector-specific state programmes. However, data availability on the impacts and outcomes of these measures, such as penetration of green buildings or passenger EVs, industry-specific energy conservation awards, energy savings, and emissions reduction remains a challenge. Most of this data has been sourced from organisations such as EESL, CII, IGBC, GRIHA, GBCI, and BEE. Likewise, the energy intensity of the states and penetration of hybrid and electric passenger vehicles have been calculated in-house with data from several government sources.

- The states and UTs have shown some progress in adopting an economy-wide approach towards EE implementation by gathering data from government and non-governmental entities for the index. However, there is no structured process or framework in place to capture data across sectors regarding EE implementation in the states. Only two states, Andhra Pradesh and Telangana, have constituted EC cells and unit offices to capture data related to EE programmes in various sectors. The SDAs should develop and implement standardised protocols for economy-wide capture of EE initiatives and their outcomes on a regular basis.

- With the exception of Andhra Pradesh, Karnataka, Kerala and Telangana, the states and UTs are yet to take a proactive role in scaling up the EE/EC programmes at the local level to reap the potentially available benefits. The national policies adapted at the state level or programmes implemented in states by the ESCOs are generally independent of one another, rather than part of a cohesive and comprehensive state strategy. A strategic roadmap delineating implementable programmes in the key sectors, funding options, potential collaborations, monitoring and verification mechanisms, etc. is still missing from state development plans. The scattered approach makes it difficult to monitor progress and measure the overall impact of EE efforts.

- Based on the findings from SEEI 2021-22, the following recommendations are proposed to enable faster and greater penetration of EE in the states, which can contribute towards the fulfilment of the SDGs and NDC.

## DEVELOP AND IMPLEMENT THE STATE ENERGY EFFICIENCY ACTION PLAN

India is a geographically and socio-economically diverse country. There is a need to address the sector-specific challenges and opportunities in each state. Building on the state-wise energy savings targets, BEE initiated the process of developing customised SEEAPs. These plans help identify focus sectors for states to address efficiency in the most energy-intensive practices in priority areas.

However, the onus of implementation lies heavily on the states, providing them with an opportunity to take ownership of action for EE aligned with state-specific socio-economic priorities. As mentioned earlier in the cross-sector results, all 36 states and UTs have conducted stakeholder inception workshops to aid the empanelled agencies in SEEAP development. However, once the plan is finalised, the state must ensure effective implementation of these activities. It will be critical to implement the EE measures with skill and speed, aligning with clearly defined timelines to achieve the national climate goals and realise the socio-economic benefits of EE. It is critical for states to work closely with the central government and private sector in order to coordinate efforts and achieve a shared goal.

To track progress, the states must regularly monitor and evaluate the energy savings from EE interventions and take corrective actions as needed to stay on track. These actions may include policy changes, investment in new technologies, and development of new programmes.

## FACILITATE FISCAL SUPPORT FOR ENERGY EFFICIENCY

A robust and sustainable stream of fiscal support is vital to implement EE initiatives in the focus sectors at the state level. This support can be a combination of central, state, and private investments. Supplementing the central fiscal support for EE programmes, the annual state budgets should also earmark dedicated funds for energy efficiency. The EC Amendment Act 2022 requires SDAs to prepare a budget for the next financial year and forward the same to the state government to include it in the annual state budget. The states must conduct a detailed cost-benefit analysis of different financing options to identify the apt EE financing programmes for different sectors and stakeholders. In doing so, the funding requirement, potential funding sources, choice of business models, and expected savings should be evaluated through financial modelling, feasibility studies, and stakeholder feedback. Targets may be set for EE financing from all the state government's funding sources to attract private sector funds through investment risk hedging.

In SEEI 2021-22, the programme-specific indicators for the sectors promoted this practice by rewarding points for specifying the allocation and utilisation of funds for different EE programmes. States should advance EE by tapping into the opportunity provided by SECF. Funds for SECF have been released in equal proportions by the central and state governments.The EC Amendment Act, 2022 has also enabled the utilisation of SECF for meeting the expenses of the designated agency in the discharge of its functions and for the objects and purposes authorised by or under the Act. However, despite being in existence for almost a decade, only five (5) states reported utilisation of the SECF. Moreover, only six (6) states reported collaboration with the private sector in EE projects. Energy efficiency is a great but largely untapped opportunity for a sustainable economy. The states must create bankable opportunities in EE to leverage private sector participation and facilitate investments from private players through appropriate business models.

## STRENGTHEN INSTITUTIONAL CAPACITY

Strong institutional capacity can aid the states and UTs in better decision-making, improved accountability, efficient implementation of programmes and policies, and enhanced responsiveness to the emerging needs and challenges in EE. In SEEI 2021-22, two states, Andhra Pradesh and Telangana, through the constitution of EC cells and unit offices in government department head offices and district offices, respectively, demonstrated exemplary commitment to strengthening the institutional capacity for smooth and timely implementation of the EC Act 2001.

Strengthening institutional capacity and increasing capacity building are parallel processes critical to EE's success. Together, these two processes ensure that the state/UT has the necessary resources and expertise to implement and sustain EE initiatives effectively. The SDA is the command centre of EE implementation in the states and UTs. It is responsible for fortifying the state-level institutional capacity for EE propagation and ensuring adequate capacity building with all relevant stakeholders in the state. To strengthen the institutional capacity in the state, the SDA should coordinate with the state government to set up EE/EC units in all district and head offices of the state departments along with department-wise EC/EE nodal officers. The SDAs should work closely with these units for localised penetration of EE through regular capacity building programmes on knowledge, skills, and awareness for relevant government officials and end-use consumers. Further, the SDAs should coordinate with the state level Steering Committees for Energy Transition formed under the Chief Secretaries of the respective states/UTs to accelerate widespread EE adoption across the economy

## COLLABORATE WITH FINANCIAL INSTITUTIONS, ESCOS, & ENERGY PROFESSIONALS

Active participation of Financial institutions (FIs), ESCOs, and energy professionals is crucial for large-scale EE implementation in the states. Each of these groups plays a critical role in identifying, financing, and implementing EE projects. FIs such as banks and insurance companies can provide the necessary capital for EE projects by offering loans, bonds, and other forms of financing. ESCOs play a key role in designing, implementing, and maintaining EE projects and are paid based on the energy savings the projects generate. Energy professionals, such as think tanks, energy consultants, and civil society can provide the technical expertise needed to design, implement, and monitor EE projects. Together, these groups can work in synergy to identify and implement EE projects that are cost-effective, technically feasible, and financially viable. The SDAs can act as a mediator between demand and supply of EE solutions in the state by working with FIs, ESCOs, and energy professionals. The SDAs should facilitate collaboration of these groups with different sectors, local industry, and local and district authorities to ensure EE programmes are tailored to the specific needs of the state and aligned with the broader goals of local and regional development. Such collaboration will also help increase business opportunities for OEMs and EE companies. Furthermore, the SDAs may coordinate with CII state chapters, state chambers of commerce, MSME development institutes, or similar organisations for EE outreach to commercial buildings, industries other than those covered under PAT, MSME, etc.

## MAINSTREAM MONITORING AND REPORTING OF ENERGY DATA

State governments cannot monitor what they cannot measure. Drafting and initiating programmes is the first step towards EE adoption. However, to effectively advance and see results, there is a need to efficiently capture the progress made under the implemented programmes. Periodic tracking of EE initiative progress can help government entities identify the areas of concern and course-correct if needed. To mainstream energy data reporting across different sectors, states must institute transparent reporting through online portals hosted by state agencies in alignment with national initiatives such as the State-wise Actions on Annual Targets and Headways on Energy Efficiency (SAATHEE) portal launched by BEE in 2020.

The SDAs must forge partnerships with organisations such as CII, EESL, and certification bodies like IGBC, GBCI India, and GRIHA to ensure regular updates on EE projects and data collection on end-use energy, energy intensity, and energy savings across various sectors. The SDAs must also develop a rapport with the relevant government departments and engage with them more regularly.

## DRIVE EE IMPLEMENTATION IN MSMES

The MSME sector is an untapped domain that requires states to take effective initiatives towards EE implementation. MSMEs are a key driver of economic activity and poverty reduction in India. However, they have limited resources and capacity to invest in EE and do not have access to the same level of information, expertise, and financing as larger firms. By targeting this area, states can help bridge this gap and make EE more accessible to MSMEs.

Over the last five decades, the MSME sector has emerged as a key sector in the Indian economy. The sector contributes to 30% of the national GDP, 36.9% of total manufacturing, and 49.5% of national exports[23]. It provides widespread employment opportunities at a comparatively lower capital cost and enables large-scale industrialisation and development.

However, MSMEs face a variety of challenges, including financial constraints, poor infrastructure, outdated technology, energy-inefficient equipment, market competition, difficulties obtaining raw materials, and a lack of skilled and trained workers. These challenges make it difficult for MSMEs to compete and grow. EE initiatives can play a definitive role in helping MSMEs overcome many of these challenges by reducing costs, increasing competitiveness, and improving overall operations. BEE has initiated a flagship programme called National Programme on Energy Efficiency and Technology Upgradation of MSMEs to implement EC measures and EE technologies in MSMEs[24]. A facilitation centre to encourage and scale up EE financing in the country has been set up and a dedicated web portal to upscale efforts and ensure maximum outreach of EE initiatives[25], developed.

Due to their size, flexibility, and localised distribution, MSMEs are well positioned to take advantage of new opportunities in EE. SDAs should collaborate with industry departments, MSME departments, MSME development institutes, FIs, ESCOs, energy professionals, and other related entities to promote the adoption and penetration of EE measures among MSMEs. These measures may include energy audits and retrofit services, low-cost financing, training and education, and technical support for EE adoption.

# 5. ANNEXURES

## DATA SOURCES

SDAs are the primary data source for SEEI 2021-22. In addition to SDA data, AEEE has used various data from the following resources:

### General

1. PIB press release, Ministry of Environment, Forest and Climate Change
2. Reserve Bank of India Handbook of Statistics on Indian States
3. UIDAI: https://uidai.gov.in/images/StateWiseAge_AadhaarSat_24082017.pdf
4. General Review 2021, Central Electricity Authority (CEA)
5. Energy Statistics India 2021, Ministry of Statistics and Planning (MoSPI)
6. Coal Directory of India 2019-20, Ministry of Coal
7. Indian Petroleum and Natural Gas Statistics 2020-21, Ministry of Petroleum and Natural Gas (MoPNG)

### Buildings

1. GRIHA: https://www.grihaindia.org/
2. GBCI: India https://gbci.org/india
3. IGBC: https://igbc.in/igbc/
4. BEE: NEERMAN award
5. EESL: BEEP programme

### Industry

1. NITI Aayog IESS
2. CII: https://energy.greenbusinesscentre.com/energyawards/index.php
3. BEE: NECA awards
4. SEEM awards
5. BEE: PAT programme
6. EESL: NMRP programme

### Municipal Services

1. BEE: MuDSM programme
2. EESL: SLNP programme
3. EESL: AJAY programme

### Transport

1. VAHAN dashboard: https://vahan.parivahan.gov.in/vahan4dashboard/
2. Indian Petroleum and Natural Gas Statistics 2020-21, Ministry of Petroleum and Natural Gas (MoPNG)
3. EESL: National E-Mobility programme

## Agriculture and DISCOM

1. BEE: Statewise actual T&D Loss (2020-21), DISCOM energy audit data
2. Tariff order issued by SERC/JERC
3. EESL: UJALA scheme

## Cross-Sector

1. BEE: SEEAP, SLSC for Energy Transition
2. Reserve Bank of India Handbook of Statistics on Indian States
3. General Review 2021, CEA
4. Energy Statistics India 2021, MoSPI
5. Coal Directory of India 2019-20, Ministry of Coal
6. Indian Petroleum and Natural Gas Statistics 2020-21, MoPNG

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3 All India Electricity Statistics, General Review- 2021 https://cea.nic.in/wp-content/uploads/general/2020/General_Review_2021.pdf

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6 Energy Statistics India 2022 [Annexure- 2] https://mospi.gov.in/documents/213904/1606151/Energy%20Statistics%20India%2020221644825594802.pdf/aed59aac-4d5a-995b-1232-bb68397cd873

7 IEA, Key World Energy Statistics 2022 https://iea.blob.core.windows.net/assets/5c2a826c-5ec7-4517-b713-1b0fc3dea05e/KeyWorldEnergyStatistics2020_Methodology.pdf

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9 Ranjan Rawal, Yash Shukla, Sophie Shnapp: Residential Buildings in India: Energy Use Projection and Savings Potential

10 National Energy Efficiency Roadmap for Movement towards Affordable and Natural habitat [https://www.bee-neerman.com/]

11 M.P Urja Saksharta Abhiyan (UShA)-[http://usha.mp.gov.in/]

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14 SAATHEE (State-wise Actions on Annual Targets and Headways on Energy Efficiency) portal: https://saathee.beeindia.gov.in/Common/BEEContent?MID=2&SMID=26

15 One District – One Idea, Kerala Development and Innovation Strategic Council: https://kdisc.kerala.gov.in/images/pdf2020/one-district-one-idea-concept-note.pdf

16 SAATHEE (State-wise Actions on Annual Targets and Headways on Energy Efficiency) portal: https://saathee.beeindia.gov.in/Common/BEEContent?MID=2&SMID=24

17 National E-Mobility Programme: https://eeslindia.org/en/electric-vehicles/

18 Rajasthan EV Policy: https://transport.rajasthan.gov.in/content/dam/transport/transport-dept/pdf/Pollution/REVP_2022.pdf

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20 Ryuthu Vedika Scheme: https://kisan.telangana.gov.in/Rythu_Vedika/Home.aspx

21 Telangana Micro Irrigation Project, Horticulture Department, Telangana Government: https://horticulturedept.telangana.gov.in/Horticultureteleangana/(S(dbyobf3zgecd4mf2mwuxpxut))/MIP_Aboutus.aspx

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