Project Summary Report

on

RAJASTHAN ENERGY SCENARIOS
2030 | 2050

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Prepared by

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This report is an abridged version of the report: Rajasthan Energy Scenarios 2030 and 2050. The study aimed at conducting long-term demand forecasting for the Rajasthan state, including DISCOM-wise energy and load profile projection.

Acknowledgements

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INTRODUCTION

To provide adequate, reliable and affordable power to consumers, demand forecasting and long-term procurement planning activities are essential for utilities as power procurement cost contributes to 70-80% of the tariff paid by electricity consumers across states in India. State-wise forecasting based on planned activities is produced by the Central Electricity Authority (CEA), which was published in the 18th and 19th Electric Power Survey (EPS). EAL has also done a study on Long Term Demand Forecasting (LTDF) and Power Procurement Planning for the state of Uttar Pradesh[1] and Chhattisgarh[2]. The ideal framework for LTDF should account for the share of captive generation capacity, the expected role of demand-side management and the share of Renewable Energy generation. EAL did the same exercise for the state of Rajasthan, the overall objective is to estimate the energy requirement for Rajasthan/DISCOMs, average load profile, peak demand and other additional demands including electric-vehicle and electric-cooking.

METHODOLOGY

The electricity demand forecast is undertaken on the basis of econometric modelling that captures the impact of various socio-economic parameters such as income, electricity price and share of economic activities. All India data including GDP, price constant, population and other factors like captive generation and auxiliary consumption have been considered in this forecasting model. The LTDF activities starts with forecasting energy requirement thereafter translating this estimation into demand profile for future years by using econometric model as shown in Fig.1.
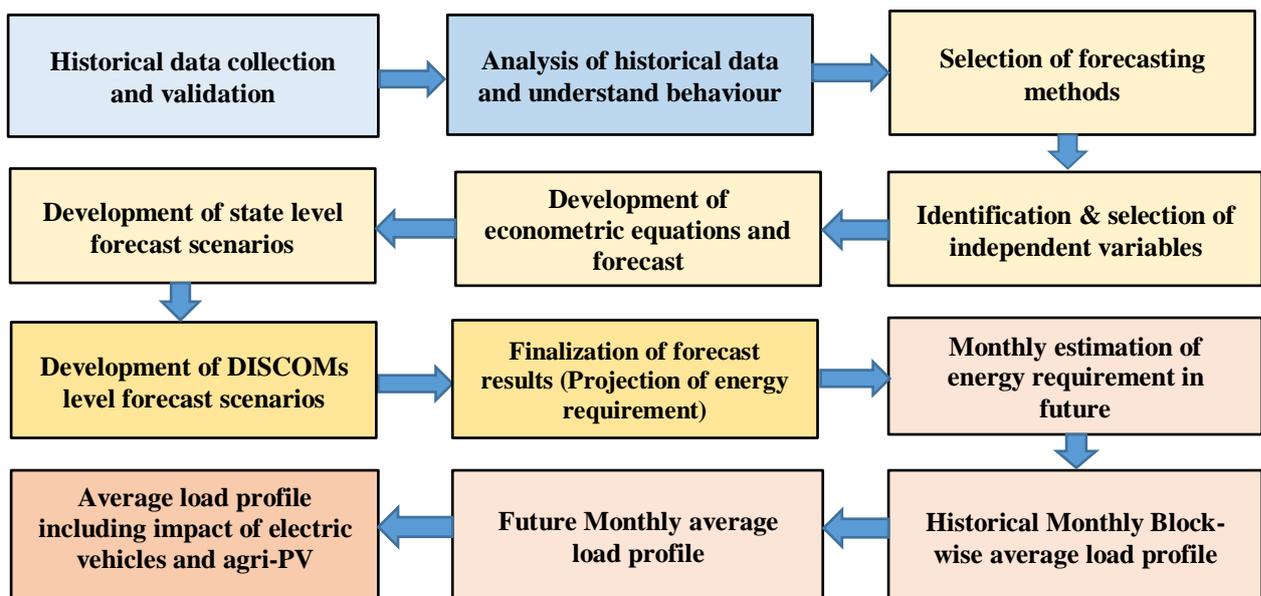
Figure 1: Steps for Long-Term Load Forecasting

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[1] Anoop Singh, Manvendra Pratap, Abhishek Das, Piyush A. Sharma, Kamal K. Gupta, "Regulatory Framework for Long-Term Demand Forecasting and Power Procurement Planning", CER and EAL, IIT Kanpur, 2019
[2] Long-Term Demand Forecasting and Power Procurement Planning for CSERC and Short-term Power sale/ Power strategy for Chhattisgarh, CER and EAL, IIT Kanpur, 2021

Rajasthan Energy Forecasting

EAL estimated the electricity demand requirement for high, realistic, medium and low GDP growth scenarios including the impact of COVID-19 on energy requirements across states. The estimated utility energy requirement (MU) in FY-30 for realistic, high, medium and low growth scenarios is projected to be 155215, 160387, 152834 and 150900, respectively.

Forecasted per capita electricity consumption for utility and non-utility at bus-bar
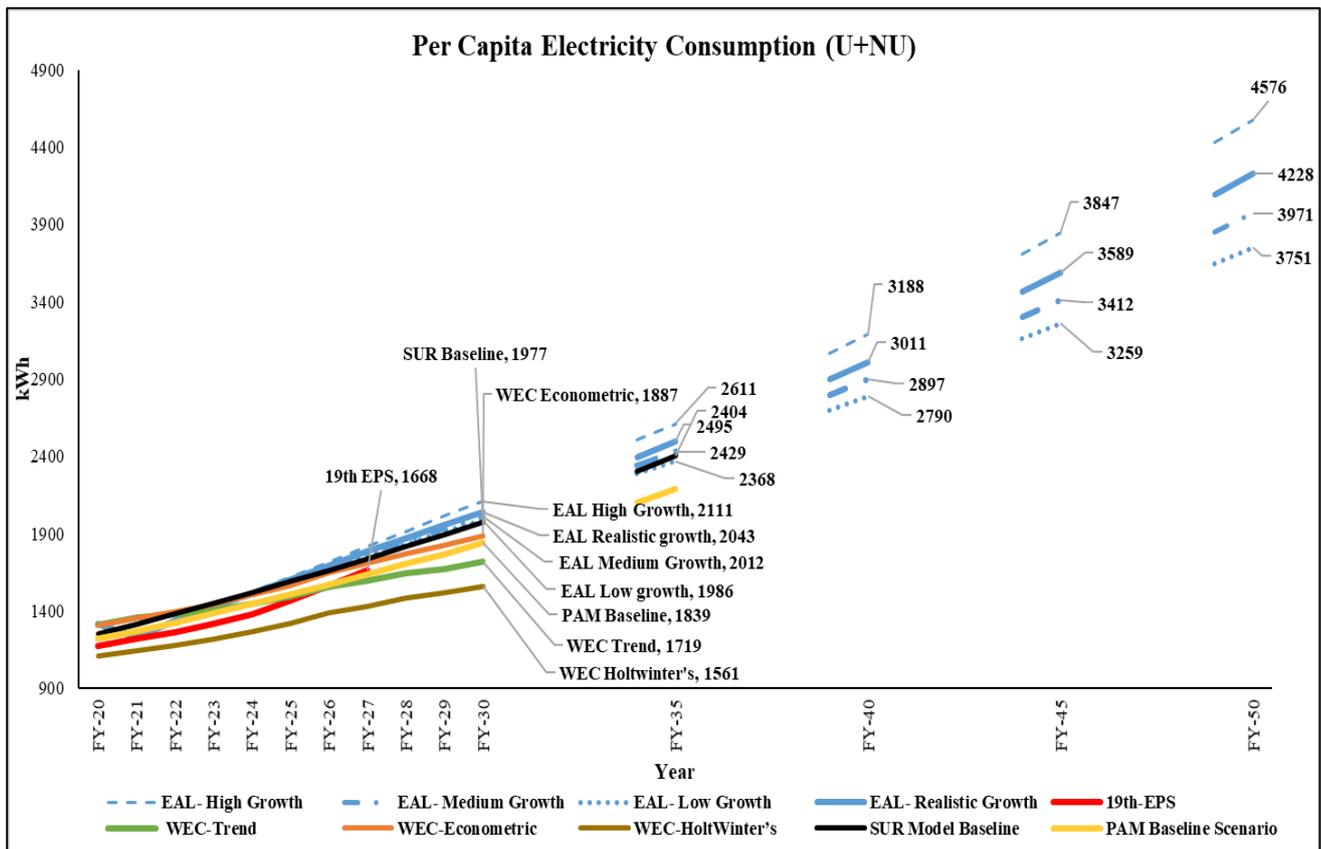

Figure 2: Forecasted per capita electricity consumption for utility and non-utility at bus-bar

EAL IITK forecasted Rajasthan's state energy requirement in FY21 and FY30 is 95389 MU and 182504 MU, respectively and a growth of 7.4% in realistic GDP growth scenario. It is estimated that energy requirement increases by 4.9% in FY50. The estimated per capita energy requirement Rajasthan State in FY21, FY30 and FY50 is 1226 kWh, 2043 kWh and 4228 kWh, respectively. Lower energy requirement in FY21 due to COVID-19 impact.

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Forecasted total energy requirement for utility and non-utility at bus-bar

**Rajasthan Energy Requirement (U+NU)**
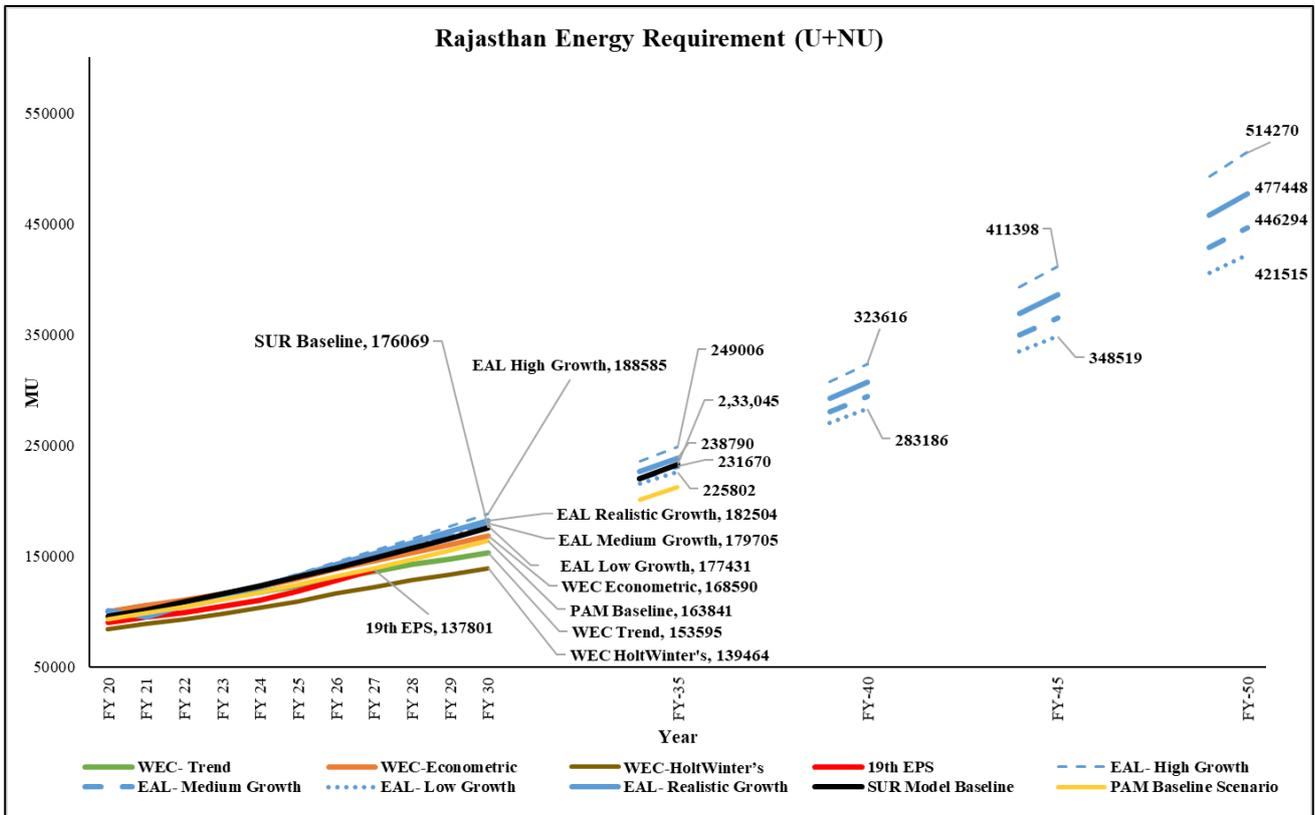
Figure 3: Forecasted total energy requirement for utility and non-utility at bus-bar

Rajasthan Monthly Average Load Profile

EAL estimated that average load is higher for the months of January, March and December in FY30 as compared to other months whereas average load profile is lower during April, July and Aug months.


Average Load Profile 2029-30
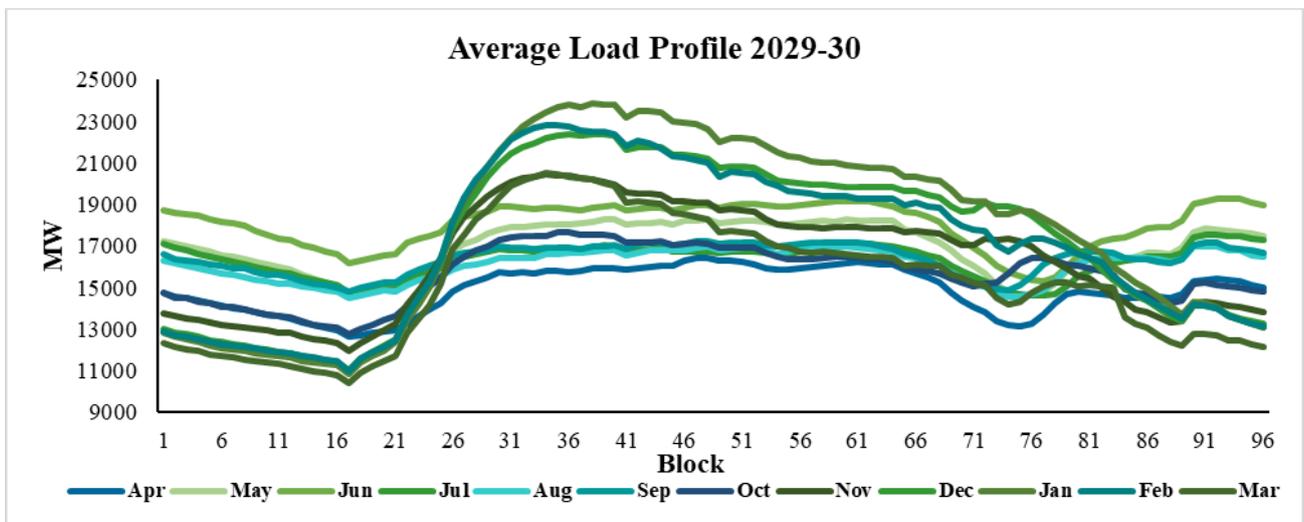
Figure 4: Average load profile 2029-30

Additional Energy Requirement

EAL projected that the energy requirement for electric vehicles and electric cooking in FY30 is 1698 MU and 1252 MU respectively, and additional demand is expected to be 6.7% and 0.9% of the overall energy requirement in FY50.
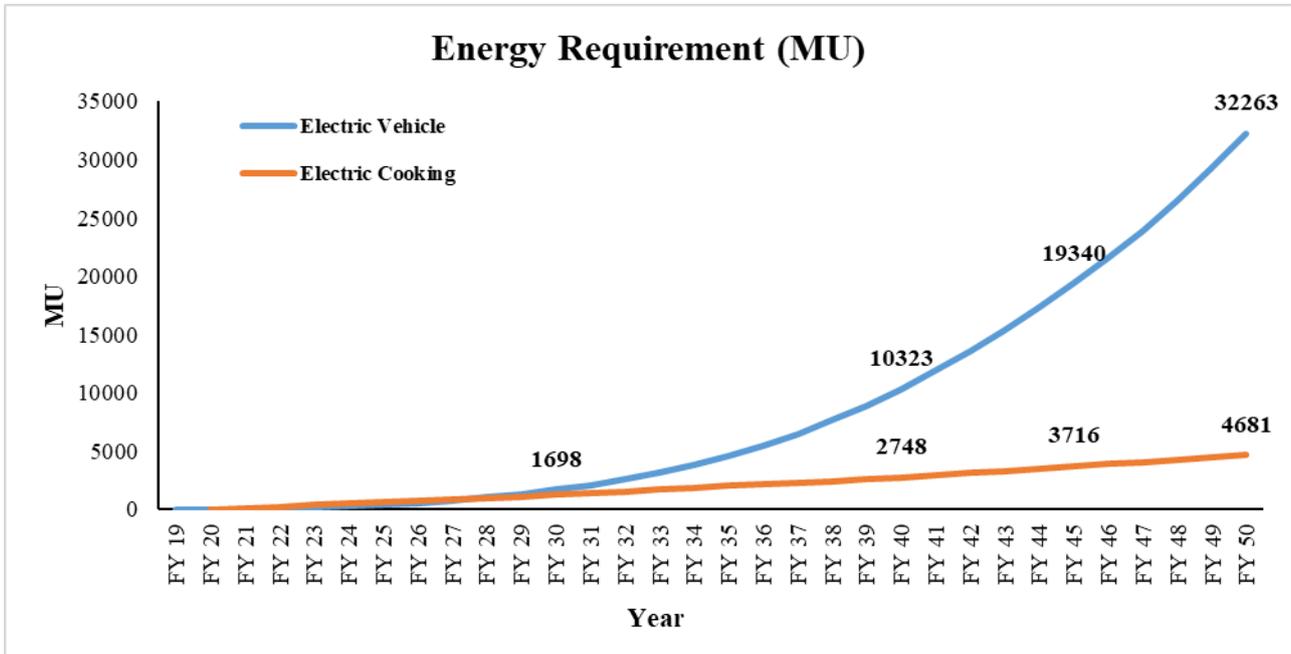

Figure 5: Energy Requirement for Electric Vehicle and Electric Cooking in MU

Month-wise Peak Demand

From FY17 to FY20, the peak demand grew from 10.6 GW to 14.3 GW i.e., 34.9%. It is estimated that peak demand grow by 38.3 % from 13.17 GW in FY 21 to 18.22 GW in FY25. The estimated peak demand in FY 30 is 24.85 GW.
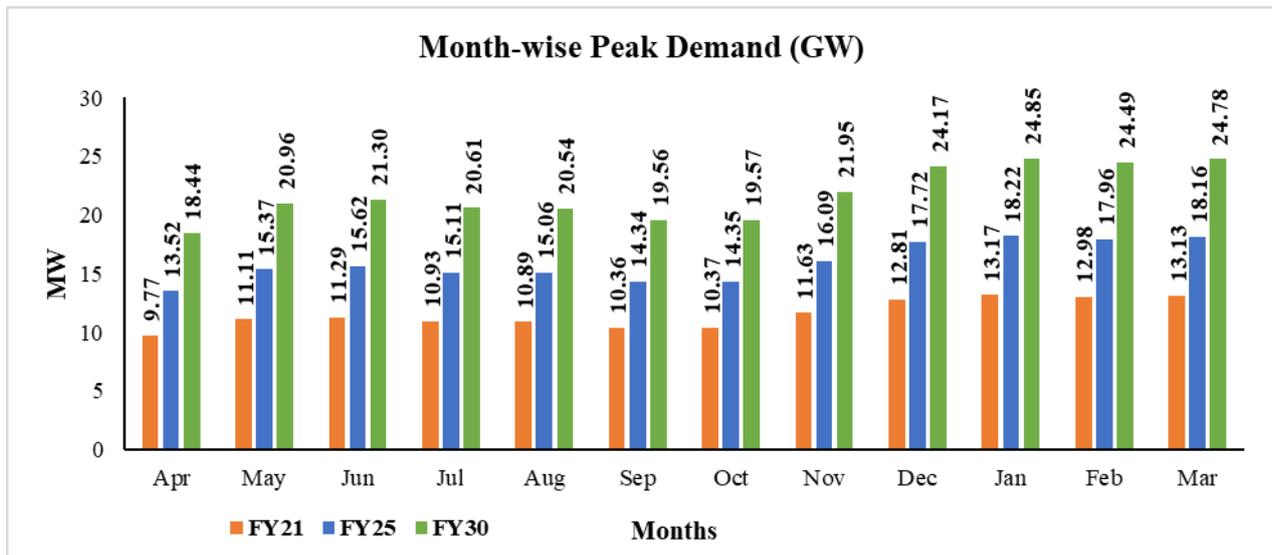

Figure 6: Month-wise Peak Demand in MW

Energy requirement for AVVNL, JdVVNL and JVVNL in FY30 is projected to be 56591 MU, 56056 MU and 69856 MU respectively. The estimated per capita energy requirement of AVVNL, JdVVNL and JVVNL in FY30 is 1899 kWh, 1881 kWh and 2344 kWh respectively.

Forecasted per capita electricity consumption for DISCOMs at bus-bar
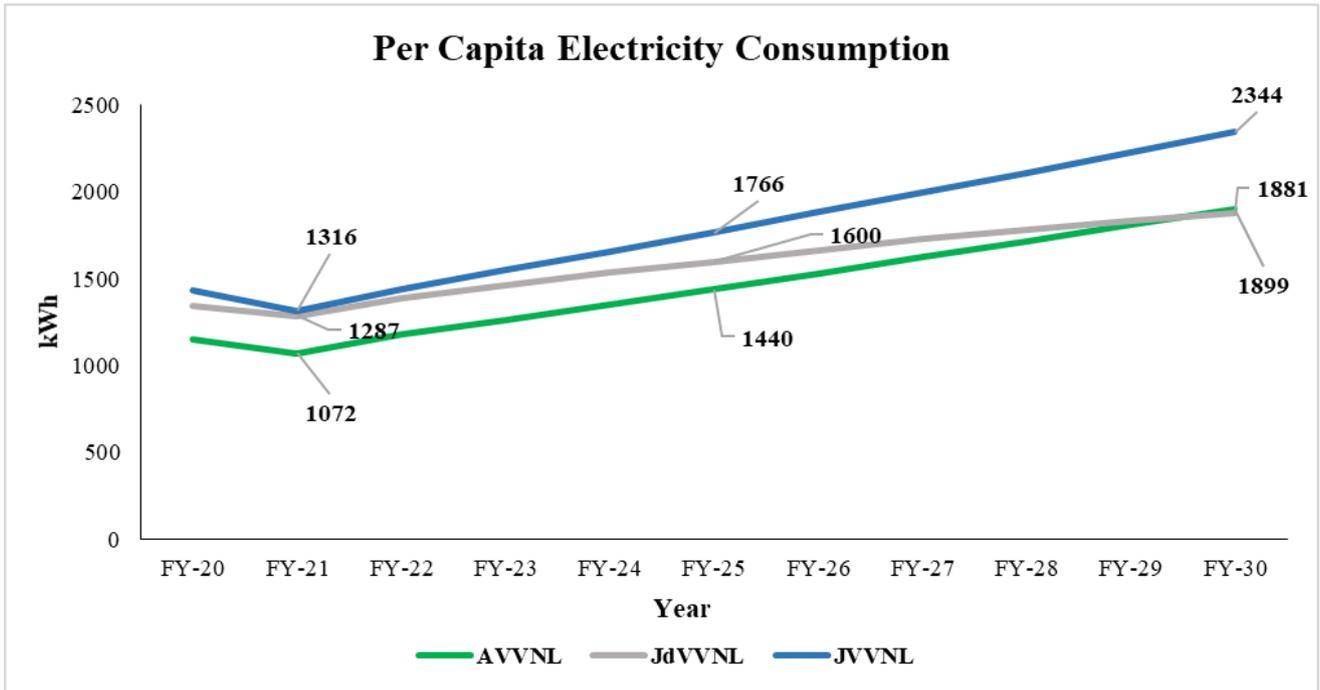
Figure 7: Forecasted per capita electricity consumption for DISCOMs at bus-bar

Forecasted Energy Requirement for DISCOMs at bus-bar
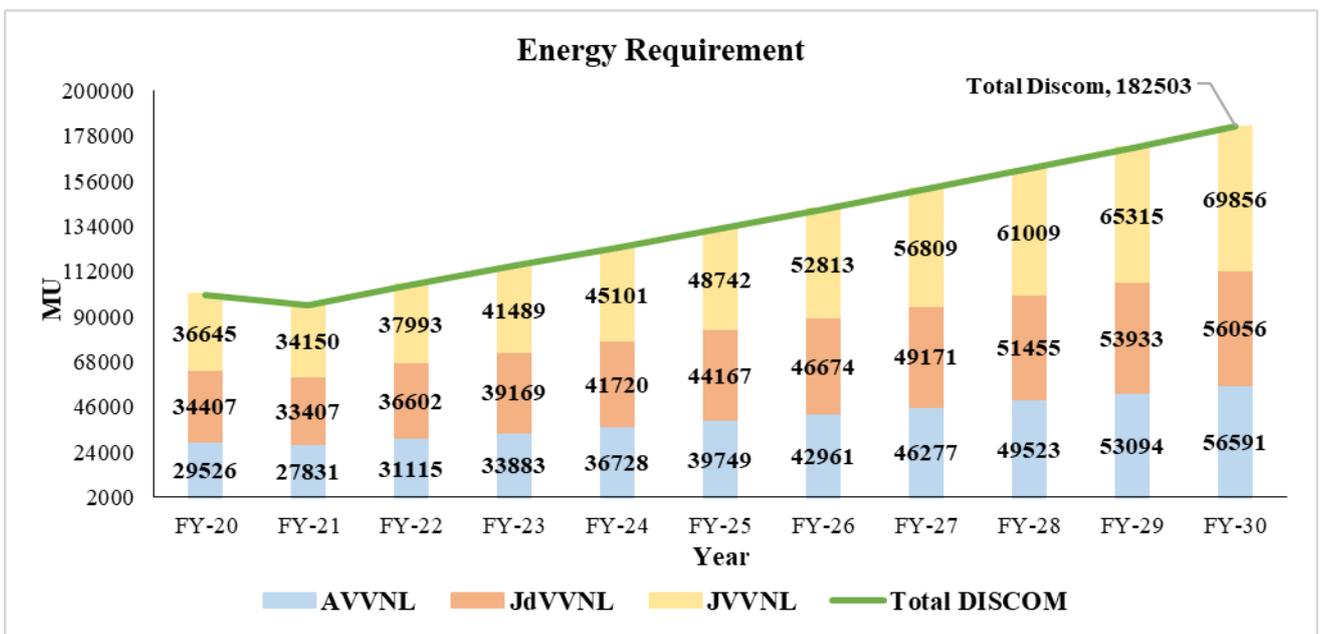
Figure 8: Forecasted Energy Requirement for DISCOMs at bus-bar

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EAL and CER Recommendations

Recommendations to policy makers and utilities are given as follows:

- Need for periodic forecasting at least every 2 years on the basis of updated data due to aspects like Electric Vehicle, Electric Cooking, etc. which were not reflected appropriately and may lead to uncertainty in the forecasted results.
- The forecasted demand profile is based on historical demand pattern, which is significantly influenced by 'load management'. In future, increase in solar utilisation may lead to change in demand pattern. Hence, these changes requires consideration in future forecasts.
- The study was limited to demand forecast for the state as a whole and DISCOM level forecast were undertaken using alternate approach, due to unavailability of detailed DISCOM level data.

Training and Capacity Building Program

CER-EAL, IITK organised Training and Capacity Building program on "Long-term Demand Forecasting: Modelling Approach for DISCOMs" in association with Bask Research Foundation and CUTS International for Power Sector Institutions which was held on 28th April, 2022. Officials from ERCs, utilities and academia participated in this workshop. The objective of this workshop was to discuss about Evolving Scenario of Indian Power sector and Long-Term Demand Forecasting for DISCOMs: A case study of Rajasthan.

The workshop also featured expert talks, Dr. B.N. Sharma, Chairman, Rajasthan Electricity Regulatory Commission, (RERC) to share his experience in power sector and current regulatory framework in demand forecasting. Mr. Deepak Kumar, director, PS & LF, Central Electricity Authority, (CEA) addressed about Practices.
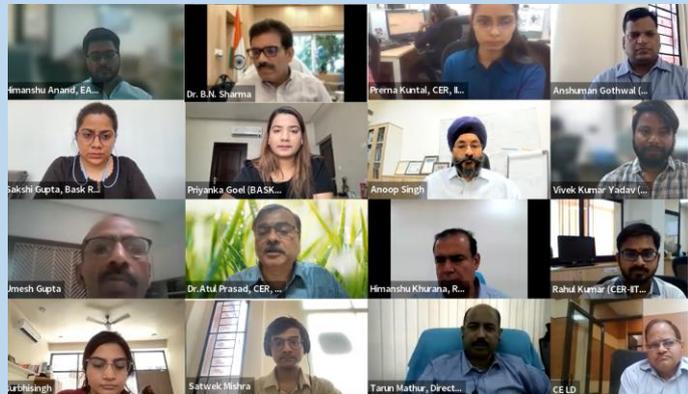
Challenges in estimating long-term Demand Ms. Ammi R. Toppo, Director (IRP), CEA discussed about the Evolving Scenario of Indian Power sector and had a fruitful interaction there.

We request your feedback for making this report more relevant to the sector.
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