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Report on Resource Adequacy Plan (Generation) for Arunachal Pradesh (2026-27 to 2036-37)

September, 2026

Department of Power
Government of Arunachal Pradesh

Contents

Disclaimer

In accordance with the Resource Adequacy Guidelines dated 28th June 2023, each Distribution Licensee is mandated to prepare a Resource Adequacy Plan (RAP) for a 10-year horizon, referred to as the Long-Term Distribution Licensee Resource Adequacy Plan (LT-DRAP), which shall be vetted and validated by the Central Electricity Authority (CEA). SLDC Arunachal Pradesh has carried out the study till 2036-37 using STELLAR Model and prepared the LT-DRAP to fulfill this requirement.

The findings, analysis and conclusions presented in this report are contingent upon the accuracy, completeness and timeliness of the information furnished by SLDC Arunachal Pradesh. Any discrepancies or limitations in the data may affect the study's outcomes accordingly.

CEA has vetted the report in fulfillment of the requirement stipulated under the aforesaid Guidelines. The vetting has been done solely based on data, inputs and assumptions provided by the state. Any change in the data, inputs or assumptions by State may lead to change in the Study/Plan. It is expressly stated that the responsibility for the implementation of the study's recommendations, ensuring the adequacy of electricity resources, and undertaking any related actions including financial implications, if any, rests entirely with the state.

Executive Summary

Ministry of Power had notified the Electricity (Amendment) Rules in December, 2022. As per Rule 16 of the Electricity (Amendment) Rules, Ministry of Power has notified Resource Adequacy (RA) Guidelines. According to these Guidelines, Central Electricity Authority (CEA) is entrusted with the responsibility of preparing the Long-Term National Resource Adequacy Plan (LT-NRAP). Further, each Distribution Utility is required to carry out a Long-Term Distribution Licensee Resource Adequacy Plan (LT-DRAP) to reliably meet its peak electricity demand and electrical energy requirements.

As per the Resource Adequacy Guidelines dated 28th June 2023, each Distribution Licensee shall undertake a Resource Adequacy Plan (RAP) with a 10-year planning horizon, LT-DRAP, to meet its own peak electricity demand and electrical energy requirements. This plan shall be vetted/validated by CEA to leverage the benefits of national-level optimization for the Distribution Licensees. The LT-DRAP shall be prepared by the Distribution Licensees on an annual rolling basis, factoring in the already contracted capacity and optimizing the requirement for additional capacity.

Government of India has gazette-notified the Renewable Energy Consumption Obligation (RCO) trajectory up to 2029-30 vide gazette notification dated 27th September 2025, which mandates that a specified portion of electrical energy consumption must be met from renewable energy sources.

To support the state in fulfilling this requirement, CEA, initially carried a Resource Adequacy (RA) study with a planning horizon up to FY 2035-36, based on the data provided by SLDC and in compliance with the RPO trajectory specified in the Ministry of Power's Office Memorandum dated 20th October, 2023. This study has now been updated and extended to cover the period up to FY 2036-37, incorporating the latest data furnished by the State and planning assumptions. The RCO requirement for the state has also been assessed in accordance with the recent gazette notified trajectory.

The electrical energy requirement and peak electricity demand as per mid-term review of 20th EPS has been considered in the study. The electrical energy requirement and peak electricity demand in Arunachal Pradesh are projected to increase at a CAGR of 4.4% and 3.4% respectively from 2026-27 to 2036-37. For satisfying resource adequacy i.e., meeting the electricity demand reliably, the state needs to methodically plan its capacity expansion either by investing in new generation or by procuring power. In view of the reduction in cost of solar panels and newer technology options like Battery Energy Storage Systems, planning for long term optimal generation capacity mix gains tremendous importance so as the future generation capacity mix is cost effective as well as environment friendly.

To identify the least-cost generation capacity expansion pathway for the period 2026-27 to 2036-37, Generation Capacity Expansion Study has been carried out with the objective of minimizing the total system cost of electricity generation, including the cost of anticipated future

investments, while satisfying all technical, operational, and policy constraints associated with various power generation technologies. The study also ensures compliance with the Renewable Consumption Obligation (RCO) notified by the Ministry of Power. Additionally, reliability study has been carried out to determine the probability of unmet demand and hours by implementing the variation in electricity demand, variation in RE generation and forced outage of thermal generators (Coal/ Lignite) etc.

Generation capacity expansion pathways have been considered for the long-term study based on the yearly capacity addition plan along with RCO constraints for Solar and DRE technologies. The Renewable capacity has been assessed in view of adherence to RCO trajectory notified by Ministry of Power, considering the fungibility among different RE sources.

The Resource adequacy studies have projected likely optimal capacity mix for future years till 2036-37 which shall be able to reliably meet the projected electricity demand. Based on the study, the likely total projected contracted capacity for the year 2036-37 is around 1241 MW which consists of 45 MW from coal; 48 MW from gas; 1112 MW from hydro; 3 MW from solar; 33 MW from Distributed Renewable Energy (DRE) sources. This capacity shall be able to meet the projected electricity demand with prescribed reliability criteria.

1.0 Introduction

Ministry of Power has notified Electricity (Amendment) Rules 2022, in December 2022. Rule 16 (I) of the said rules stipulates that "A guideline for assessment of resource adequacy during the generation planning stage (one year or beyond) as well as during the operational planning stage (up to one year) shall be issued by the Central Government in consultation with the Authority". Accordingly, the Resource Adequacy Guidelines have been notified in June, 2023, by Ministry of Power.

Resource Adequacy is generally defined as a *mechanism to ensure that there is an adequate supply of generation resources to serve expected demand reliably at least cost*. A key aspect of resource adequacy planning is to ensure that adequate generation capacities are available round-the-clock to reliably serve demand, under various scenarios. This naturally translates into the need for ensuring adequate reserve margin which could cater to varying levels of demand and supply conditions in the grid. In the wake of high RE generation, it is important to understand demand-supply situation in the grid precisely due to high seasonality and intermittency in RE generation. Resource Adequacy exercise may also help in assessment of capacity requirement to be tied up or contracted on long term, medium term, and short-term basis.

Further, Ministry of Power vide notification dated 27th September, 2025, had notified the Renewable Energy Consumption Obligation (RCO) trajectory for the states/Discoms. Based on the trajectory specified, hydro, wind and other (solar, biomass etc.) RCO quantum in million units (MUs) has been calculated to find additional quantum of renewable capacity that the states/Discoms have to contract in addition to the existing/planned capacity to meet their RCO targets.

The study recommends an optimal resource mix up to the year 2036-37, taking into account technical and financial parameters associated with various technologies. It aims to optimize long-term power procurement while ensuring resource adequacy to meet electricity demand on a 24x7 basis, considering variation in electricity demand, variation in RE generation, and forced outage of thermal capacities. The study also assesses the Planning Reserve Margin (PRM) required by the state to account for the aforementioned uncertainties, ensuring that demand can be reliably met throughout the year.

Prior to this, Arunachal Pradesh jointly with CEA had conducted the RA study for the state up to FY 2035-36, based on data furnished by SLDC and in accordance with the RCO trajectory specified in the Ministry of Power's Office Memorandum dated 20th October, 2023.

2.0 Highlights of the Previous RA Study (Up to FY 2035-36)

1. In the earlier Resource Adequacy (RA) study, financial year 2024-25 had been considered as the base year, and the study covered the period from 2025-26 to 2035-36. The fuel-wise contracted capacity of Arunachal Pradesh as on 31st March, 2025, is given in Fig. 1.

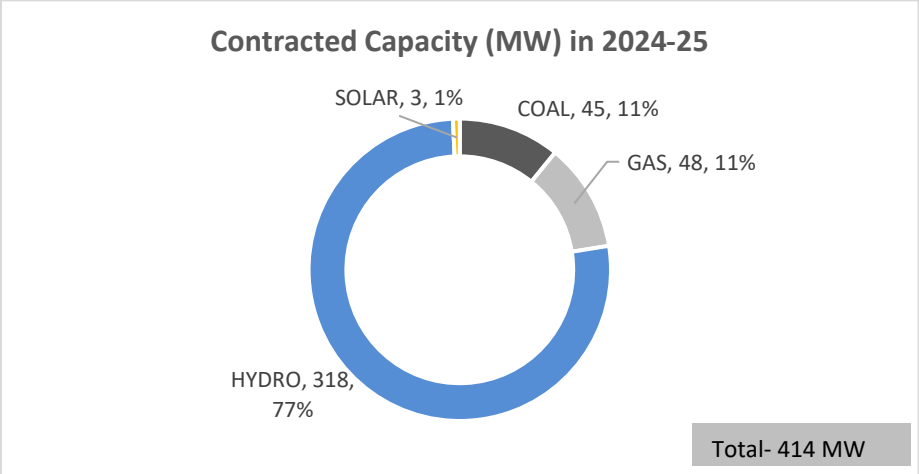


Figure 1: Fuel-wise Contracted Capacity (in MW) as on 31st March, 2025

2. The peak electricity demand and electrical energy projections that has been considered in the study is given in Table 1.

Table 1: Peak electricity demand & electrical energy projections as per the mid-term review of 20th EPS

	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
Electrical Energy Projections (MU)	1118	1178	1242	1309	1378	1436	1492	1560	1630	1701	1753
Year on Year Growth		5.32%	5.44%	5.43%	5.25%	4.23%	3.87%	4.56%	4.46%	4.36%	3.10%
Peak Electricity Demand Projections (MW)	206	217	226	236	245	253	259	268	277	286	295
Year on Year Growth		5.34%	4.18%	4.18%	4.02%	3.03%	2.69%	3.38%	3.29%	3.20%	3.10%

3. To meet the above projected peak electricity demand and electrical energy requirement reliably, the source-wise projected capacity (in MW) as outlined in the previous report is given in Table 2.

Table 2: Source-wise projected capacities (in MW)

YEAR	COAL	GAS	HYDRO	SOLAR	DRE
2025-26	45	48	318	3	10
2026-27	45	48	912	3	13
2027-28	45	48	941	3	17
2028-29	45	48	994	3	21
2029-30	45	48	994	3	25
2030-31	45	48	994	3	26
2031-32	45	48	994	3	27
2032-33	45	48	994	3	29
2033-34	45	48	994	3	30
2034-35	45	48	994	3	31
2035-36	45	48	994	3	32

4. The year-wise planned and additional capacity contract addition (in MW) for the above tabulated cumulative capacity is given in Table 3.

Table 3: Year-wise planned and additional capacity contracts (in MW)

	Hydro	DRE	Total	
Year	Planned Contracts	Additional Contracts	Planned Contracts	Additional Contracts
2025-26	0	10	0	10
2026-27	594	3	594	3
2027-28	30	4	30	4
2028-29	53	4	53	4
2029-30	0	4	0	4
2030-31	0	1	0	1
2031-32	0	1	0	1
2032-33	0	2	0	2
2033-34	0	1	0	1
2034-35	0	1	0	1
2035-36	0	1	0	1
Total	**677**	**32**	**677**	**32**

3.0 RA Study for Arunachal Pradesh (from 2026-27 to 2036-37)

3.1 Present Power Scenario in Arunachal Pradesh

3.1.1 Power Supply Position

The power supply position for Arunachal Pradesh from 2021-22 to 2025-26 is given in Table 4:

Table 4: Power Supply Position of Arunachal Pradesh

Power Supply Position						
Year	**Electrical Energy required (MU)**	**Electrical Energy supplied (MU)**	**Gap (MU)**	**Peak Demand (MW)**	**Peak Met (MW)**	**Demand not met (MW)**
2021-22	875	874	1	197	168	29
2022-23	915	892	23	167	167	0
2023-24	1014	1014	0	186	186	0
2024-25	1050	1050	0	218	191	27
2025-26	1194	1194	0	223	223	0

The data in Table 4 indicates that over the past five years, Arunachal Pradesh's electrical energy requirement and peak electricity demand have increased at a Compound Annual Growth Rate (CAGR) of 8.1% and 3.15% respectively.

3.1.2 Contracted Capacity as on March 2026

As per the data provided by SLDC, as of March 2026, the total contracted capacity of Arunachal Pradesh is 463 MW. Out of the total contracted capacity (CC), the share of non-fossil fuel-based CC is 80 %. The fuel-wise contracted capacity as on 31st March, 2026 is given in Table 5 and Fig. 2.

Table 5: Fuel-wise Contracted Capacity as on 31st March 2026

Source	**Contracted Capacity (MW)**	**Percentage**
Coal	45	10%
Gas	48	10%
Hydro	367	79%
Solar	3	1%
Total	**463**	**100%**

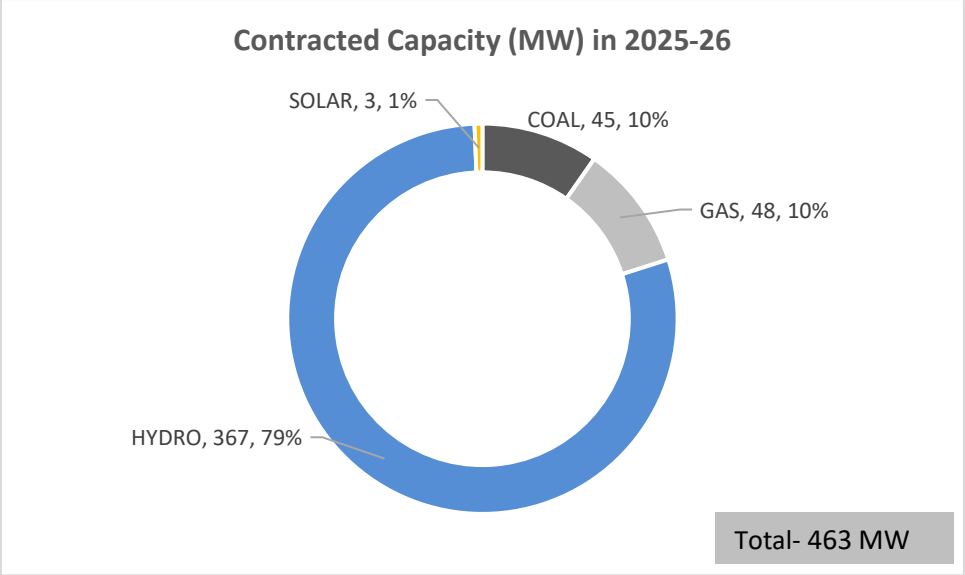


Figure 2: Fuel-wise Contracted Capacity (in MW) as on 31st March, 2026

3.2 Demand Analysis of the FY 2025-26

Hourly demand pattern of 2025-26 was analyzed and it was observed that the peak demand season for State of Arunachal Pradesh is typically during the months from January to February. Arunachal Pradesh witness peak electricity demand during non-solar hours. The month-wise average hourly electricity demand observed for the year 2025-26 is shown in Fig. 3.

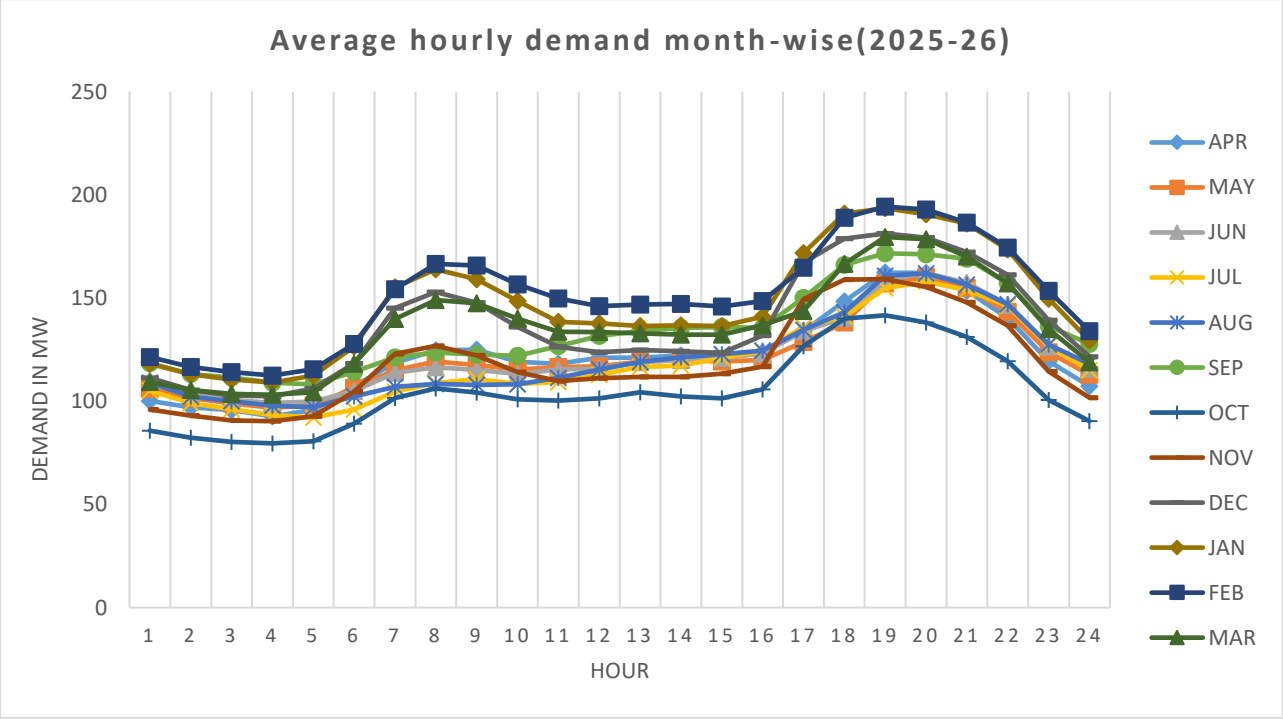


Figure 3: Average Hourly Demand Variation (Month-wise) for 2025-26

From the hourly demand data of 2025-26, the daily peak during solar hours (05:00 to 17:00 hrs) and non-solar hours are plotted in Fig. 4.

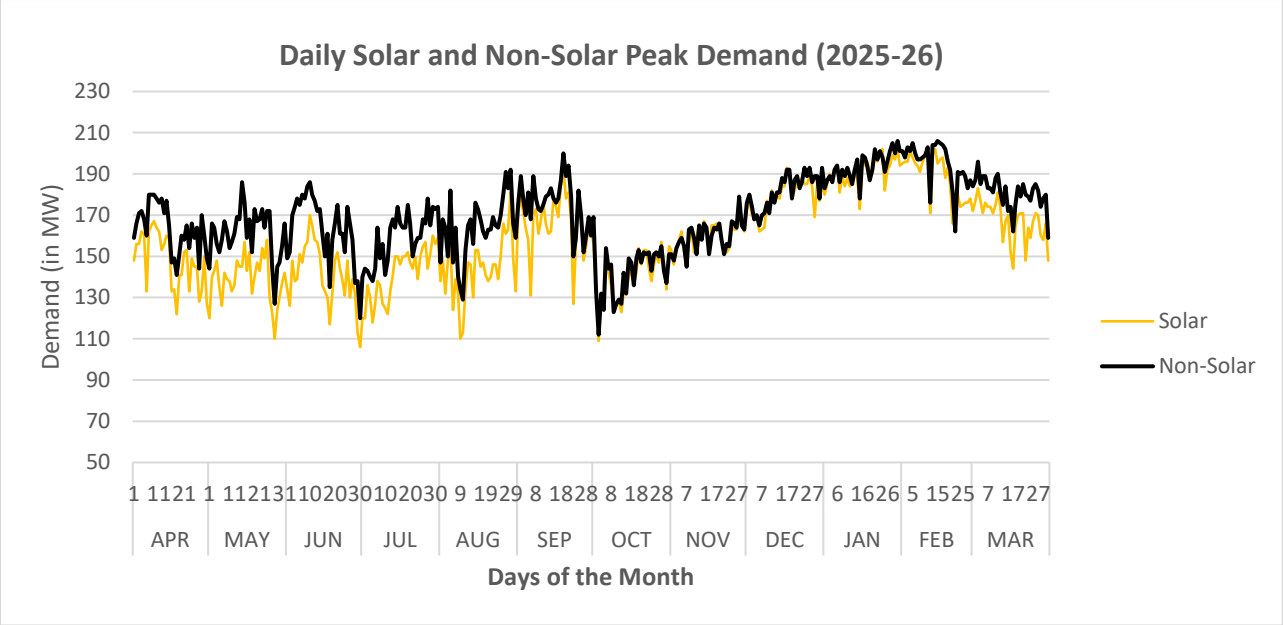


Figure 4: Solar and non-solar peak in MW for the year 2025-26

The hourly demand pattern of 2025-26 was analysed for finding out the number of occurrences of the peak and near peak demand. Such instances are critical for study purpose as it is necessary to ensure resource adequacy during such instances with an optimal mix of long-term, medium-term and short-term contracts. Frequency Distribution of hourly demand profile for 2025-26 is shown in Fig. 5.

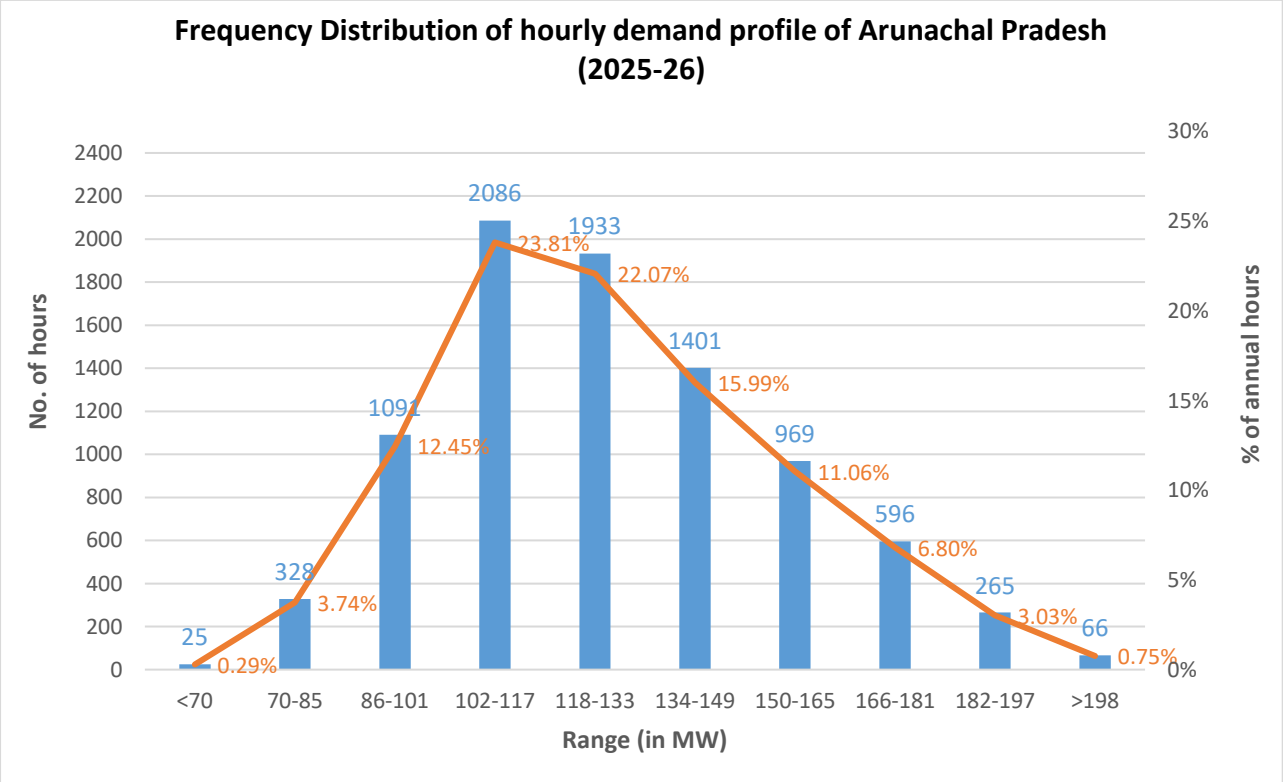


Figure 5: Frequency Distribution of Hourly Demand Profile of 2025-26

4.0 Principles of Generation Planning

The objective of Generation Planning process is to obtain an optimal generation capacity mix in the least cost manner to meet the electricity demand at every instance of time while ensuring the most efficient use of resources.

The major aspects considered in the planning process are:

i) To Supply 24x7 reliable power to the consumers
ii) To achieve objectives of all policies of the Government of India such as RCO trajectory, RE capacity addition plan etc.
iii) To achieve sustainable development.
iv) To fulfil desired operational characteristics of the system such as reliability and flexibility.
v) Most efficient use of resources.
vi) Fuel availability

4.1 Generation Expansion Planning Tool – STELLAR

Central Electricity Authority (CEA) has successfully developed an indigenously generation expansion planning tool that integrates long-term capacity planning, economic dispatch, and reliability analysis into a unified framework. Named “STELLAR” (Strategic Expansion for Long-Term Load Adequacy and Resilience), the tool represents a significant advancement in power system modelling and planning. STELLAR is a state-of-the-art optimisation model framework specifically designed to support long-term decision-making in the electricity sector, with a focus on ensuring resource adequacy, operational resilience, and cost-effective system evolution in line with India's energy transition goals.

STELLAR serves as a comprehensive and robust platform for long-term generation and transmission planning, supporting informed policymaking and investment strategies in India's evolving power sector. The salient features of STELLAR include representative-day modelling, co-optimisation of energy and ancillary services, demand response modelling, and reliability modelling. The schematic diagram of the software is given in Figure 6.

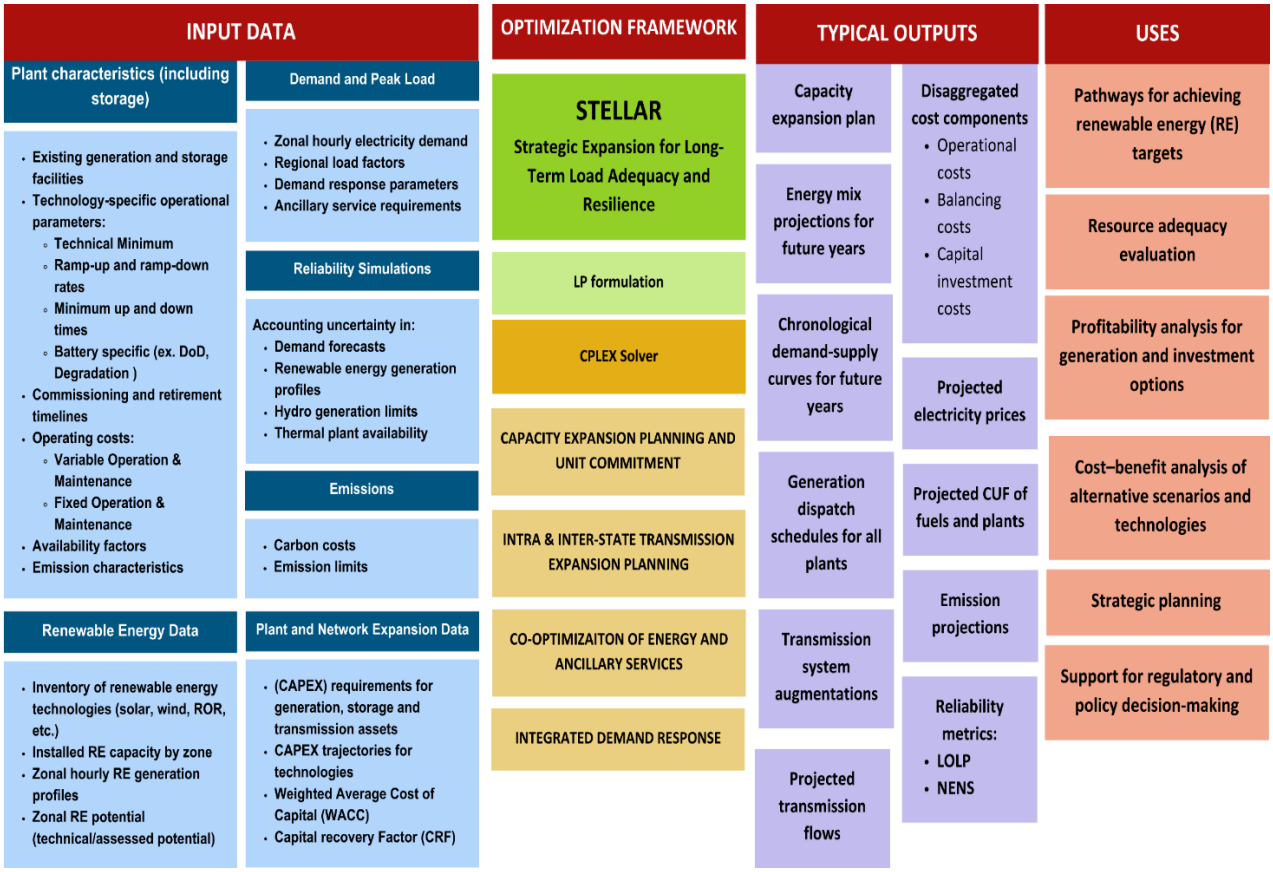


Figure 6: STELLAR Schematic Diagram

5.0 Reliability Analysis

One of the main criteria of resource adequacy studies is to determine the reliability of the system to meet the demand adequately at every instance of time. This reliability is measured via two indices i.e. LOLP (Loss of Load Probability) and EENS (Expected Energy Not Served). These indices have been defined in resource adequacy guidelines as below:

- **Loss of Load Probability (LOLP)**: Measure of the probability that a system's load may exceed the generation and firm power contracts available to meet that load in a year. E.g., 0.0274 % probability of load being lost.
- **Expected Energy Not Served (EENS):** Expected amount of energy (MWh) that may not be served for each year within the planning period under study. It is a summation of the expected number of megawatt hours of demand that may not be served for the year. This is an energy-centric metric that considers the magnitude and duration of energy being not served, calculated in Mega Watt hours (MWh). The metric can be normalized (i.e., divided by total system energy requirement) to create a Normalized Energy Not Served (NENS) metric.

Monte Carlo /Stochastic simulation has been used to factor-in the uncertainty associated with various generation resources and demand. It is an approach which is used to predict the

probability of a variety of outcomes when the potential for random variables is present, as compared to deterministic modelling. Monte Carlo simulation helps in analysing the randomness associated with RE generation resource, demand pattern changes and forced outages of plant. A large number of random samples of these variables is simultaneously simulated to ascertain system reliability indices (i.e. Loss of load probability LOLP & Energy Not Served (ENS)) and the system robustness in case of above variation of system parameters.

Planning Reserve Margin (PRM): To meet the prescribed standard of LOLP / NENS conditions, sufficient reserve margins need to be maintained in the system for adequately addressing the demand and supply variations. Planning Reserve Margin (PRM) is the predominant metric used to ensure adequacy of generation resources in the system. PRM in a power system is generally expressed as a certain percent of the projected peak electricity demand.

5.1 Variation in Electricity Demand

The variation in demand pattern for last two years viz. 2024-25 and 2025-26 (considering 2024-25 as the base year) has been analyzed. The demand pattern variation across 2024-25 and 2025-26 is shown in Fig. 7.

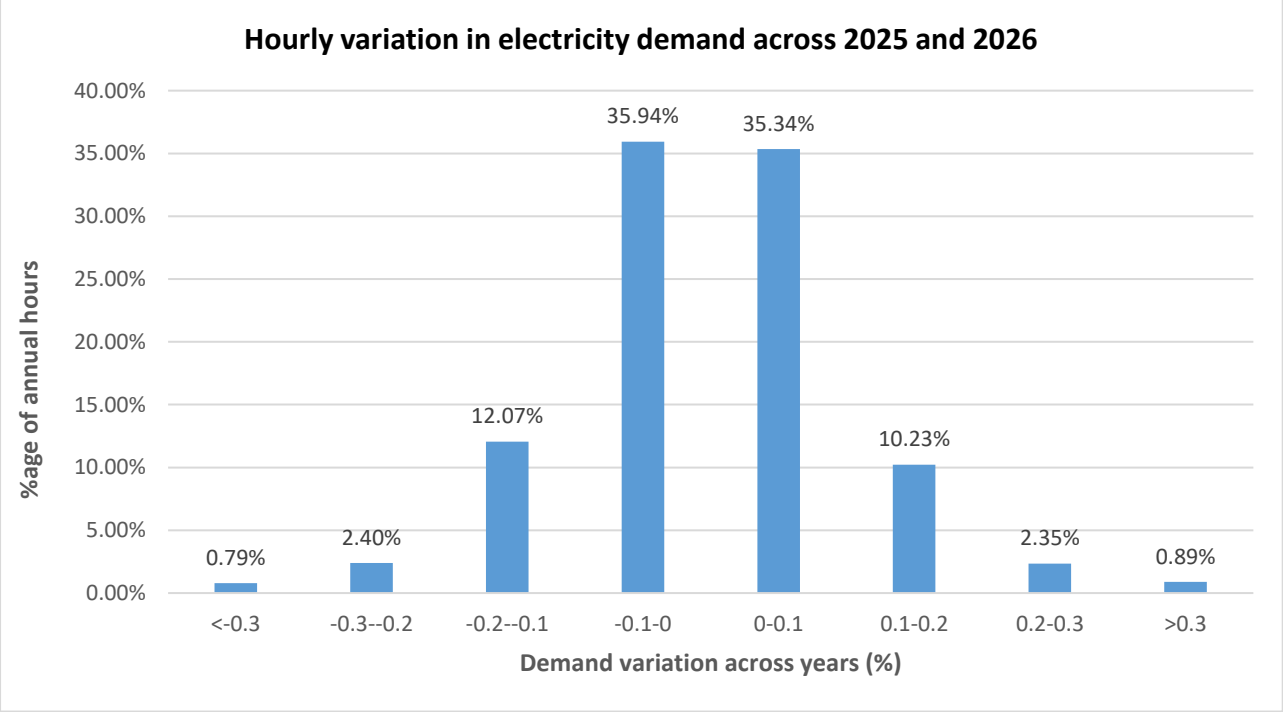


Figure 7: Hourly Variation in electricity demand across years

It can be observed that the hourly demand typically varies within ±10% for ~71.28% of instances. This variation is primarily due to temperature, weather parameter or any random outages of transmission line and generating units etc. This variation has been captured in the reliability study by incorporating a variation of ±10% in the projected hourly electricity demand for the future years by introducing a random variable (with normal distribution) for demand as per observed behavior over the years.

5.2 Variation in RE

In the Long-term capacity expansion planning studies, a particular profile for Solar and Wind is considered based on the observed generation data to determine the optimal capacity mix. However, due to intermittent nature of these sources, generation from these non-dispatchable sources may vary across years. As per the analyses carried out based on historical generation data, solar generation has been varied by ±10% to incorporate the variation in the generation sources and plan for requisite measures to mitigate such behavior.

5.3 Forced Outage of Thermal Generators

The average forced outage rate of thermal generators is typically 10% with ±5% variation. The same has been incorporated in the model.

Based on these variations, reliability studies have been carried out to ascertain robustness of the system.

6.0 Inputs/Assumptions for the Study

i) The peak electricity demand and electrical energy requirement of Arunachal Pradesh as per mid-term review of 20th EPS is given in Table 6.

Table 6: Electricity demand projection

	Peak Electricity Demand		Electrical Energy Requirement	
	Projections (in MW)	Y-o-Y Growth	Projections (in MU)	Y-o-Y Growth
2026-27	217	-	1178	-
2027-28	226	4.18%	1242	5.44%
2028-29	236	4.18%	1309	5.43%
2029-30	245	4.02%	1378	5.25%
2030-31	253	3.03%	1436	4.23%
2031-32	259	2.69%	1492	3.87%
2032-33	268	3.38%	1560	4.56%
2033-34	277	3.29%	1630	4.46%
2034-35	286	3.20%	1701	4.36%
2035-36	295	3.10%	1753	3.10%
2036-37	304	3.16%	1808	3.12%

ii) Future demand profile till the year 2036-37 has been projected using the demand profile for the year 2025-26 as the base profile.

iii) The solar and hydro generation profiles and CUFs have been referred from data available in CEA.

iv) The capital cost of candidate plants for coal, solar, and battery/PSP technologies is detailed in the Annexure and are in alignment with current market trends and recent price discovery.

v) The planned capacity has been considered based on the tie-up information by Arunachal Pradesh. The same is summarised in Table 7 and details are furnished in Annexure.

Table 7: Source-wise planned capacity addition

FY	HYDRO (Conventional/Small) (MW)	Hydro (DRE) (MW)
2026-27	-	
2027-28	571	
2028-29	65	8
2029-30	103	
Total	**739**	**8**

vi) **Renewable Energy Consumption Obligation (RCO) trajectory**: Ministry of Power vide gazette notification dated 27th September, 2025, had notified the source wise minimum share of consumption from non-fossil sources (renewable energy) by designated consumers, till the year 2029-30 as given in Table 8.

Table 8: Renewable Energy Consumption Obligation (RCO) trajectory (%)

Sl. No.	Year	Wind renewable energy	Hydro renewable energy	Other renewable energy	Distributed renewable energy	Total renewable energy
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1.	2025-26	1.45	1.22	28.24	2.1	33.01
2.	2026-27	1.97	1.34	29.94	2.7	35.95
3.	2027-28	2.45	1.42	31.64	3.3	38.81
4.	2028-29	2.95	1.42	33.1	3.9	41.36
5.	2029-30	3.48	1.33	34.02	4.5	43.33

It has been assumed that the share of RE generation in the generation mix shall at least remain 43.33% beyond 2029-30. Further, being a hilly state, the DRE percentage for Arunachal Pradesh has been taken as half of the percentage what other states are obliged to meet. Hence, the suggested trajectory of Renewable Consumption Requirement up to FY 2036-37 is given in Table 9.

Table 9: Renewable Energy Consumption Obligation (RCO) trajectory (in %) considered for the study

Sl. No.	Year	Wind renewable energy	Hydro renewable energy	Other renewable energy	Total renewable energy w/o DRE	Distributed renewable energy
(1)	(2)	(3)	(4)	(5)	(3) + (4) +(5)	(6)
1.	2026-27	1.97	1.34	31.29	34.6	1.35
2.	2027-28	2.45	1.42	33.29	37.16	1.65
3.	2028-29	2.95	1.42	35.04	39.41	1.95
4.	2029-30	3.48	1.33	36.27	41.08	2.25
5.	2030-31	41.08			41.08	2.25
6.	2031-32	41.08			41.08	2.25
7.	2032-33	41.08			41.08	2.25
8.	2033-34	41.08			41.08	2.25

9.	2034-35	41.08	41.08	2.25
10.	2035-36	41.08	41.08	2.25
11.	2036-37	41.08	41.08	2.25

Based on the trajectory specified, RCO quantum in million units (MUs) from hydro, other (Solar, etc.) and distributed renewable energy (DRE) is calculated and given in Table 10.

Table 10: Total Energy required to meet RCO (MU)

Sl. No.	Year	Wind renewable energy (MU)	Hydro renewable energy	Other renewable energy	Total renewable energy w/o DRE	Distributed renewable energy
(1)	(2)	(3)	(4)	(5)	(3) + (4) +(5)	(6)
1.	2026-27	23.21	15.79	368.60	407.59	15.90
2.	2027-28	30.43	17.64	413.46	461.53	20.49
3.	2028-29	38.62	18.59	458.67	515.88	25.53
4.	2029-30	47.95	18.33	499.80	566.08	31.01
5.	2030-31	589.91			589.91	32.31
6.	2031-32	612.91			612.91	33.57
7.	2032-33	640.85			640.85	35.10
8.	2033-34	669.60			669.60	36.68
9.	2034-35	698.77			698.77	38.27
10.	2035-36	720.13			720.13	39.44
11.	2036-37	742.73			742.73	40.68

As indicated in Table 11, the state with its existing and envisaged future capacity additions will be able to meet its RCO requirements from the year 2026-27 onwards.

Table 11: Renewable Energy (other than DRE) Deficit/Surplus

FY	RE Generation required to meet RCO [excluding DRE]	RE Generation available/met (From existing/ planned contracts) Excluding DRE	RCO Surplus (+)/ Deficit (-)
	(MU)	(MU)	(%)
2026-27	407.59	1090.43	58.4
2027-28	461.53	1279.11	62.8
2028-29	515.88	1348.57	60.6
2029-30	566.08	1419.39	58.9
2030-31	589.91	1479.50	58.9
2031-32	612.91	1536.82	58.9
2032-33	640.85	1606.92	58.9
2033-34	669.60	1678.57	58.9
2034-35	698.77	1751.70	58.9
2035-36	720.13	1805.95	58.9
2036-37	742.73	1862.24	58.9

7.0 Outcome of the model

7.1 Investment options to meet the unserved energy and ensure RCO compliance

With the existing and planned capacity addition, the State will be able to meet the projected electricity demand and RCO obligations (excluding DRE). Hence, the State only needs to set up additional DRE capacity to meet the DRE Obligations. The capacity projections (existing, planned, to be tied up) for Arunachal Pradesh are given in Table 12.

Table 12: Year-wise contracted capacity projections (in MW)

Year	Coal	Gas	Hydro	Solar	DRE
2026-27	45	48	367	3	13
2027-28	45	48	936	3	17
2028-29	45	48	1009	3	21
2029-30	45	48	1112	3	25
2030-31	45	48	1112	3	26
2031-32	45	48	1112	3	27
2032-33	45	48	1112	3	29
2033-34	45	48	1112	3	30
2034-35	45	48	1112	3	31
2035-36	45	48	1112	3	32
2036-37	45	48	1112	3	33

The projected contracted capacity mix, year-wise is given in Figure 8.

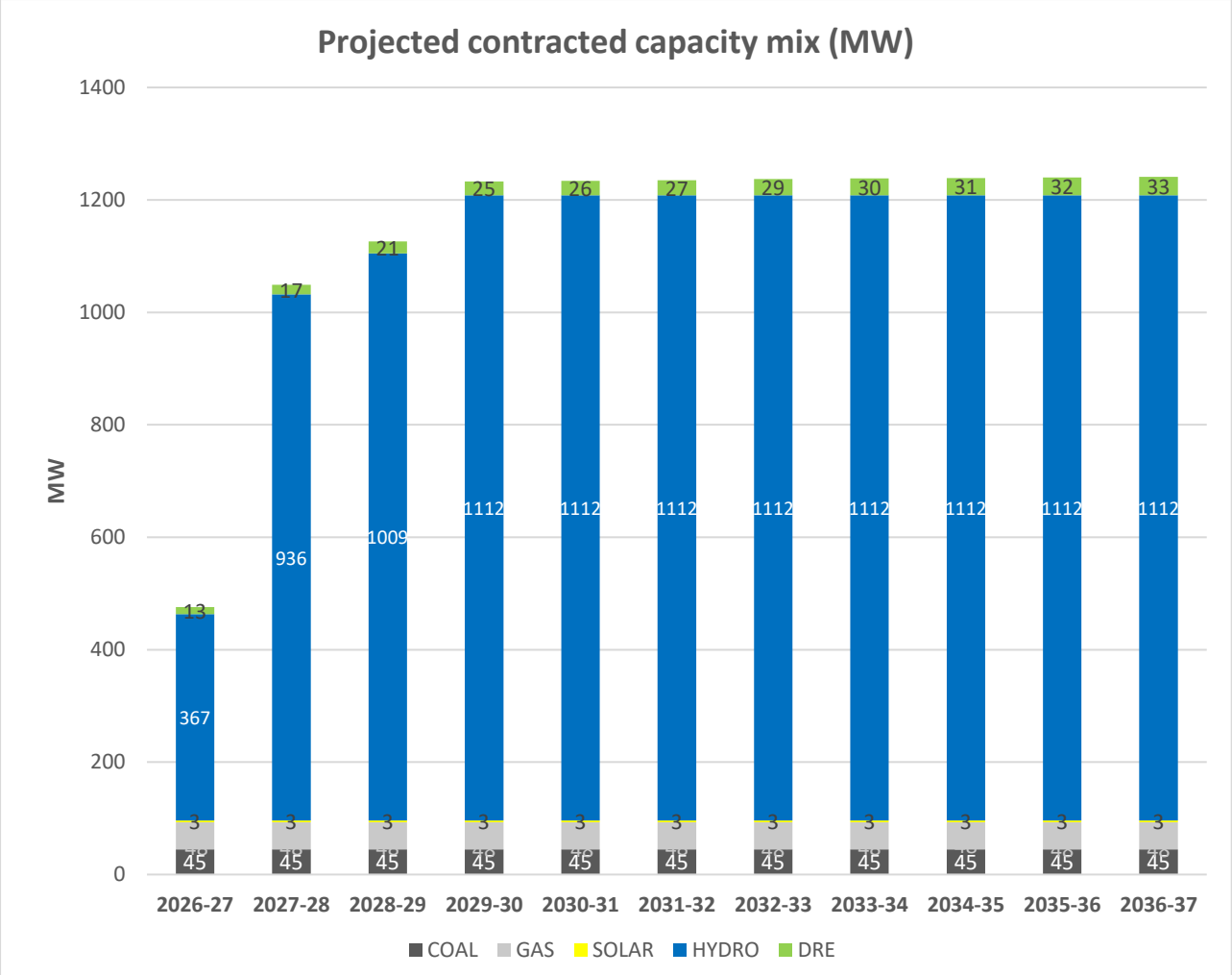


Figure 8: Year-wise Projected Contracted Capacity Mix (MW)

Reliability studies have been conducted based on the projected capacity for the year 2036-37. The analysis confirms that the projected capacity meets the reliability criteria specified in the National Electricity Plan (NEP), with the Loss of Load Probability (LoLP) and Not-Served Energy (NENS) remaining within the permissible limits of 0.2% and 0.05%, respectively.

As per the resource adequacy studies, the likely total projected contracted capacity for the year 2036-37 is around 1,241 MW which consists of 45 MW from coal; 48 MW from gas; 1,112 MW from hydro; 3 MW from solar; 33 MW from DRE. This capacity shall be able to meet the projected demand with prescribed reliability criteria and to comply with the stipulated Renewable Energy Consumption Obligation (RCO) targets. Based on the capacity addition, the planning reserve margin works out to be about 5%. Capacity mix required by 2036-37 is shown in Figure 9.

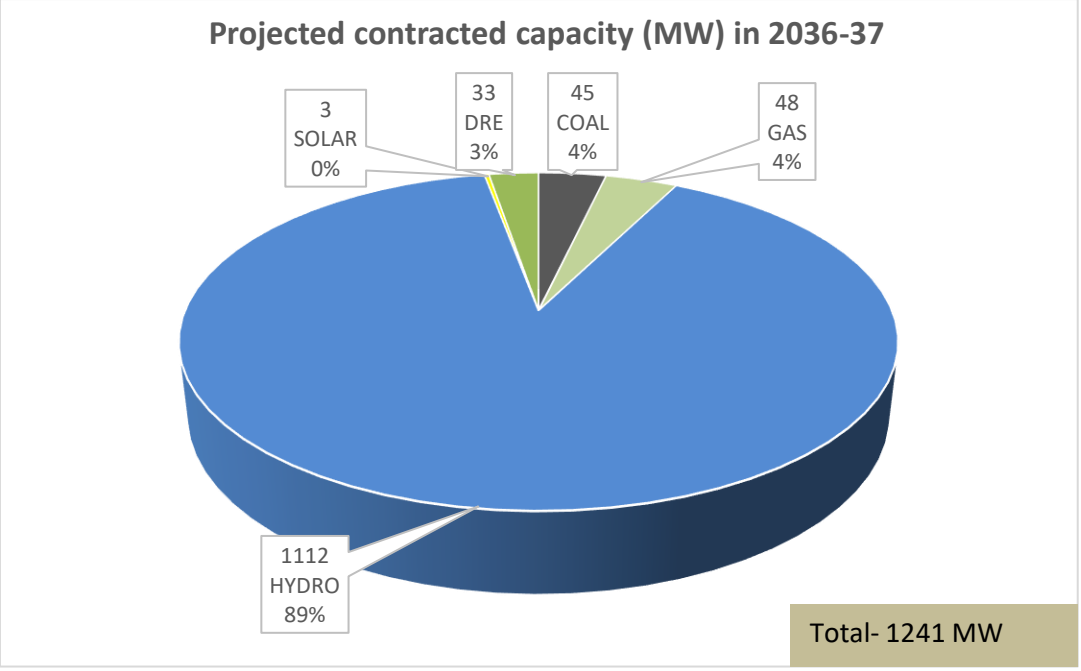


Figure 9: Contracted Capacity Mix in 2036-37

It is important to note that any deviations in the commissioning schedule of the planned capacity could result in a situation where the state is unable to meet the projected peak electricity demand and electrical energy requirements identified in this study with the available resources. Such changes may also lead to an increase in the cost of meeting the state's power demand reliably.

As per the study, the state likely needs to contract the following capacities (planned and additional) every year till 2036-37 to meet its demand reliably as shown in Table 13.

Table 13: Year-wise Capacity Addition (in MW)

	Hydro	**DRE**		**Total**	
Year	Planned Contracts	Additional Contracts	Planned Contracts	Planned Contracts	Additional Contracts
2026-27	-	13	-	-	13
2027-28	571	3.6	-	571	3.6
2028-29	72	0	8	80	0
2029-30	102.6	0.5	-	102.6	0.5
2030-31	-	1.1	-	-	1.1
2031-32	-	1.0	-	-	1.0
2032-33	-	1.2	-	-	1.2
2033-34	-	1.3	-	-	1.3
2034-35	-	1.3	-	-	1.3
2035-36	-	1.0	-	-	1.0
2036-37	-	1.0	-	-	1.0
Total	**745.6**	**25**	**8**	**753.6**	**25**

The projected gross generation mix for the state is shown in Figure 10 and 11.

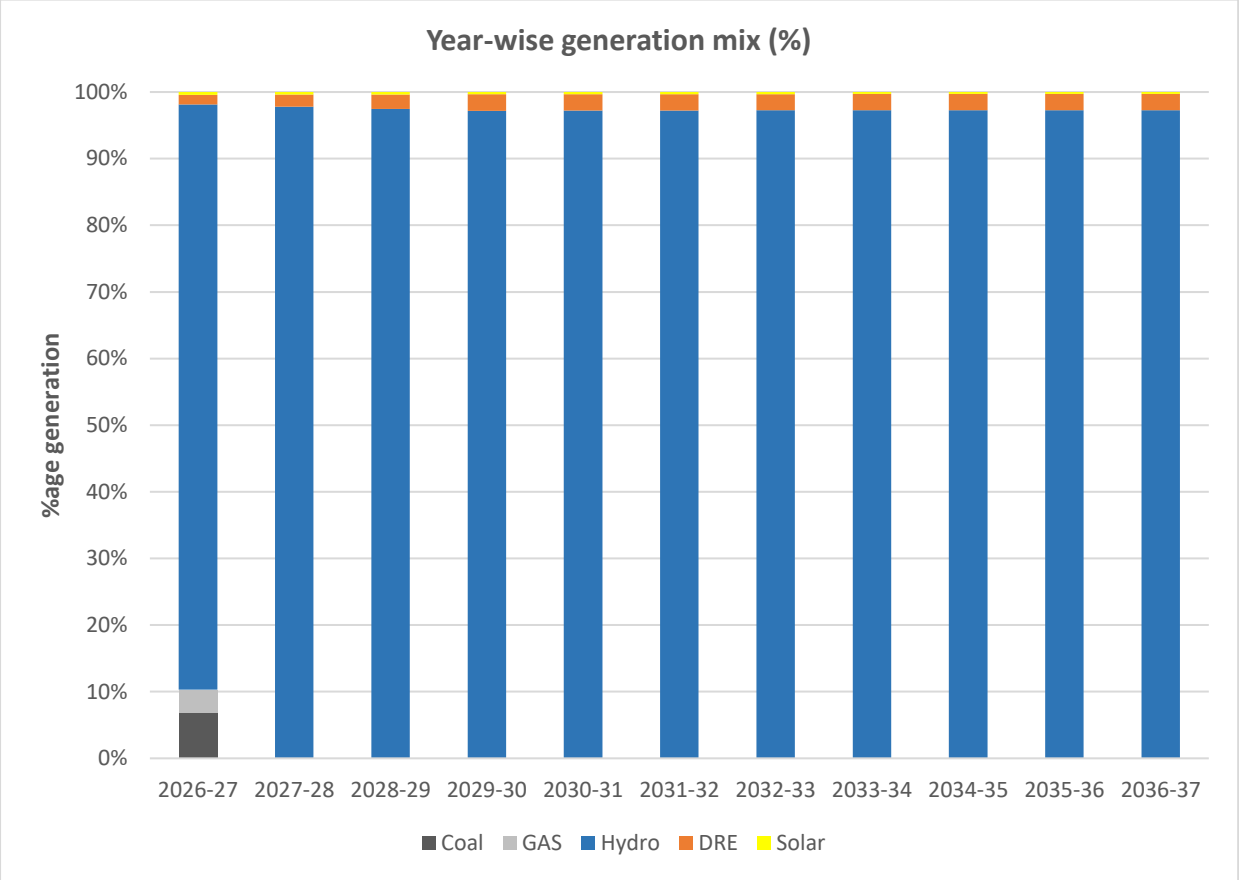
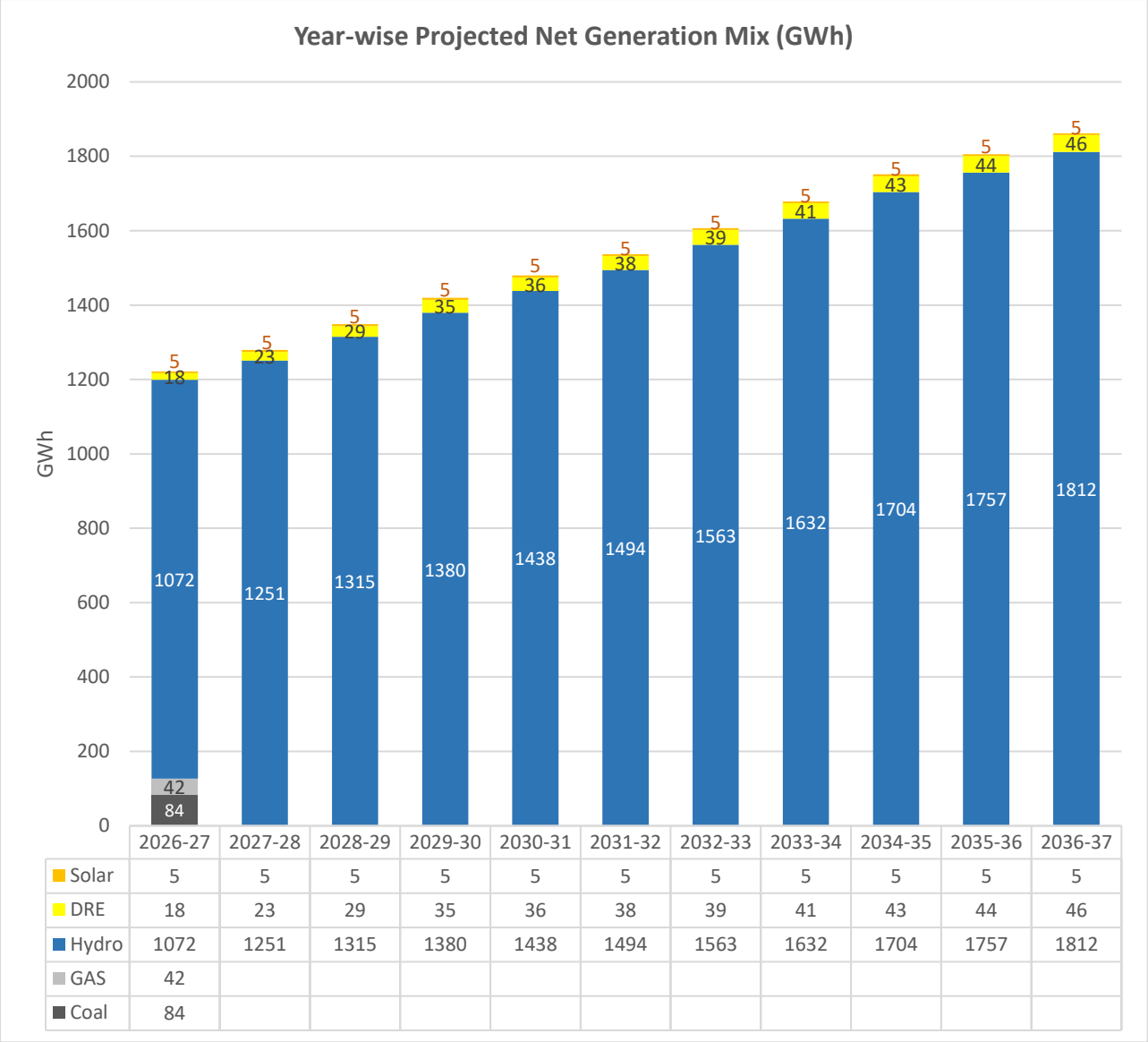


Figure 10: Year-wise projected net generation mix (in %)



	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36	2036-37
Solar	5	5	5	5	5	5	5	5	5	5	5
DRE	18	23	29	35	36	38	39	41	43	44	46
Hydro	1072	1251	1315	1380	1438	1494	1563	1632	1704	1757	1812
GAS	42										
Coal	84										

Figure 11: Year-wise projected net generation (in GWh)

8.0 Conclusions

Based on the Resource Adequacy studies of Arunachal Pradesh up to the year 2036-37, the following conclusions may be drawn:

1. The study has been done based on the hourly electricity demand pattern of the year 2025-26. It has been observed that the peak demand season is typically from January to February with peak demand occurring during non-solar hours.
2. The study has considered electricity demand projection as per mid-term review of 20th EPS, which envisages that the annual electrical energy requirement of the state is likely to grow at a CAGR of 4.4% while the peak electricity demand for the state is likely to grow at a CAGR of 3.4% for the period of 2026-27 to 2036-37.

3. Arunachal Pradesh, with its existing and planned capacity addition only, is likely to witness no energy deficit. The State needs to tie up DRE Capacity to meet the DRE obligation. The projected capacity and generation mix outlined in the report meet the state's RCO requirements for the years 2026-27 to 2036-37.
4. As per studies, the state is expected to have a surplus hydro-based capacity. This surplus capacity may be banked or shared with other states whose demand profile complements that of Arunachal Pradesh.
5. The Planning Reserve Margin (PRM) for Arunachal Pradesh has been assessed at about 5%. Further, the study indicates year-wise short-term/medium-term/bilateral requirements inclusive of the PRM capacity to optimally meet the demand.
6. Timely commissioning of planned capacities is critical for ensuring that the state meets its projected peak electricity demand and electrical energy requirements reliably. Any deviation from the planned schedule may lead to resource shortfalls and could significantly increase the cost of reliably meeting the state’s power demand.

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Annexure

Details of upcoming considered in the study

Sl. No.	Tied capacity name	Type of generation	Expected COD	Arunachal Pradesh's share (in MW)
1.	Subansiri Lower	Hydro	2027-28	556.5
2.	Pareng SHEP	Hydro	2027-28	14.5
3.	Dengzi SHEP	Hydro	2028-29	18
4.	Keyi SHEP	Hydro	2028-29	23
5.	Yameng SHEP	Hydro	2028-29	15
6.	Halaipani SHEP	Hydro	2028-29	16
7.	Paikangrong SHEP (DRE)	Hydro	2028-29	7.5
8.	Lohit Tidal (DRE)	Hydro	2028-29	0.5
9.	Ressing SHEP	Hydro	2029-30	12
10.	Kamlang SHEP	Hydro	2029-30	24.6
11.	Khuitam HEP	Hydro	2029-30	66

Assumption for Resource Adequacy Studies

1. Electricity Demand & peak requirement: As per information furnished by the State.
2. Demand Profile: Based on hourly demand profile of 2025-26.
3. Existing & Planned Capacity: As per the information shared by the state.
4. Cost parameters: based on information in National Electricity Plan.

RE CUF considered

Hydro	Solar (existing)	DRE
38 %	18%	14%

Technical Parameters

Technology	Type	Availability (%)	Ramping (%/min)	Min. Technical . (%)
Coal/Lignite	Existing/Planned	85	1	55
	Candidate	88	1	55
Gas	Existing	90	5	40
Nuclear	Existing/Planned	68	Const. Load	-
Biomass	Existing/Planned	60	2	50
Hydro	Existing/Planned/ Candidate	As per available hourly generation profile	100	-
Solar	Existing/Planned		-	-
	Candidate		-	-

Technology	Type	Heat Rate (MCal/MWh)		Aux. Consum. (%)	Min. up time (hr)	Min. down time (hr)
		At max loading	At min loading			
Coal	Existing/ Planned	2300 to 2879	2438 to 3052	7.0	6	4
	Candidate (SC & USC)	2060 to 2125	2183 to 2253	6.5	6	4
Gas	Existing	2000 to 2900	2260 to 3277	2.5	4	3
Nuclear	Existing/ Planned	2777	2777	10	6	4
	Candidate	2777	2777	10	-	-
Biomass	Existing/ Planned	4200	4450	8	6	4
	Candidate	4200	4450	8	6	4
Hydro	Existing/ Planned	-	-	0.7	-	-
	Candidate	-	-	0.7	-	-

Transmission Parameters

A single node has been considered for the purpose of study with all generating units and demand connected to the node. No transmission bottleneck has been considered for the study. Interstate ATC limit has not been considered in the study.

Financial Parameters

Following cost parameters have been assumed:

Resource	Capex* (in ₹/MW)	O&M Fixed Cost (in ₹/MW)	Construction Time (in years)	Amortization /Life time (in years)
Coal	12 Cr	30 Lakh	4	25
Solar	4.5 Cr to 4 Cr	1 % of Capex	1	25