



# UPPCL'S FORECASTING METHODOLOGY





# Long and Medium Term Planning

# UPPCL historical Demand & Yearly growth



**Uttar Pradesh**  
**Power Corporation Limited**

Average and Peak Demand met by UPPCL in last three Financial years

| FY    | Average Demand Met (in MW) | Peak Demand Met (in MW) |
|-------|----------------------------|-------------------------|
| FY-24 | 16050                      | 26327                   |
| FY-25 | 17879                      | 29002                   |
| FY-26 | 17707                      | 30013                   |

| Period                  | CAGR Average Demand Met | CAGR Peak Demand Met |
|-------------------------|-------------------------|----------------------|
| Last 3 Years from FY-24 | 3.33%                   | 4.46%                |

**Note:-**

***\*This data is at UP state drawl periphery grossed up with state transmission loss***

## Pattern considered for Demand projections:

- ✓ UPPCL's block-wise actual drawl data for FY-25 and FY-26, grossed up by state transmission loss and including actual rostering has been used for demand projection
- ✓ The derived block-wise demand was then converted into monthly average block-wise demand profiles for both years.
- ✓ For each time block, the higher of the monthly average demand values observed in FY-25 and FY-26 was considered as the baseline demand from FY-27 to FY-40.

**Demand growth is evaluated as per the CEA resource adequacy plan for UP**

| <b>FY</b>    | <b>RTC Demand Growth(%)</b> | <b>Peak Demand Growth(%)</b> |
|--------------|-----------------------------|------------------------------|
| <b>FY-27</b> | 7.00%                       | 6.50%                        |
| <b>FY-28</b> | 7.30%                       | 7.20%                        |
| <b>FY-29</b> | 7.40%                       | 6.80%                        |
| <b>FY-30</b> | 7.50%                       | 7.00%                        |
| <b>FY-31</b> | 7.50%                       | 7.00%                        |
| <b>FY-32</b> | 6.80%                       | 7.00%                        |
| <b>FY-33</b> | 6.80%                       | 6.50%                        |
| <b>FY-34</b> | 6.70%                       | 6.50%                        |
| <b>FY-35</b> | 6.70%                       | 6.50%                        |
| <b>FY-36</b> | 6.70%                       | 6.50%                        |
| <b>FY-37</b> | 6.70%                       | 6.50%                        |
| <b>FY-38</b> | 6.70%                       | 6.50%                        |
| <b>FY-39</b> | 6.70%                       | 6.50%                        |
| <b>FY-40</b> | 6.70%                       | 6.50%                        |

# Current Tied-up PPAs (Contracted and Commissioned)



**Uttar Pradesh**  
**Power Corporation Limited**

## Contracted and Commissioned Capacity of UPPCL

| Category                | Contracted Capacity<br>(MW) | Commissioned Capacity till present<br>(MW) |
|-------------------------|-----------------------------|--------------------------------------------|
| Coal (State)            | 9120                        | 9120                                       |
| Coal (Central)          | 9252                        | 5418                                       |
| Coal (IPP)              | 11214                       | 10599                                      |
| <b>Coal (Total)</b>     | <b>29586</b>                | <b>25137</b>                               |
| <b>Gas (Central)</b>    | <b>549</b>                  | <b>549</b>                                 |
| Hydro (State)           | 492                         | 481                                        |
| Hydro (Central)         | 4440                        | 2475                                       |
| Hydro (IPP)             | 1083                        | 1083                                       |
| <b>Hydro (Total)</b>    | <b>6015</b>                 | <b>4038</b>                                |
| <b>Atomic (Central)</b> | <b>451</b>                  | <b>370</b>                                 |
| Solar+DRE               | 9983                        | 2937                                       |
| Wind                    | 4741                        | 1659                                       |
| Co-gen and bio Mass     | 1512                        | 1512                                       |
| FDRE                    | 4010                        | 0                                          |
| BESS                    | 250                         | 0                                          |
| Hybrid                  | 300                         | 0                                          |
| <b>RE Total</b>         | <b>20497</b>                | <b>6108</b>                                |
| <b>Total</b>            | <b>57098</b>                | <b>36203</b>                               |

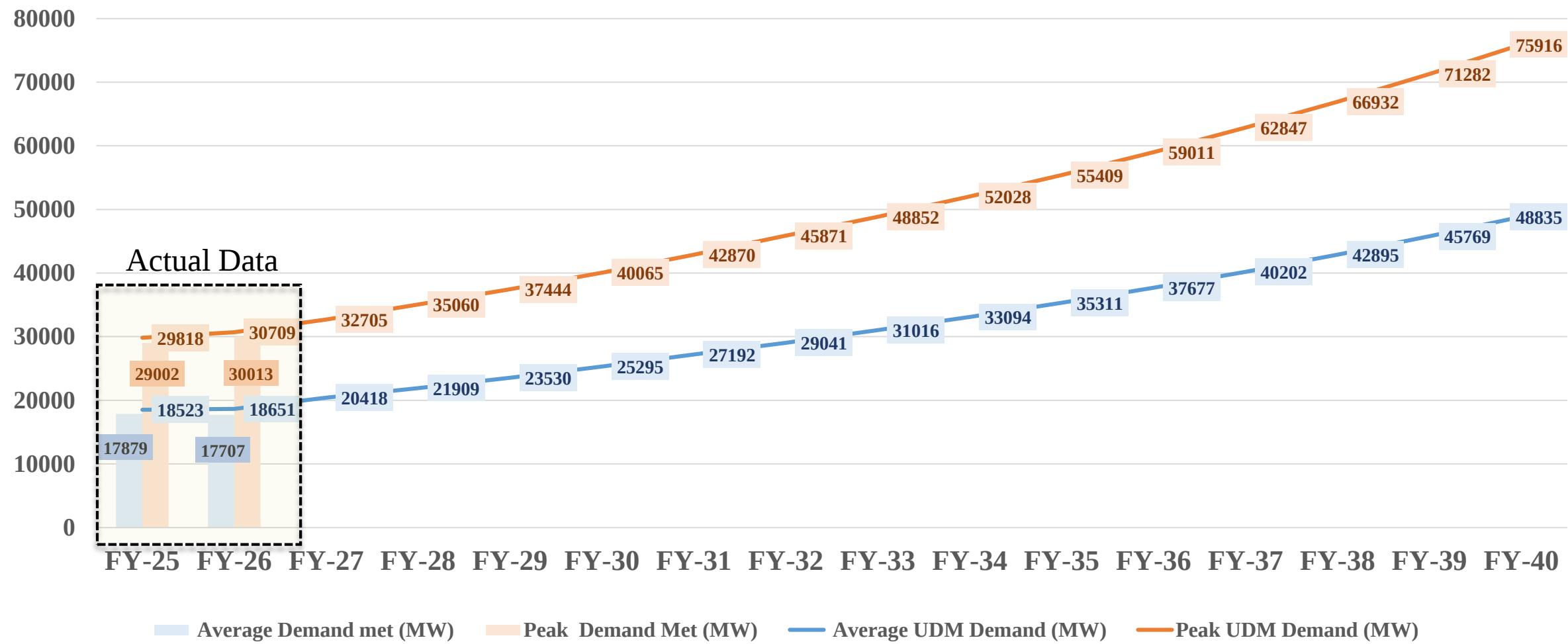
- 1) Availability from Solar, Wind, Hydro and CPP has been considered as per historical CUF data.
- 2) For thermal plants, availability has been considered at 85% for May and June and 80% for remaining months as per historical PAF data.
- 3) Inter-State Transmission losses of 3.5% have been considered for Inter State thermal and Hydro units.
- 4) The availability from thermal plants may vary based upon the coal stock condition in the real time scenario.
- 5) Gas availability not considered in projection for upcoming years.
- 6) FDRE, capacity has been considered as per the CUF .
- 7) 95% availability has been assumed for both composite and tolling-based BESS projects. For composite BESS, a power loss of 15% has been considered during the discharge cycle.
- 8) 90% availability has been assumed for PSP projects, with an estimated power loss of  $\approx 24\%$  during operation.

| Sr. | Technology | Capacity(MW) | Expected COD |
|-----|------------|--------------|--------------|
| 1   | PSP        | 1250         | 31-05-2031   |
| 2   | PSP        | 1500         | 31-05-2031   |
| 3   | BESS       | 375          | 30-06-2027   |
| 4   | BESS       | 250          | 30-06-2027   |

# Average and Peak Demand projection for FY 27 to FY 40



UPPCL Average and Peak Demand Projections





## Peak/Off Peak, Summer – UPPCL Average Supply Availability for FY-27 to FY-40

| Supply Availability (MW) | FY-27 | FY-28 | FY-29 | FY-30 | FY-31 | FY-32 | FY-33 | FY-34 | FY-35 | FY-36 | FY-37 | FY-38 | FY-39 | FY-40 |
|--------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Summer Peak Hours        | 24999 | 26475 | 27335 | 27405 | 28080 | 31094 | 32178 | 32298 | 32298 | 32298 | 32298 | 32298 | 32298 | 32298 |
| Summer Off Peak Hours    | 24205 | 28557 | 30003 | 30291 | 31129 | 32327 | 32388 | 32556 | 32556 | 32556 | 32556 | 32556 | 32556 | 32556 |
| Summer RTC               | 24536 | 27690 | 28891 | 29088 | 29859 | 31814 | 32300 | 32449 | 32449 | 32449 | 32449 | 32449 | 32449 | 32449 |
| Winter RTC               | 23231 | 26513 | 26809 | 26908 | 28415 | 29521 | 29811 | 29817 | 29817 | 29817 | 29817 | 29817 | 29817 | 29817 |
| Yearly RTC               | 23883 | 27101 | 27850 | 27998 | 29137 | 30667 | 31056 | 31133 | 31133 | 31133 | 31133 | 31133 | 31133 | 31133 |

➤ **Peak Hours : 19:00 to 05:00 hrs**

\*Figures shown above are for UPPCL Discom

➤ **Off Peak Hours : 05:00 to 19:00 hrs.**

➤ **RTC: Round the Clock**

# Peak/Off Peak, Summer – UPPCL Average UDM Demand Projections for FY-27 to FY-40



| UDM Demand (MW)       | FY-27 | FY-28 | FY-29 | FY-30 | FY-31 | FY-32 | FY-33 | FY-34 | FY-35 | FY-36 | FY-37 | FY-38 | FY-39 | FY-40 |
|-----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Summer Peak Hours     | 25675 | 27549 | 29588 | 31807 | 34193 | 36518 | 39001 | 41614 | 44402 | 47377 | 50551 | 53938 | 57552 | 61408 |
| Summer Off Peak Hours | 22415 | 24052 | 25831 | 27769 | 29851 | 31881 | 34049 | 36331 | 38765 | 41362 | 44133 | 47090 | 50245 | 53612 |
| Summer RTC            | 23774 | 25509 | 27397 | 29451 | 31660 | 33813 | 36113 | 38532 | 41114 | 43868 | 46808 | 49944 | 53290 | 56860 |
| Winter RTC            | 17063 | 18309 | 19664 | 21138 | 22724 | 24269 | 25919 | 27656 | 29509 | 31486 | 33596 | 35846 | 38248 | 40811 |
| Yearly RTC            | 20418 | 21909 | 23530 | 25295 | 27192 | 29041 | 31016 | 33094 | 35311 | 37677 | 40202 | 42895 | 45769 | 48835 |

➤ **Peak Hours : 19:00 to 05:00 hrs**

\*Figures shown above are for UPPCL Discom

➤ **Off Peak Hours : 05:00 to 19:00 hrs.**

➤ **RTC: Round the Clock**



# Surplus / Deficit Projections for Peak/Off Peak, FY-27 to FY-40

| Surplus /Deficit (UDM) | FY-27 | FY-28 | FY-29 | FY-30 | FY-31 | FY-32 | FY-33 | FY-34 | FY-35  | FY-36  | FY-37  | FY-38  | FY-39  | FY-40  |
|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|
| Summer Peak Hours      | -676  | -1074 | -2253 | -4402 | -6112 | -5423 | -6823 | -9316 | -12104 | -15079 | -18253 | -21640 | -25254 | -29110 |
| Summer Off Peak Hours  | 1790  | 4506  | 4171  | 2522  | 1277  | 446   | -1661 | -3774 | -6208  | -8806  | -11577 | -14534 | -17689 | -21055 |
| Summer RTC             | 762   | 2181  | 1494  | -363  | -1802 | -2000 | -3812 | -6083 | -8665  | -11419 | -14359 | -17495 | -20841 | -24411 |
| Winter RTC             | 6167  | 8204  | 7145  | 5769  | 5691  | 5252  | 3892  | 2161  | 308    | -1669  | -3778  | -6029  | -8431  | -10993 |
| Yearly RTC             | 3465  | 5192  | 4320  | 2703  | 1945  | 1626  | 40    | -1961 | -4178  | -6544  | -9068  | -11762 | -14636 | -17702 |

- **Peak Hours : 19:00 to 05:00 hrs**
- **Off Peak Hours : 05:00 to 19:00 hrs.**
- **RTC: Round the Clock**

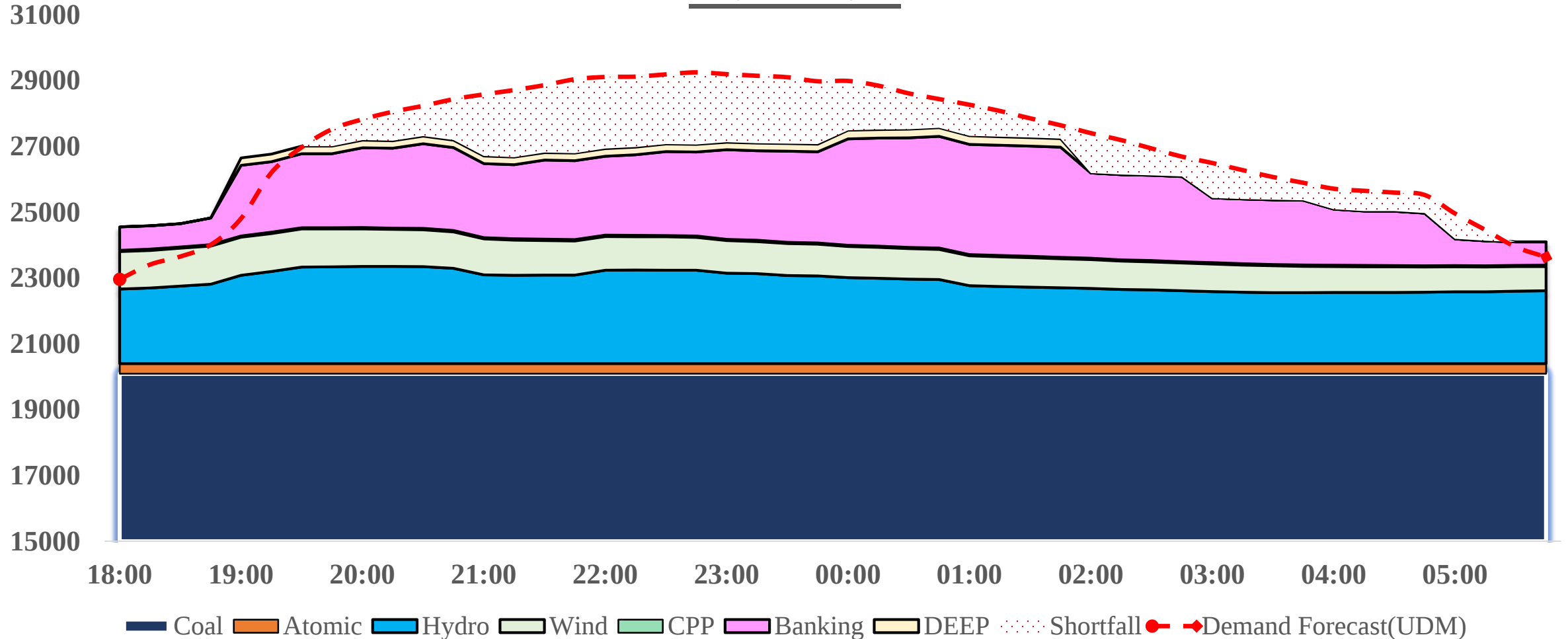
\*Figures shown above are for UPPCL Discom

# Average Demand Supply Scenario of UPPCL for Jun-26



**Uttar Pradesh**  
**Power Corporation Limited**

## UPPCL Demand Supply Scenario for Jun-26 18:00-06:00

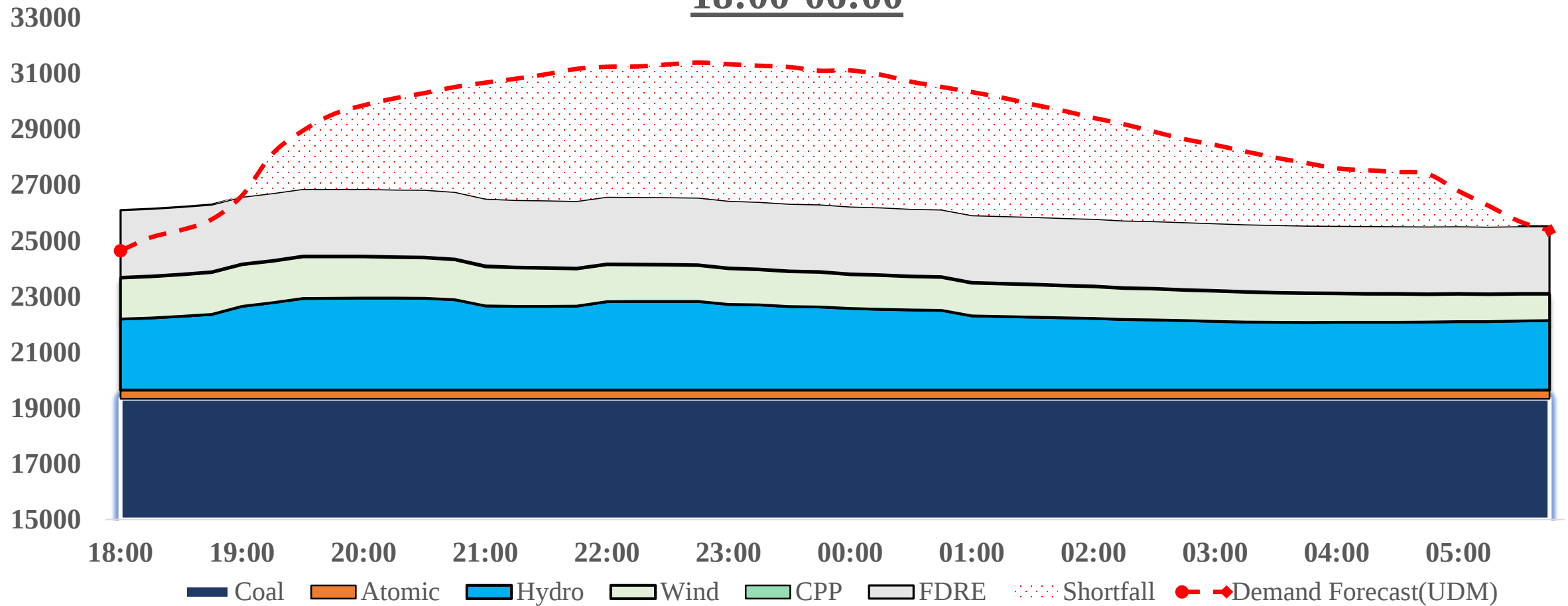


# Average Demand Supply Scenario of UPPCL for Jun-27



**Uttar Pradesh**  
**Power Corporation Limited**

## UPPCL Demand Supply Scenario for Jun-27 18:00-06:00



## 1. General Approach for Domestic/Commercial/Agriculture/Industrial categories

**For the period FY 2025–26 to FY 2029-30 :**

The projection is based on 8-year CAGR (FY 2016–17 to FY 2024–25) .

**For the period Post FY 2029-30 :**

- (i) For categories where the CAGR exceeds certain %, a gradual Y-o-Y tapering has been applied, reducing the CAGR progressively to, say 20%, of its original value by FY 2037-38, considering the growth will not be consistent and may attain saturation.
- (ii) Where the CAGR is less than above certain %, a gradual Y-o-Y tapering has been applied, reducing the CAGR progressively to, say 10% of its original value by FY 2037-38, considering the growth will not be consistent and may attain saturation.
- (iii) The moderated CAGR achieved at FY 2037-38 has been maintained constant thereafter up to FY 2046–47.

**2. EV Charging stations (LMV-11):** 2-year CAGR (FY 2025-26 to FY 2033–34); thereafter 10% growth per annum up to FY 2046–47.

**3. Rooftop Solar:** 2–3-year CAGR (up to FY 2029–30); thereafter 5% growth per annum up to FY 2046–47.

## **Step 1: Establish the base CAGR (growth rate)**

8-year CAGR is calculated using actual data for Consumers count and Electrical Energy Consumption from FY 2016-17 to FY 2024-25.

## **Step 2: For FY 2025-26 to FY 2029-30**

The 8-year CAGR computed in Step 1 is applied to consumer count and Electrical Energy Consumption for FY 2025-26 to FY 2029-30.

## **Step 3: Post FY 2029-30 to FY 2037-38— Gradual tapering**

Applied gradual tapering from FY 2029-30 to FY 2037-38.

## **Step 4: Post FY 2037-38 to FY 2046-47**

The moderated CAGR reached at FY 2037-38 is considered **constant** up to FY 2046-47.

## **Step 5: Specific Electrical Energy Consumption**

Once the Consumer count growth and Electrical Energy Consumption growth trajectory is set (Steps 1–4), Specific Electrical Energy Consumption is derived based on the calculation given below:

Electrical Energy Consumption

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Consumer count (in Mid-Year\*)

\*Mid-Year Data = (Current Year Data + Previous Year Data)/2

## **Step 1: Establish the base CAGR (growth rate)**

8-year CAGR is calculated using actual data for Connected Load and Electrical Energy Consumption from FY 2016-17 to FY 2024-25.

## **Step 2: For FY 2025-26 to FY 2029-30**

The 8-year CAGR computed in Step 1 is applied to Connected Load and Electrical Energy Consumption for FY 2025-26 to FY 2029-30.

## **Step 3: Post FY 2029-30 to FY 2037-38 — Gradual tapering**

Applied gradual tapering from FY 2029-30 to FY 2037-38.

## **Step 4: Post FY 2037-38 to FY 2046-47**

The moderated CAGR reached at FY 2037-38 is considered **constant** up to FY 2046-47.

## **Step 1: Establish the base CAGR (growth rate)**

8-year CAGR is calculated using actual data for Connected Load and Electrical Energy Consumption from FY 2016-17 to FY 2024-25.

## **Step 2: For FY 2025-26 to FY 2029-30**

The 8-year CAGR computed in Step 1 is applied to Connected Load and Electrical Energy Consumption for FY 2025-26 through FY 2029-30.

## **Step 3: Post FY 2029-30 to FY 2037-38 — Gradual tapering**

Applied gradual tapering till FY 2037-38.

## **Step 4: Post FY 2037-38 to FY 2046-47**

The moderated CAGR reached at FY 2037-38 is considered **constant** up to FY 2046-47.

## **Step 5: Hours in Operation**

Once the Connected Load growth and Electrical Energy Consumption growth trajectory is set (Steps 1–4), Hours in Operation is derived based on the calculation given below:

Electrical Energy Consumption

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Connected Load (in Mid-Year\*)

\*Mid-Year Data = (Current Year Data + Previous Year Data)/2



# Medium/Long Term Discom-wise projection

| Energy Consumption of DISCOMS (MU) | 2014-15 | 2015-16 | 2016-17 | 2017-18 | 2018-19 | 2019-20 | 2020-21 | 2021-22 | 2022-23  | 2023-24  | 2024-25  |
|------------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|----------|
| DVVNL                              | 14,260  | 15,388  | 16,766  | 18,708  | 19,031  | 19,516  | 19,183  | 19,177  | 22,755   | 24,963   | 28,241   |
|                                    |         | 8%      | 9%      | 12%     | 2%      | 3%      | -2%     | 0%      | 19%      | 10%      | 13%      |
| MVVNL                              | 11,535  | 12,644  | 14,615  | 16,588  | 17,624  | 18,536  | 18,757  | 20,114  | 23,423   | 24,490   | 28,022   |
|                                    |         | 10%     | 16%     | 13%     | 6%      | 5%      | 1%      | 7%      | 16%      | 5%       | 14%      |
| PVVNL                              | 20,881  | 21,947  | 25,310  | 28,642  | 28,489  | 29,302  | 27,492  | 29,401  | 34,664   | 35,538   | 39,644   |
|                                    |         | 5%      | 15%     | 13%     | -1%     | 3%      | -6%     | 7%      | 18%      | 3%       | 12%      |
| PuVVNL                             | 13,855  | 15,859  | 18,252  | 20,732  | 20,789  | 21,251  | 21,900  | 22,993  | 25,832   | 27,353   | 30,723   |
|                                    |         | 14%     | 15%     | 14%     | 0%      | 2%      | 3%      | 5%      | 12%      | 6%       | 12%      |
| Kesco                              | 2,780   | 2,960   | 3,175   | 3,271   | 3,190   | 3,262   | 3,029   | 3,383   | 3,893    | 3,878    | 4,218    |
|                                    |         | 6%      | 7%      | 3%      | -2%     | 2%      | -7%     | 12%     | 15%      | 0%       | 0%       |
| Consolidated                       | 63,312  | 68,799  | 78,118  | 87,941  | 89,123  | 91,867  | 90,360  | 95,069  | 1,10,568 | 1,16,223 | 1,30,849 |
|                                    |         | 9%      | 14%     | 13%     | 1%      | 3%      | -2%     | 5%      | 16%      | 5%       | 13%      |



# Medium/Long Term Discom-wise projection

| Energy Consumpton of DISCOMS (MU) | 2025-26  | 2026-27  | 2027-28  | 2028-29  | 2029-30  | 2030-31  | 2031-32  | 2032-33  | 2033-34  | 2034-35  | 2035-36  |
|-----------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| DVVNL                             | 29,831   | 32,177   | 34,735   | 37,528   | 40,582   | 43,921   | 47,505   | 51,344   | 55,449   | 59,831   | 64,499   |
|                                   | 6%       | 8%       | 8%       | 8%       | 8%       | 8%       | 8%       | 8%       | 8%       | 8%       | 8%       |
| MVVNL                             | 29,612   | 32,250   | 35,139   | 38,306   | 41,778   | 45,586   | 49,664   | 54,020   | 58,663   | 63,599   | 68,836   |
|                                   | 6%       | 9%       | 9%       | 9%       | 9%       | 9%       | 9%       | 9%       | 9%       | 8%       | 8%       |
| PVVNL                             | 43,605   | 46,221   | 48,926   | 51,794   | 54,849   | 58,105   | 61,528   | 65,128   | 68,914   | 72,898   | 77,091   |
|                                   | 10%      | 6%       | 6%       | 6%       | 6%       | 6%       | 6%       | 6%       | 6%       | 6%       | 6%       |
| PuVVNL                            | 34,961   | 37,998   | 41,327   | 44,974   | 48,975   | 53,367   | 58,078   | 63,124   | 68,520   | 74,283   | 80,429   |
|                                   | 14%      | 9%       | 9%       | 9%       | 9%       | 9%       | 9%       | 9%       | 9%       | 8%       | 8%       |
| Kesco                             | 4,881    | 5,082    | 5,289    | 5,506    | 5,718    | 5,952    | 6,194    | 6,444    | 6,702    | 6,968    | 7,242    |
|                                   | 0%       | 4%       | 4%       | 4%       | 4%       | 4%       | 4%       | 4%       | 4%       | 4%       | 4%       |
| Consolidated                      | 1,42,888 | 1,53,728 | 1,65,416 | 1,78,109 | 1,91,G01 | 2,06,930 | 2,22,969 | 2,40,060 | 2,58,248 | 2,77,578 | 2,98,096 |
|                                   | 9%       | 8%       | 8%       | 8%       | 8%       | 8%       | 8%       | 8%       | 8%       | 7%       | 7%       |

# Medium/Long Term Discom-wise projection



| Energy Consumpition of DISCOMS (MU) | 2036-37         | 2037-38         | 2041-42         | 2046-47         |
|-------------------------------------|-----------------|-----------------|-----------------|-----------------|
| <b>DVVNL</b>                        | <b>69,447</b>   | <b>74,695</b>   | <b>99,741</b>   | <b>1,44,845</b> |
|                                     | 8%              | 8%              | 34%             | 45%             |
| <b>MVVNL</b>                        | <b>74,340</b>   | <b>80,139</b>   | <b>1,07,495</b> | <b>1,56,218</b> |
|                                     | 8%              | 8%              | 34%             | 45%             |
| <b>PVVNL</b>                        | <b>81,316</b>   | <b>85,717</b>   | <b>1,05,074</b> | <b>1,36,516</b> |
|                                     | 5%              | 5%              | 23%             | 30%             |
| <b>PuVVNL</b>                       | <b>86,961</b>   | <b>93,910</b>   | <b>1,27,930</b> | <b>1,95,586</b> |
|                                     | 8%              | 8%              | 36%             | 53%             |
| <b>Kesco</b>                        | <b>7,525</b>    | <b>7,816</b>    | <b>8,312</b>    | <b>9,972</b>    |
|                                     | 4%              | 4%              | 6%              | 20%             |
| <b>Consolidated</b>                 | <b>3,19,589</b> | <b>3,42,275</b> | <b>4,48,550</b> | <b>6,43,136</b> |
|                                     | 7%              | 7%              | 31%             | 43%             |

# T&D Losses projections



1. Historical data for FY 2014-15 to FY 2019-20 considered as submitted in EPS 20<sup>th</sup> survey
2. FY 2020-21 to FY 2024-25, considered as per balance sheet.
3. FY 2025-26 to FY 2029-30, considered as per UPERC ARR submissions.
4. Post FY 2029–30: Loss trajectory is declined to achieve a loss level of ~ 5-6%.

| Particulars | 2024-25 | 2025-26 | 2026-27 | 2027-28 | 2028-29 | 2029-30 | 2030-31 | 2031-32 | 2032-33 | 2033-34 | 2034-35 | 2035-36 | 2036-37 | 2037-38 | 2041-42 | 2046-47 |
|-------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 1           | 2       | 3       | 4       | 5       | 6       | 7       | 8       | G       | 10      | 11      | 12      | 13      | 14      | 15      | 16      | 17      |
| DVVNL       | 15.53   | 15.53   | 15.22   | 14.91   | 14.62   | 14.32   | 14.01   | 13.10   | 12.25   | 11.45   | 10.71   | 10.02   | 9.38    | 8.78    | 6.73    | 5.85    |
| MVVNL       | 13.59   | 13.59   | 13.32   | 13.05   | 12.79   | 12.53   | 12.27   | 11.38   | 10.57   | 9.82    | 9.13    | 8.50    | 7.92    | 7.39    | 6.15    | 5.52    |
| PVVNL       | 11.18   | 11.18   | 10.95   | 10.73   | 10.52   | 10.31   | 10.10   | 9.60    | 9.12    | 8.66    | 8.23    | 7.82    | 7.45    | 7.10    | 6.42    | 5.72    |
| PuVVNL      | 15.96   | 15.96   | 15.90   | 15.58   | 15.27   | 14.97   | 14.67   | 13.65   | 12.70   | 11.83   | 11.02   | 10.27   | 9.58    | 8.94    | 7.84    | 5.78    |
| KESCO       | 7.68    | 7.68    | 7.53    | 7.38    | 7.23    | 7.09    | 6.94    | 6.86    | 6.77    | 6.68    | 6.59    | 6.51    | 6.43    | 6.36    | 6.15    | 5.49    |

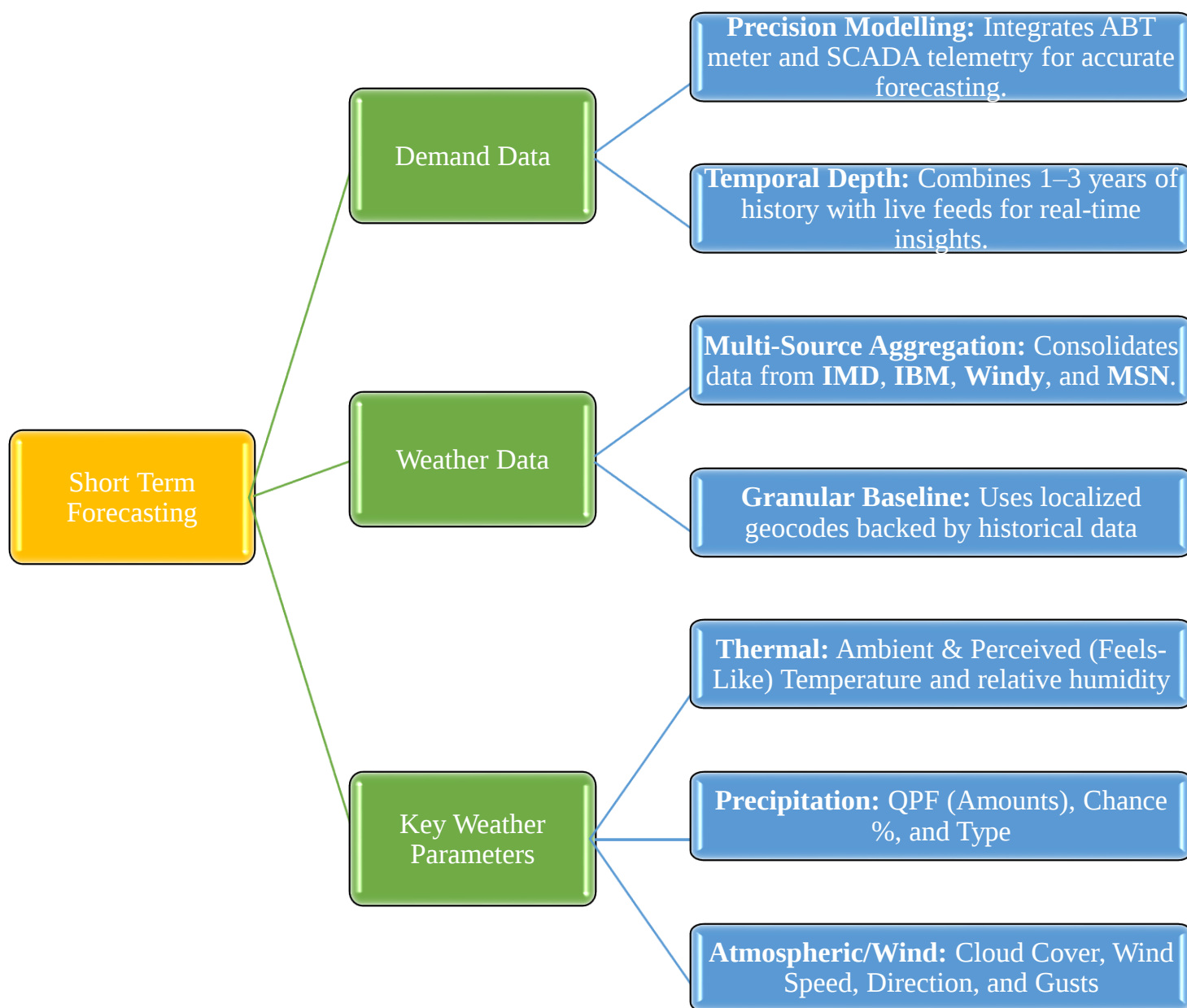
## Major Challenges

- 1 Renewable and Electric Vehicle Integration
- 2 Major Policy reforms (*P2P trading*)
- 3 BESS & PSP Trajectory
- 4 Metro & Railway Traction
- 5 Industrial and Agricultural Load Variability
- 6 Technological Reforms and Advancement
- 7 Natural Calamities (Tsunami, Earthquake, Covid etc)



# Short-Term Planning

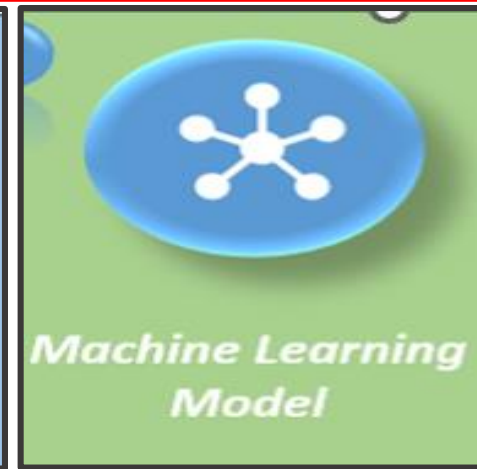
# Key Data Inputs for short term forecasting



## Forecasting Tools



*Time Series Model*



*Machine Learning Model*

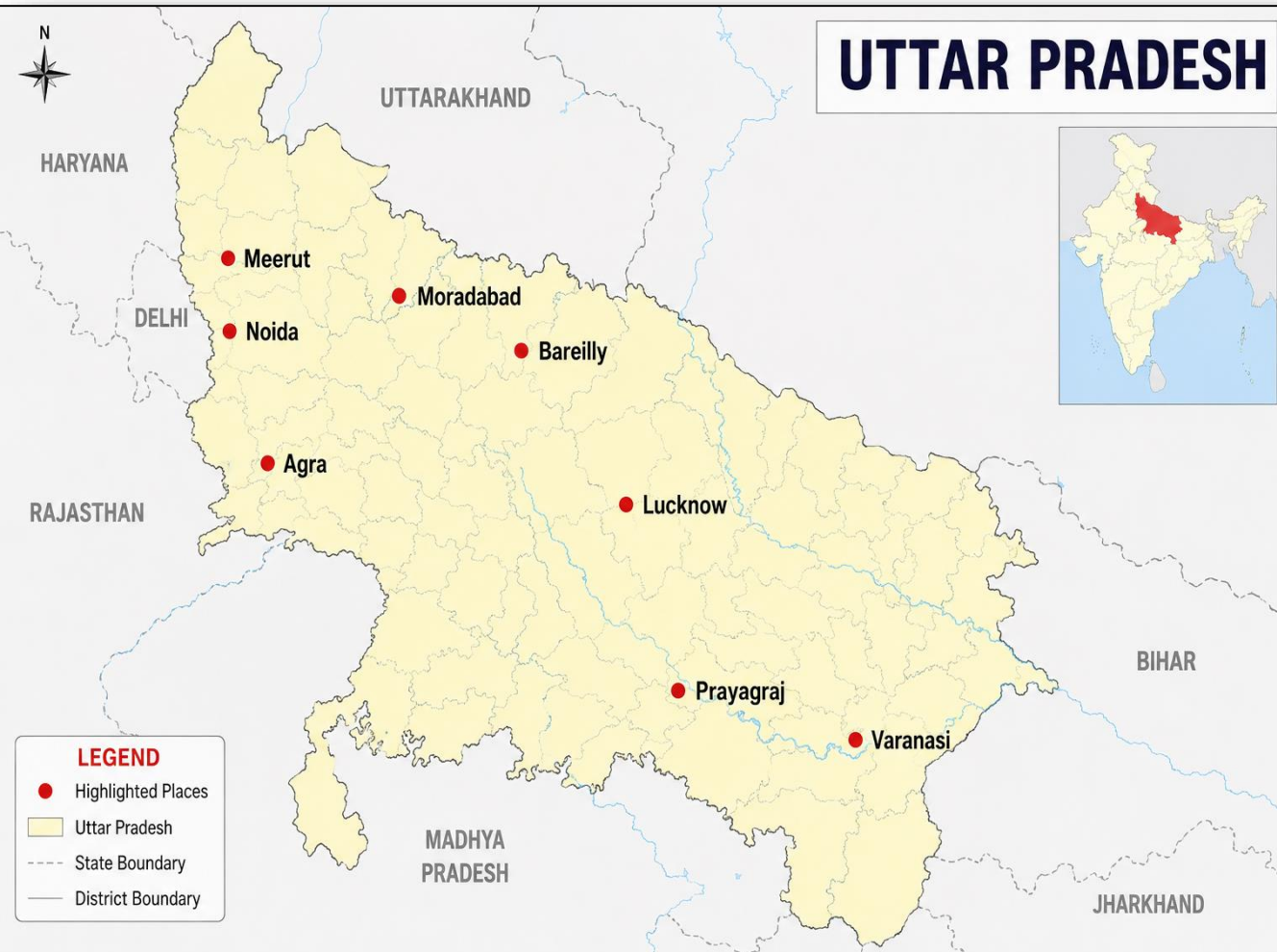
**Time series models** – Statistical models that forecast future demand using historical demand patterns through techniques such as autoregression, differencing, and moving averages. These models primarily rely on past values of the target variable.

**Machine Learning model** – Unlike time series models, machine learning models learn relationships between demand and multiple influencing variables. They perform forecasting using techniques such as linear regression, tree-based models, ensemble methods, and Long Short-Term Memory (LSTM) networks.

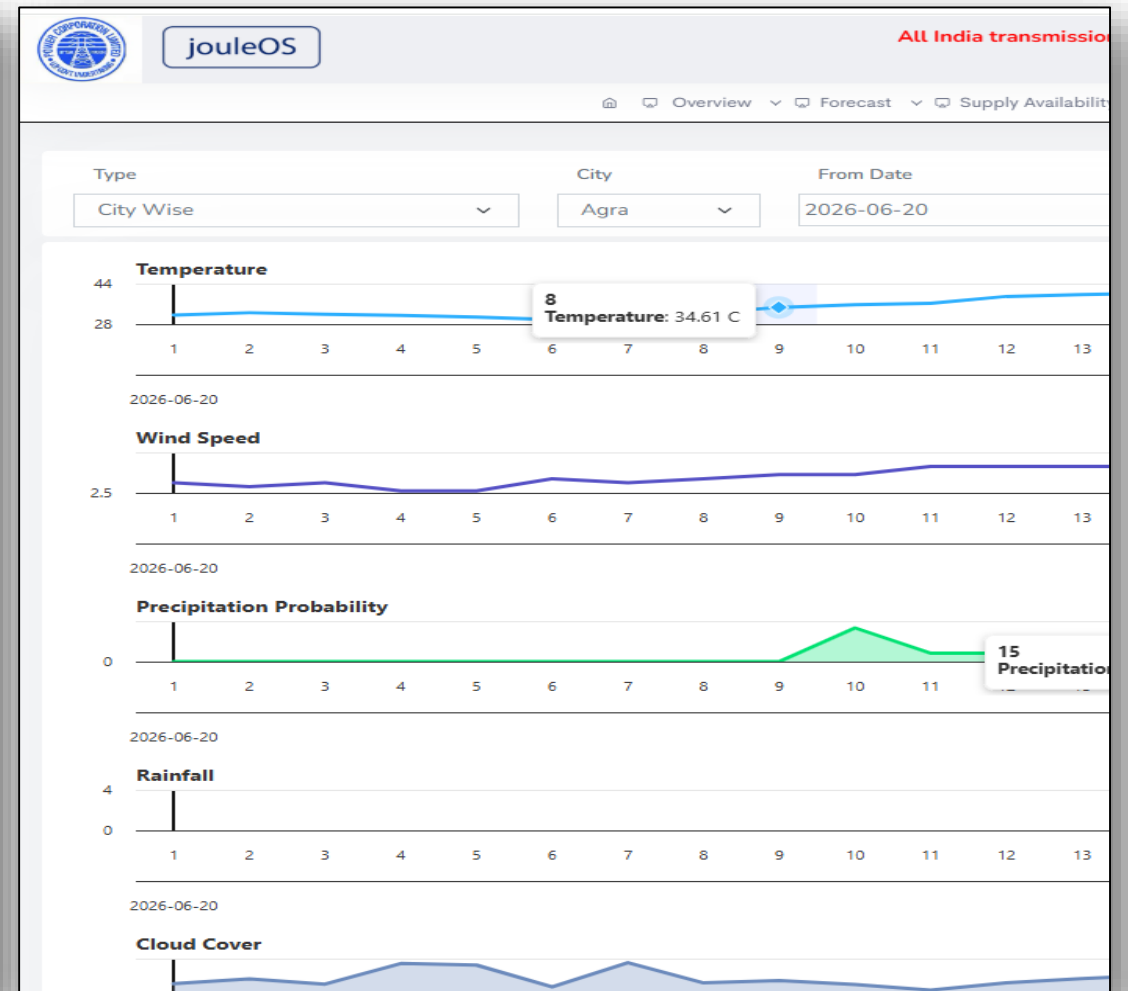


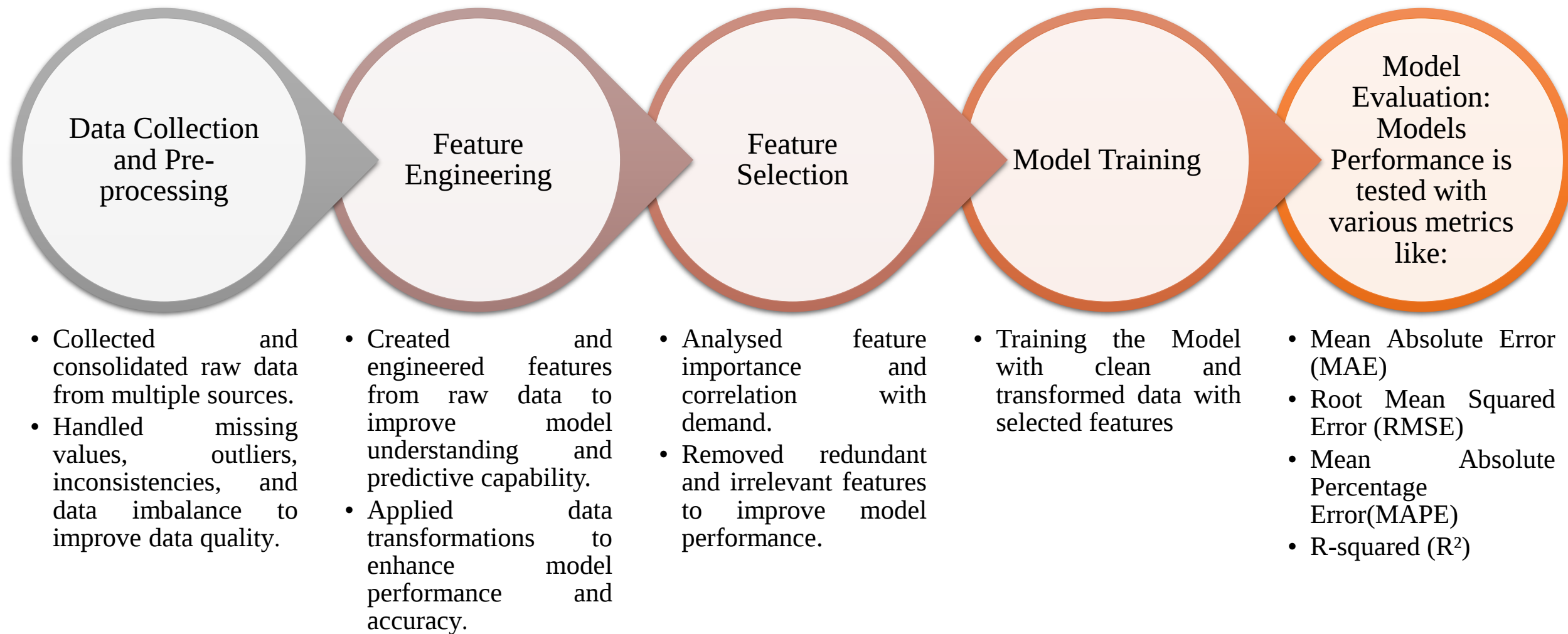
# Integrated Weather Dashboard & Major Load Centres

*Weather data from various geographical locations is employed, with a focus on major load centers.*



## Integrated Weather Dashboard



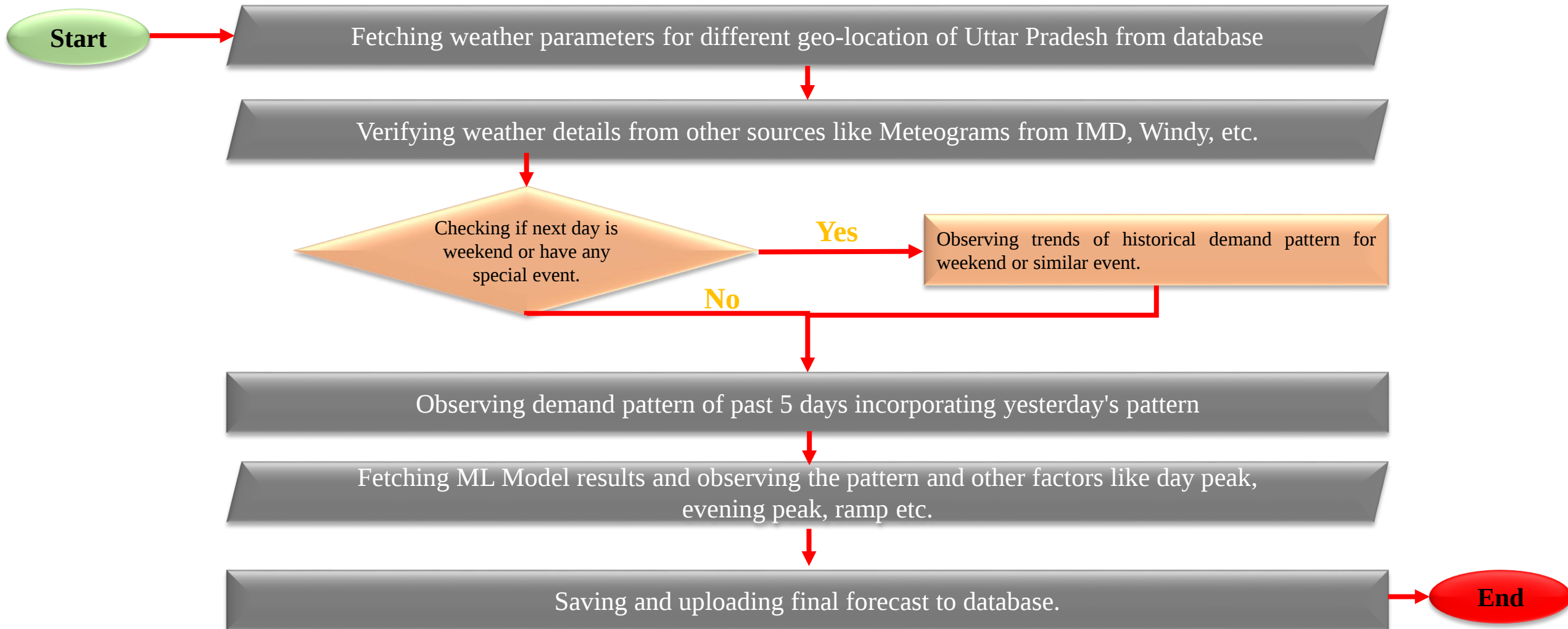


***Reporting: Models output fitting the demand forecasting criteria's as per client is reported.***

# Forecasting Process Flow



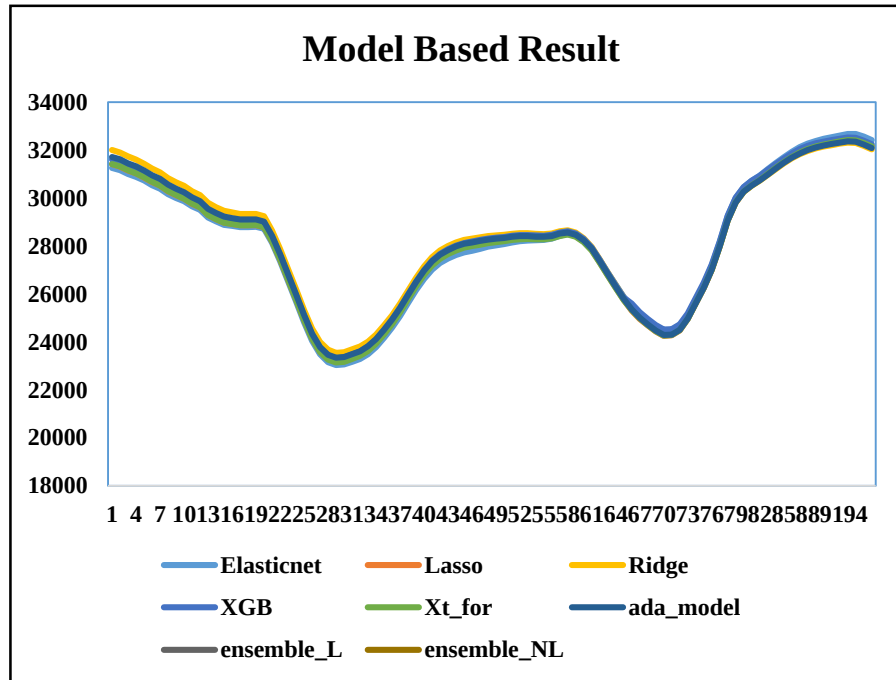
*A structured way to generate accurate demand forecasts by combining data and analysis:*



# Forecasting Model Workflow: Predictions to Final Output

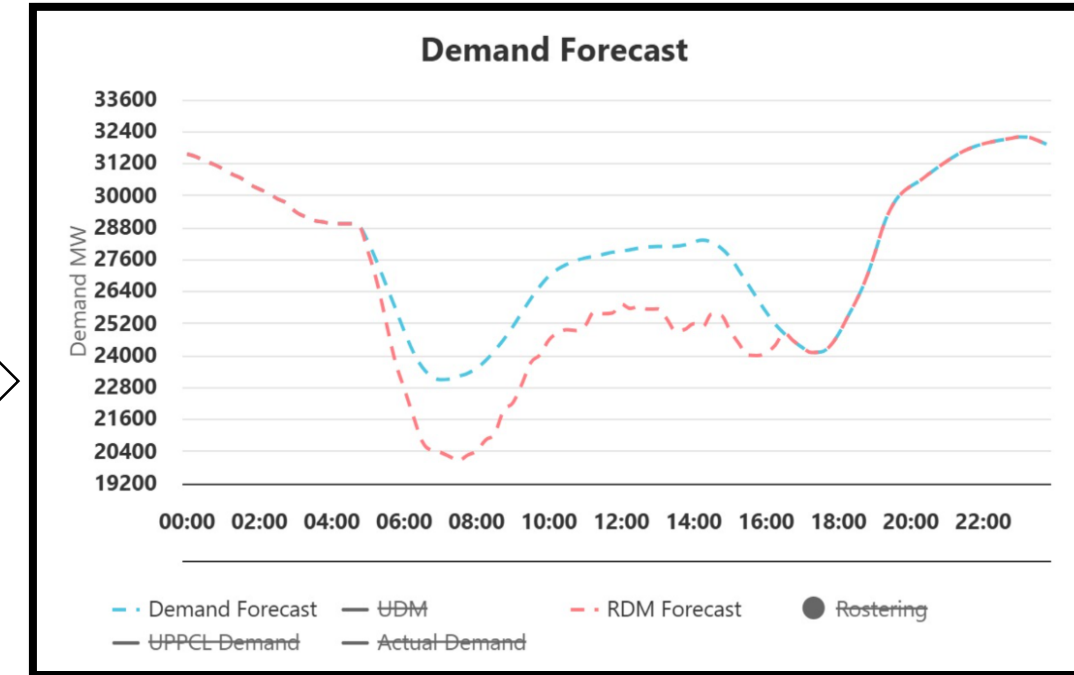


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Generated Response From Various Models

Ensemble Model



Final Single Output

## Daily Forecasting for Day-ahead

□ **Time:** 7:30 AM (Every Morning)

👥 **Teams Involved:**

➤ **Forecasting Team** – Responsible for data analysis and model execution.

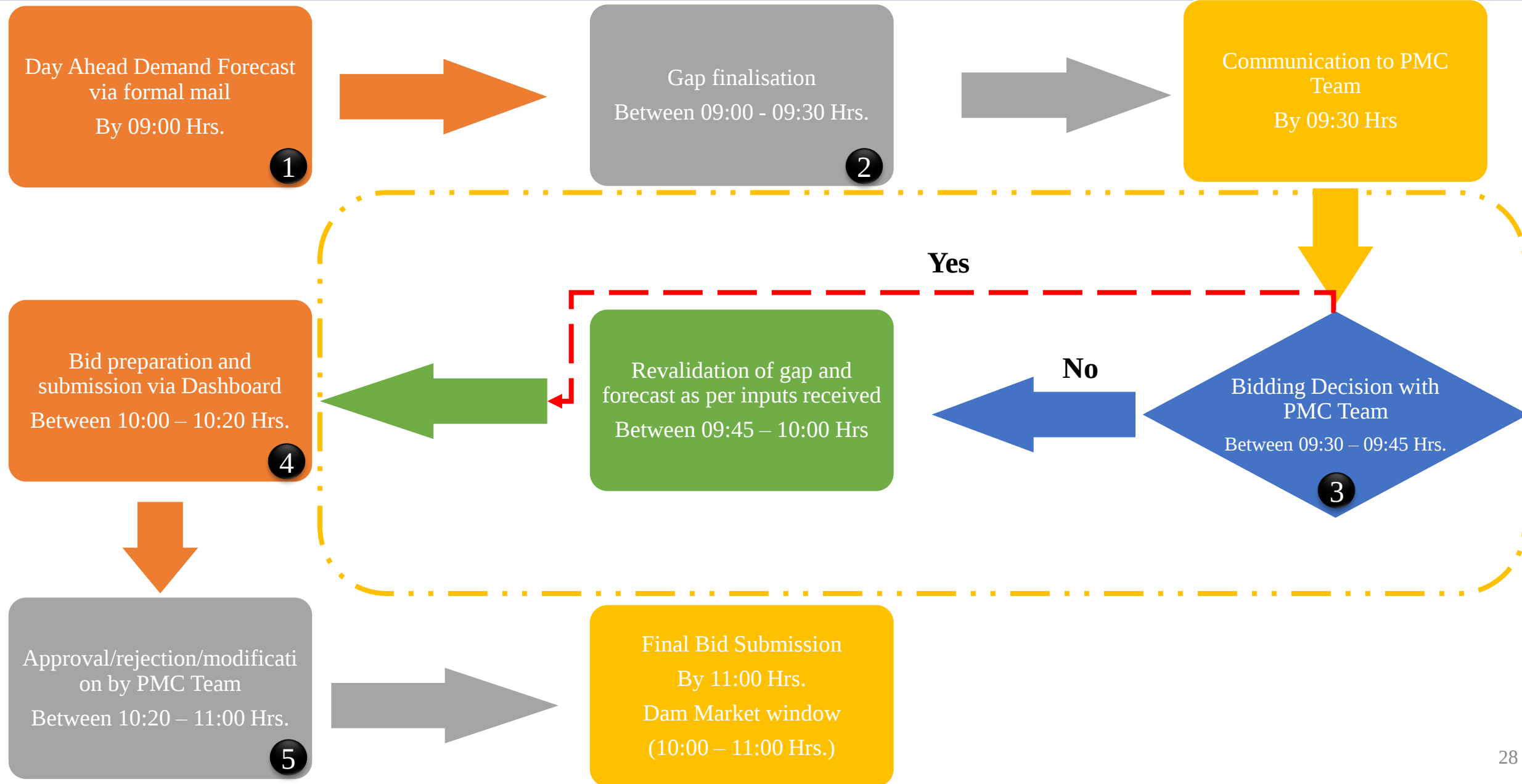
➤ **EPM Team** – Collaborates to refine forecasts based on latest insights.

✓ **Objective:**

➤ Review demand forecasts for the **day-ahead market**.

➤ Align strategies to optimize power procurement and scheduling.

# Process Flow – Day Ahead



# Process Flow – Day Ahead



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1

## *Day Ahead Forecast*

- Weather forecast
- Demand Pattern
- Weekdays/weekend/special event

2

## *Gap Analysis*

- Intra state and Inter state availability considering plant outages and availability
- Intra state solar availability considering cloud coverage and weather forecast
- Hydro availability
- Banking and bilateral availability

3

## *PMC team meeting*

- Validation of gap with respect to availability and forecast
- Previous weeks trend analysis with subject to change in demand patterns and clearance ratios
- Decision on bidding strategy

4

## *Bid preparation and submission*

- Bid preparation considering the finalized gap
- Consideration of reliability margins
- NOC validation
- Price trends
- Submission of finalized bid

5

## *PMC team approval of submitted bid*

- PMC team validates the submitted bid via dashboard considering the finalized gaps
- Final approvals of bid

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**Approval/Rejection/Modification by PMC Team**

All the bidding process is based on automated dashboard (from availability fetching to submission on power exchange portal)

**↓ Primary Bid Submission**

## Final Bid Submission

Demand Forecast for  
00:00 – 00:30 by  
22:45

- **Between 22:45 – 23:00**  
Gap preparation  
Bid submission  
Bid  
approval/modification by  
PMC team



Demand Forecast for  
00:30 – 01:00 by  
23:15

- **Between 23:15 – 23:30**  
Gap preparation  
Bid submission  
Bid approval/modification  
by PMC team



Demand Forecast for  
01:00 – 01:30 by  
23:45

- **Between 23:45 – 24:00**  
Gap preparation  
Bid submission  
Bid approval/modification  
by PMC team

*(Continue process 24\*7 ) Forecasting done with a frequency of every 30 Mins*

1

## *Intra Day Demand Forecast*

- Weather variability
- Intraday demand pattern
- AMR Data analysis district and discom wise.
- DRE impact on Demand

2

## *Availability and Gap preparation*

- Intra state and Inter state availability considering plant outages and availability
- Intra state solar availability considering cloud coverage and weather forecast
- Hydro availability
- Banking and bilateral availability
- Open access and over injection trend patterns

3

## *Gap preparation and Bid submission*

- Intraday plant outages and availability
- Solar and hydro pattern and availability considering real time scenarios
- Final bid preparation in coordination with PMC team
- Submission of bid
- PMC team validates and approves/modify the final bid

***Considering clearance percentages, schedule monitoring and Gap analysis of load and availability, incoordination with PMC team and SLDC team decision of backing and lifting of intra state plants are done***

# Process Flow – Real Time through dashboard



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|                                                                               |                   |            |                |                |                |                |                |                |                |                |                |                |
|-------------------------------------------------------------------------------|-------------------|------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| jouleOS 2-06-2026                                                             |                   |            |                |                |                |                |                |                |                |                |                |                |
| Session 31 15:00-15:30 Timer 00:24:20                                         |                   |            |                |                |                |                |                |                |                |                |                |                |
| Overview Forecast Supply Availability Scheduling DAM RTM IEX RTM HPX RTM PXIL |                   |            |                |                |                |                |                |                |                |                |                |                |
| Session                                                                       |                   |            | 31             |                | 32             |                | 33             |                | 34             |                | 35             |                |
| Category                                                                      | PX Price (Rs/MWh) | Plant Name | 15:00<br>15:15 | 15:15<br>15:30 | 15:30<br>15:45 | 15:45<br>16:00 | 16:00<br>16:15 | 16:15<br>16:30 | 16:30<br>16:45 | 16:45<br>17:00 | 17:00<br>17:15 | 17:15<br>17:30 |
| Bid Volume: →                                                                 |                   |            | 2287           | 2852           | 2865           | 2516           | 2449           | 2507           | 2035           | 2500           | 2615           | 2367           |
| Surplus deficit: →                                                            |                   |            | 2887           | 3452           | 3465           | 3116           | 3049           | 3107           | 2635           | 3100           | 3215           | 2967           |
| UP Forecast: →                                                                |                   |            | 24369          | 23698          | 23313          | 23306          | 23429          | 23723          | 24157          | 23836          | 23534          | 23347          |
| Supply Availability: →                                                        |                   |            | 27257          | 27150          | 26778          | 26422          | 26478          | 26831          | 26792          | 26936          | 26749          | 26314          |
| RTM Forecasted Price (Rs/MWh) →                                               |                   |            | 3307           | 3414           | 3301           | 3390           | 2885           | 3233           | 3037           | 3466           | 3423           | 3598           |
| Buffer Price: →                                                               |                   |            | 50             | 50             | 50             | 50             | 50             | 50             | 50             | 50             | 50             | 50             |

|                                                                                            |                    |                                       |                        |           |                        |           |                        |           |  |  |  |  |
|--------------------------------------------------------------------------------------------|--------------------|---------------------------------------|------------------------|-----------|------------------------|-----------|------------------------|-----------|--|--|--|--|
| jouleOS All India transmission losses from 15-06-2026 to 21-06-2026 Session 31 15:00-15:30 |                    |                                       |                        |           |                        |           |                        |           |  |  |  |  |
| Overview Forecast Supply Availability Scheduling DAM RTM IEX RTM HPX RTM PXIL              |                    |                                       |                        |           |                        |           |                        |           |  |  |  |  |
| Category                                                                                   | Bid Price (Rs/MWh) | Plant Name                            | 15:00<br>15:15<br>null |           | 15:15<br>15:30<br>null |           | 15:30<br>15:45<br>null |           |  |  |  |  |
| Total Bid Volume ->                                                                        |                    |                                       | Bid Volume             | Bid Price | Bid Volume             | Bid Price | Bid Volume             | Bid Price |  |  |  |  |
| InSGS                                                                                      | 3721               | Panki Thermal Extension Project 1X660 | 350                    |           | 400                    |           | 400                    |           |  |  |  |  |
| InSGS                                                                                      | 4018               | ROSA-I                                |                        |           |                        |           | 300                    | 4018      |  |  |  |  |
| InSGS                                                                                      | 4294               | PARICHHA-C                            | 350                    | 4294      | 400                    | 4294      | 100                    | 4294      |  |  |  |  |
| Exchange Split:                                                                            |                    |                                       | IEX-100_PXIL-0         |           | IEX-100_PXIL-0         |           | IEX-100_PXIL-0         |           |  |  |  |  |
| Revision No                                                                                |                    |                                       | 1                      |           | 1                      |           | 1                      |           |  |  |  |  |
| Prepared By                                                                                |                    |                                       | Ravi Pandey            |           | Ravi Pandey            |           | Ravi Pandey            |           |  |  |  |  |
| Time                                                                                       |                    |                                       | 13:31                  |           | 13:31                  |           | 13:31                  |           |  |  |  |  |
| Approved/Rejected By                                                                       |                    |                                       | RTM SHIFT              |           | RTM SHIFT              |           | RTM SHIFT              |           |  |  |  |  |
| Approved/Rejected Time                                                                     |                    |                                       | 13:32                  |           | 13:32                  |           | 13:32                  |           |  |  |  |  |
| Action                                                                                     |                    |                                       | Submitted              |           | Submitted              |           | Submitted              |           |  |  |  |  |

|                                                                                                            |              |                                            |                     |                        |                      |                                                                                                                    |                           |                     |                          |                          |                   |                      |
|------------------------------------------------------------------------------------------------------------|--------------|--------------------------------------------|---------------------|------------------------|----------------------|--------------------------------------------------------------------------------------------------------------------|---------------------------|---------------------|--------------------------|--------------------------|-------------------|----------------------|
| jouleOS 6 to 21-06-2026 is 3.56%                                                                           |              |                                            |                     |                        |                      |                                                                                                                    |                           |                     |                          |                          |                   |                      |
| Session 31 15:00-15:30 Timer 00:17:21 Ashish                                                               |              |                                            |                     |                        |                      |                                                                                                                    |                           |                     |                          |                          |                   |                      |
| Overview Forecast Supply Availability Scheduling DAM RTM IEX RTM HPX RTM PXIL Weather Reports Masters User |              |                                            |                     |                        |                      |                                                                                                                    |                           |                     |                          |                          |                   |                      |
| Bid Status                                                                                                 |              |                                            |                     |                        |                      |                                                                                                                    |                           |                     |                          |                          |                   |                      |
| Download Report Get Exp. Status Updated Bid Status                                                         |              |                                            |                     |                        |                      |                                                                                                                    |                           |                     |                          |                          |                   |                      |
| Time Block                                                                                                 | Revision No. | Status                                     | Single Bid          | Bid Submitted Revision | Single Bid Submitted | UPC01 / Single Bid Status                                                                                          | UPC02 / Single Bid Status | Block Bid Submitted | UPC01 / Block Bid Status | UPC02 / Block Bid Status | ACP - M2 (Rs/MWh) | Cleared Volume (BWh) |
| 15:30-15:45                                                                                                | 1            | Submitted<br>Reason : This data is correct | 300@4018, 100@4294. |                        |                      | S_126061800115820<br>0@0,<br>0@3721,<br>0@3722,<br>0@4018,<br>-300@4019,<br>-300@4294,<br>-400@4295,<br>-400@10000 |                           |                     |                          |                          | 0                 | 0                    |
| 15:45-16:00                                                                                                | 1            | Submitted<br>Reason : This data is correct | 450@4018,           |                        |                      | S_126061800115821<br>0@0,<br>0@3721,<br>0@3722,<br>0@4018,<br>-450@4019,<br>-450@4294,<br>-450@4295,<br>-450@10000 |                           |                     |                          |                          | 0                 | 0                    |

jouleOS

All India transmission losses from 15-0

Session 2311:00-11:30Timer 00:17:16Ashish

OverviewForecastSupply AvailabilitySchedulingDAMRTM IEXRTM HPXRTM PXILWeatherReportsMastersUser

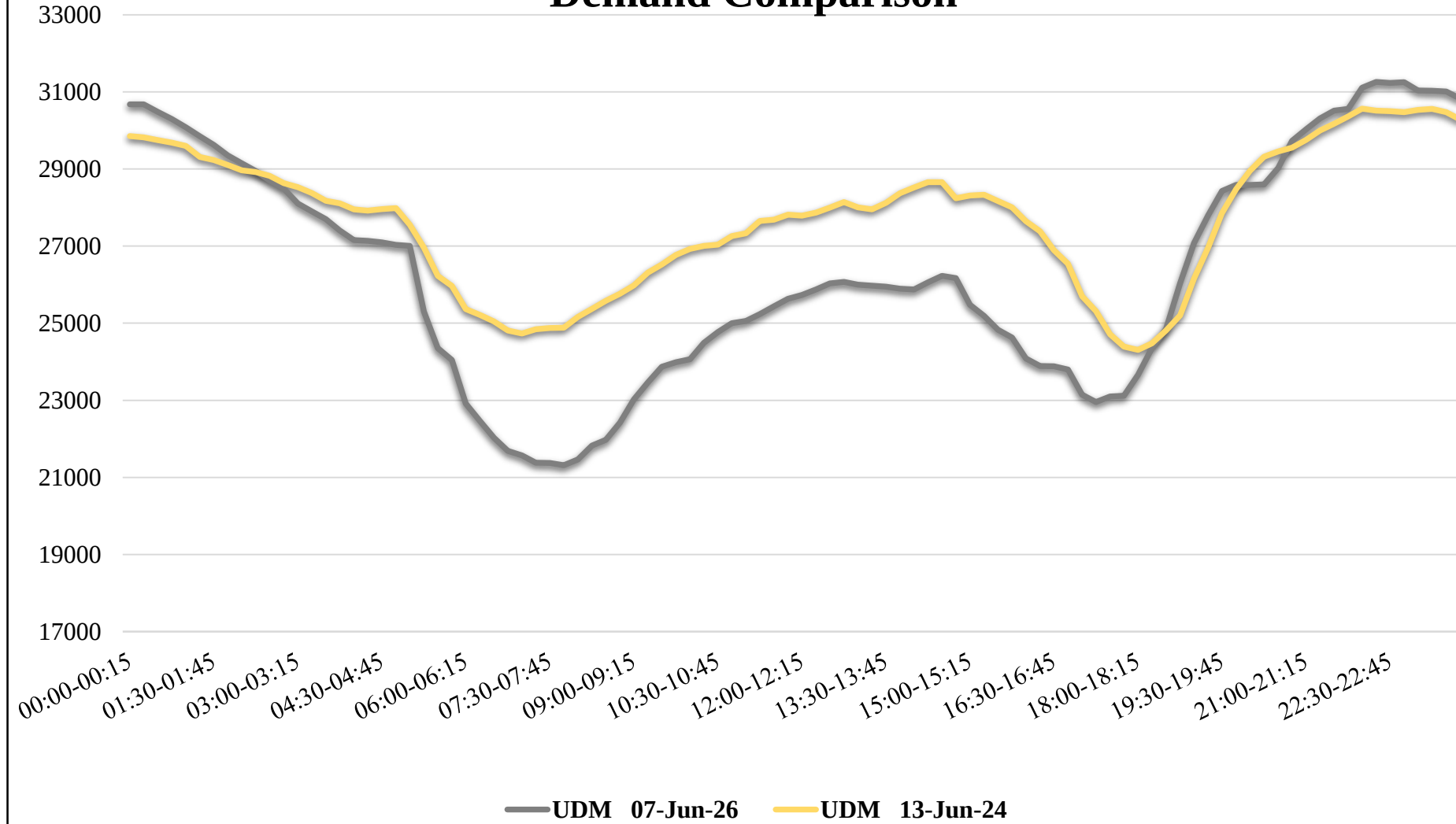
Date: 2026-06-20 | Rev: 45 | Submitted block: 39Run SchedulingMust Merit (100% DC)At MTL (55%)Ramp LimitedBacked DownNormalFrozen Block

| Session / Category | VC | Plant Name                 | 00:00-00:15 | 00:15-00:30 | 00:30-00:45 | 00:45-01:00 | 01:00-01:15 | 01:15-01:30 | 01:30-01:45 | 01:45-02:00 | 02:00-02:15 | 02:15-02:30 | 02:30-02:45 | 02:45-03:00 |
|--------------------|----|----------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Must Total         |    |                            | 7666.71     | 7723.37     | 7696.94     | 7910.61     | 7764.12     | 7819.94     | 7742.80     | 8167.47     | 8313.22     | 8452.46     | 8636.75     | 8928.31     |
| Merit Total        |    |                            | 18276.59    | 18276.59    | 18276.59    | 18231.75    | 18329.70    | 18434.66    | 18505.81    | 17335.37    | 17329.44    | 17289.26    | 17246.79    | 17222.79    |
| ISGS Total         |    |                            | 10,816      | 10,873      | 10,846      | 11,027      | 10,853      | 10,862      | 10,738      | 10,522      | 10,668      | 10,819      | 11,009      | 11,300      |
| InSGS Total        |    |                            | 15,128      | 15,127      | 15,127      | 15,115      | 15,241      | 15,393      | 15,510      | 14,981      | 14,975      | 14,923      | 14,875      | 14,851      |
| Total              |    |                            | 25943.30    | 25999.96    | 25973.53    | 26142.37    | 26093.82    | 26264.59    | 26248.60    | 25502.84    | 25642.66    | 25741.72    | 25883.54    | 26151.09    |
| Demand             |    |                            | 32198.25    | 32267.34    | 32275.43    | 32230.60    | 32145.86    | 32038.71    | 31924.21    | 32006.00    | 32004.00    | 31950.00    | 31830.00    | 31738.00    |
| Surplus / Deficit  |    |                            | -6254.95    | -6267.38    | -6301.90    | -6088.23    | -6052.03    | -5784.11    | -5675.61    | -6503.16    | -6361.34    | -6208.28    | -5946.46    | -5586.91    |
| InSGS (Merit)      | 0  | OBRA C                     | 1237.50     | 1237.50     | 1237.50     | 1237.50     | 1237.50     | 1237.50     | 1237.50     | 1237.50     | 1237.50     | 1237.50     | 1237.50     | 1237.50     |
| InSGS (Merit)      | 0  | Jawaharpur Vidyut Utlap... | 870.00      | 870.00      | 870.00      | 870.00      | 870.00      | 870.00      | 870.00      | 1244.10     | 1244.10     | 1244.10     | 1244.10     | 1244.10     |
| InSGS (Merit)      | 0  | NUPPL firm power           | 744.92      | 744.92      | 744.92      | 744.92      | 882.78      | 1046.75     | 1164.59     | 744.92      | 744.92      | 744.92      | 744.92      | 744.92      |

# Major Observations in Demand Changes

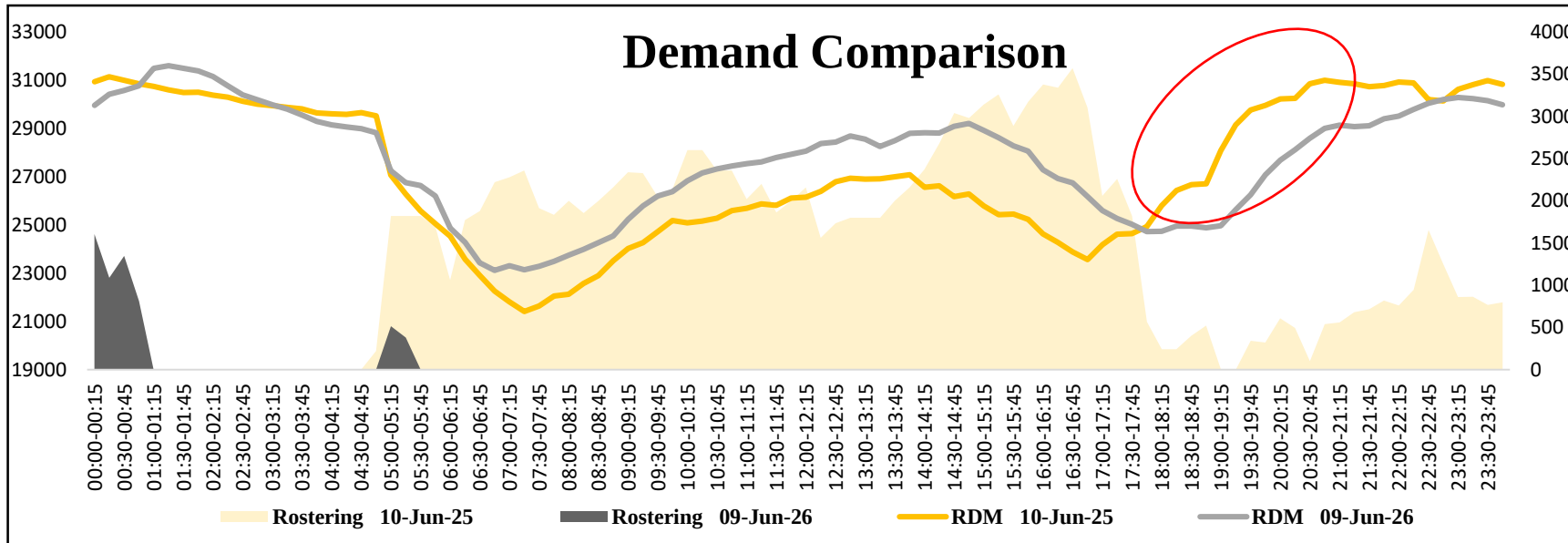


## Demand Comparison

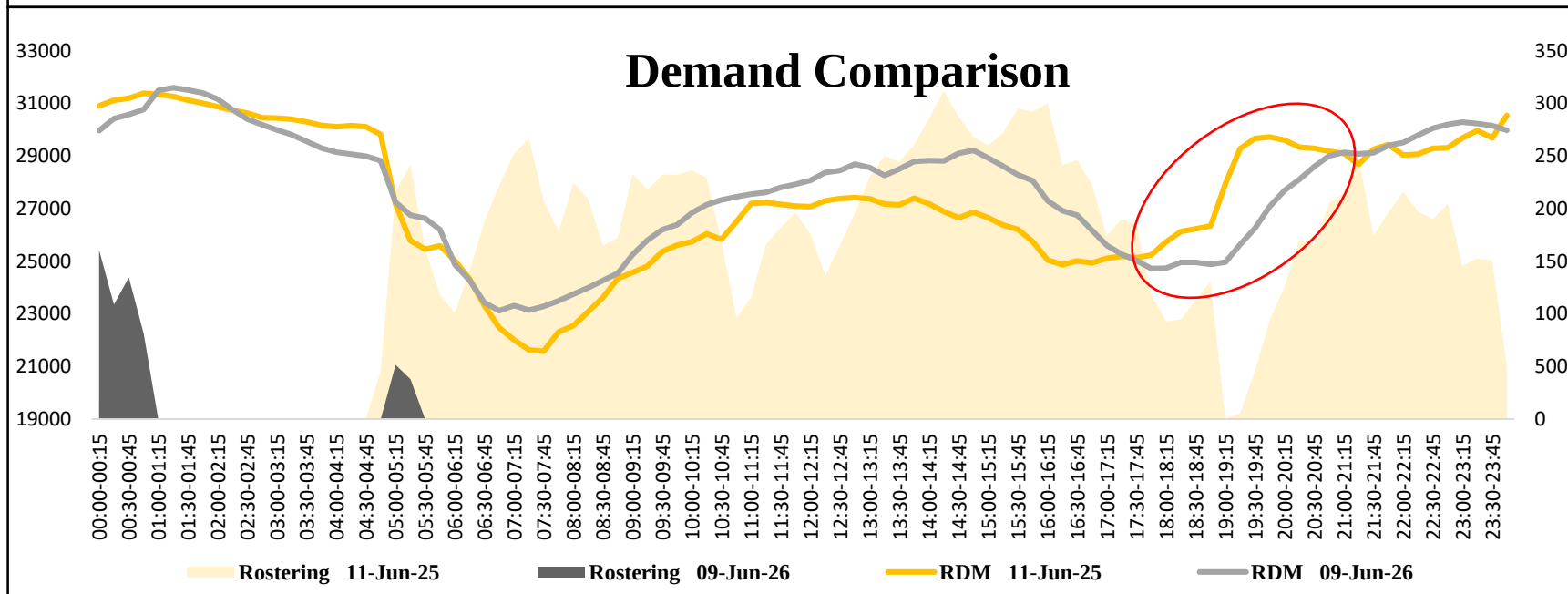


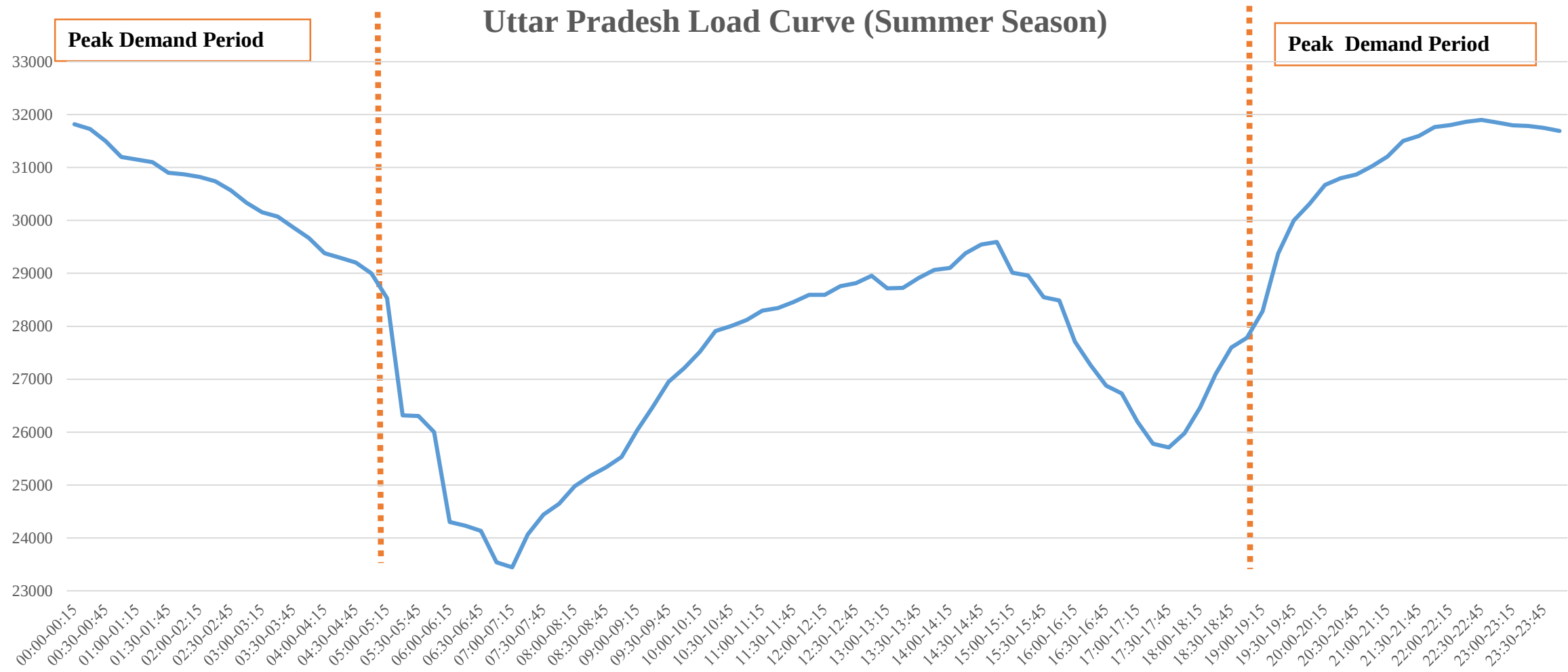
Increased DRE penetration has reduced daytime grid demand, while evening peak demand with significant increase due to the withdrawal of solar generation after sunset.

# Major Observations in Demand Changes



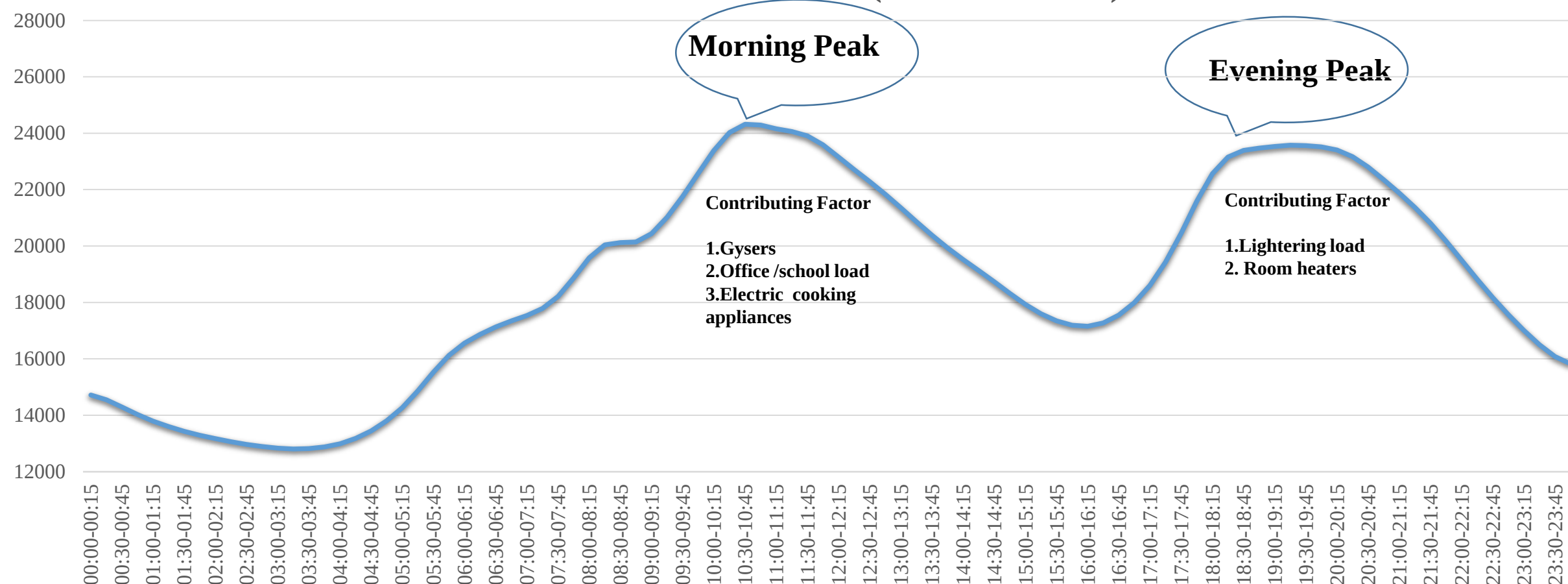
- **RDM:** Restricted Demand Met
- **UDM:** Unrestricted Demand Met (demand considering rostering)
- As illustrated in the graph, it can be observed that when power supply is maintained at the **UDM level**, the evening peak demand ramp-up is relatively lower (approximately **500 MW**) compared to the scenario where supply is provided at the **RDM level** (with rostering restrictions).





- **UP experiences summer season from April to mid October**
- **During this season the peak demand period starts from 19:00 hrs. and sustains till 02:00 hrs. and from 02:00 hrs. onwards demand start to decline**

## Uttar Pradesh load Curve (Winter Season)



- Uttar Pradesh experiences winter season from the 2<sup>nd</sup> fortnight of October to December and from January to March.
- Energy demand peaks twice in a day once in morning between 09:00 to 11:00 hours and other in evening during 17:30 hrs. to 20:00 hrs.

# Key Issues observed in UP during load Monitoring



**Uttar Pradesh**  
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## Impact of Drawal UP state vs UPPCL

| FY      | Average drawal_UP (MW) | Average drawal_UPPCL (MW) |
|---------|------------------------|---------------------------|
| 24-25   | 7644                   | 19044                     |
| 25-26   | 6358                   | 18800                     |
| Average | 7002                   | 18922                     |

UP state drawal is considerably lower than the overall UPPCL drawal; however, both are presently assigned the same deviation limit of 200 MW as per CERC.

## Impact of Intra-State Generator Over-Injection

- All Intra-state generators pertain to UPPCL (NPCL & Railway have no shares in intra-state generators) *as per available information.*
- Over-Injection done by intrastate generators by default becomes the drawl of UPPCL and there is no any mechanism to manage intra-state deviation, increasing DSM exposure.

***‘Upper /Lower volume limit of DSM quantum is 200 MW. Thus for 14000 MW generation in AGC mode with 5% variation the deviation will be 700 MW’***

# Way Forward for monitoring & scheduling



| Uttar Pradesh |                             |               |  |                                       |
|---------------|-----------------------------|---------------|--|---------------------------------------|
| Uttar Pradesh | UPPCL                       | Uttar Pradesh |  | Pashchimanchal Periphery              |
|               |                             |               |  | Madhyanchal Periphery                 |
|               |                             |               |  | Purvanchal Periphery                  |
|               |                             |               |  | Dashinanchal Periphery                |
|               |                             |               |  | Kesco Periphery                       |
|               | Railways                    |               |  | Railways Periphery                    |
|               | Noida Power Company Limited |               |  | Noida Power Company Limited Periphery |
| Uttar Pradesh |                             |               |  |                                       |

## Current Status :

UPPCL Periphery may be deduced from SCADA data / AMR data

Railways & NPCL data may be deduced from SCADA data available in UPSLDC

Monitoring of all DISCOMs can be carried out through a centralized desk, enabling better coordination and control.

## Way Forward :

DISCOM wise periphery drawl data to be captured on real time basis.

DISCOM wise contracts to be defined based on Drawl share in demand/Energy Sales etc.

DISCOM wise DSM calculation could be done.

DISCOM wise volume limit could be requested to Hon'ble UPERC



- ✓ Impact of Open Access and Generator Over-Injection gets diversified across DISCOMs.
- ✓ Weather-related demand fluctuations are smoothed out due to geographical diversity of loads.
- ✓ Reduced volatility in aggregate demand profile, leading to improved forecasting accuracy and DSM management.
- ✓ Lower risk of large deviations arising from localized events in a particular DISCOM area.

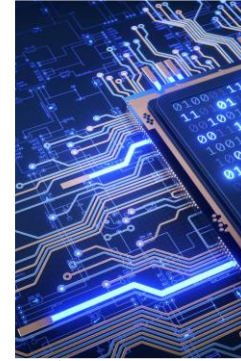
| DSM Summary for Mar'26 |                |                 |                |                         |
|------------------------|----------------|-----------------|----------------|-------------------------|
| DisCom                 | DSM (in Cr.)   |                 | Volume Limit 1 |                         |
| MVVNL                  | 8.95           | <b>44.48 Cr</b> | 100 MW / 10%   | <b>550 MW (approx.)</b> |
| KESCO                  | 1.13           |                 | 100 MW / 10%   |                         |
| PVVNL                  | 13.48          |                 | 100 MW / 10%   |                         |
| PuVVNL                 | 10.91          |                 | 100 MW / 10%   |                         |
| DVVNL                  | 10.01          |                 | 200 MW         |                         |
| UPPCL                  | <b>59.81Cr</b> |                 | <b>200 MW</b>  |                         |

Shifting from the existing state-level DSM framework to a **discom-wise DSM mechanism** is likely to reduce UPPCL's DSM charges, as the permissible DSM volume limit would effectively increase from **200 MW to about 550 MW**, providing greater operational flexibility and reducing DSM exposure



## Historical Demand Analysis

- Analysis of historical 15-minute (96-block) demand data.
- Development and comparison of annual average load curves.
- Assessment of year-on-year changes in peak, base and average demand.



## Peak and Average Load Assessment

- Tracking annual average peak demand and average demand trends.
- Identification of structural demand growth and changing consumption patterns.



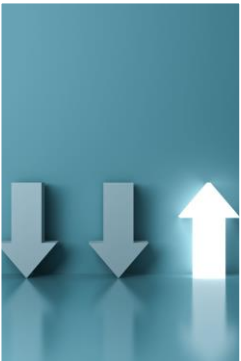
## Load Curve and Ramp Analysis

- Evaluation of morning and evening ramp characteristics.
- Analysis of peak shifting behaviour and system flexibility requirements.



## Weather Correlation Analysis

- Correlation of electricity demand with temperature, seasonal variations and extreme weather events.
- Assessment of weather-sensitive demand components



## AMR data Analysis

- Review of demand across various Discom categories.
- District wise demand analysis in accordance with weather disturbances.



## Forecasting and Resource Adequacy Assessment

- Utilization of historical demand, weather and consumer growth trends for forecasting.
- Support for medium-term and long-term demand projections, resource adequacy studies and procurement planning



**Uttar Pradesh**  
**Power Corporation Limited**

# Thank You



**Uttar Pradesh**  
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