

# IMPLEMENTATION OF AMR FOR RENEWABLE GENERATORS IN TANGEDCO



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*TANGEDCO*

**6<sup>th</sup> BEST PRACTICES TRAINING AND INTERNATIONAL WORKSHOP ON AGRI PV PLANTS, RE INTEGRATION  
AND GREEN HYDROGEN 15-17 MARCH 2023 JODHPUR**

A vertical green sidebar on the left side of the slide. It features stylized white wind turbines at the bottom, a leafy branch at the top, and several semi-transparent circles of varying sizes scattered throughout.

# OUTLINE

**01** RENEWABLE ENERGY IN TAMIL NADU

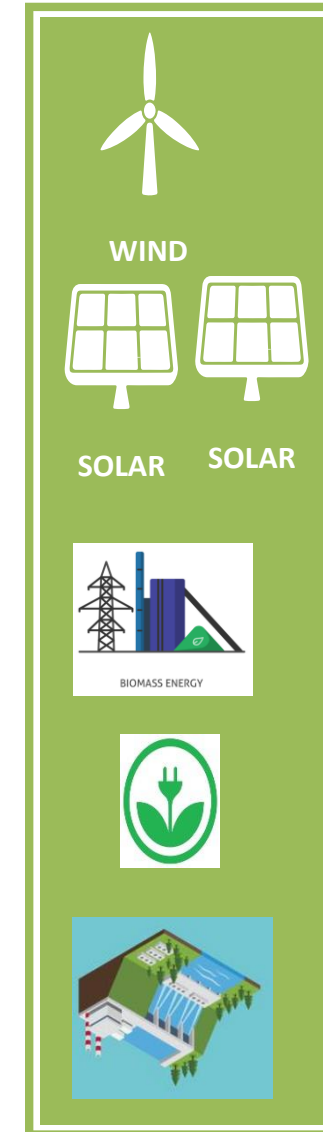
**02** AMR IMPLEMENTATION FOR  
RENEWABLE GENERATORS

**03** FUTURE PLANS

# ACHIEVEMENTS OF TAMILNADU IN RENEWABLE ENERGY

17688MW

- ❖ Pioneer in India to promote wind energy
- ❖ First position in India in wind capacity addition till date
- ❖ First solar farm PV in India installed at Sivagangai, Tamil Nadu
- ❖ Largest single location PV was first located in Tamil Nadu.
- ❖ Tamil Nadu's Contribution towards renewable energy has made India one of the top 5 countries in the global Renewable Energy market .
- ❖ Stands Third position in RE state-wise installed capacity as on February 2023.
- ❖ Stands Fourth in solar state-wise capacity addition as on February 2023 in India



**9983 MW**

**6087 MW**

**265 BIOMASS**

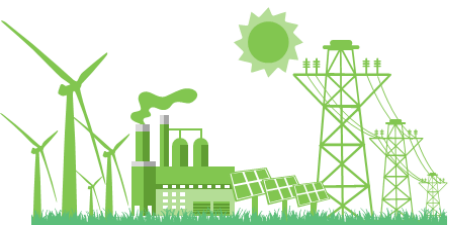
**721 CO-GENERATION  
(BAGASSE)**

**SMALL HYDRO (1 MW to 25 MW)**

**123.05MW**

# India's first large-scale commercial, RE AMR Project

- TANGEDCO has successfully implemented the ***automatic meter reading*** first of its kind in India on Large Scale for open access billing, real time monitoring for wind energy generators, Solar Generators, Thermal Generators and HT consumers.
- The AMR billing software has been implemented in TANGEDCO through Open Access Energy Accounting Software for Wind Electric Generators from **1st of February 2019**, solar energy generator (SEG)
- For Thermal generators from 1st of August 2019, and Bio-Mass, Bagasse generators from Sep 2020.
- Successful implementation has resulted in the ***Economic and Operational benefits***.



# SCENARIO BEFORE IMPLEMENTATION OF AMR



- ❖ The generator services are located in remote area which is hard to access
- ❖ Requires huge number of labour operators and long working hours to achieve complete area reading and billing
- ❖ Capturing and Calculation of data at different days at different offices.
- ❖ Manual / CMRI capture of generator reading and entering into meter cards
- ❖ Manual preparation of monthly generation statement for each generator cards with data entry errors such as missing data, incorrect data, unit conversions, round-of errors etc.
- ❖ Paper based allocation request from generator and manual preparation of allocation order in generation end office
- ❖ Communicating to consumer end office through paper/e-mail based communication.





# ***CHALLENGES FACED BEFORE AMR IMPLEMENTATION***

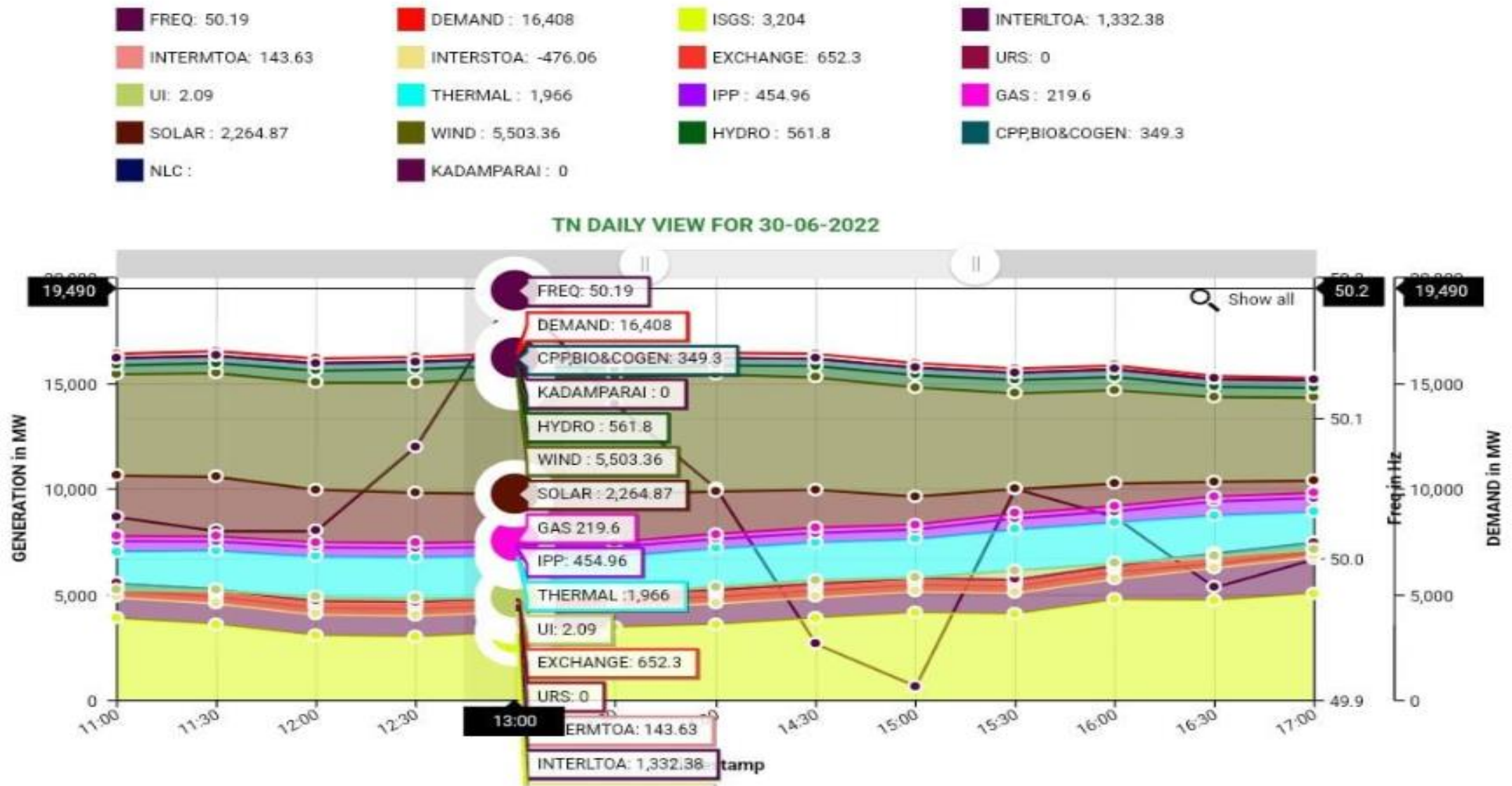
- Consolidating the Master data of all the Generators and Consumers from various offices and ensuring their correctness.
- Field Co-ordination with the Engineers in meter changing and installing the DLMS meter.
- Connectivity issues due to low signal strength / no signal
- Creating awareness to consumers on the new technology.
- Shifting of the billing cycle date to the first of the month.
- Attending to failure of meter / modem
- RTC drift issues
- More customer complaints/Longer time taken to resolve billing disputes
- Enabling multiple meter features and integrating AMI with a larger number of systems

# Benefits of the AMR Implementation

- Error free data is captured on the first day of the month from all the RE Generators which prevents revenue leakage and delay in revenue realization.
- Availability of single point, ready to access, cumulative summaries on Open Access generation, Consumption, Banking and Sale details
- The data obtained is used for predicting the energy demands trends of the future, over any given time period.
- Technology reliability is high.
- Communication Standard is efficient, reliable and secure
- **Implementation of AMR for RE generators has helped TANGEDCO during COVID-19 outbreak to carry out activities without delay**

- Human Intervention has been reduced to 4 to 5% from 100%
- Billing accuracy has been improved
- Customer complaints has reduced drastically
- Operational efficiencies have improved to great extent
- Tamper and theft has been reduced to great extent
- *Based on not using paper for generation and allocation from our end, we are saving the environment -According to statistics, recycling just one tonne of paper can save 7,000 gallons of water, 17 trees, 380 gallons of oil required to produce one tonne of new paper, three cubic yards of landfill space (because most of the paper end up as mountains of wastes) and 4,000 kilowatts of energy*

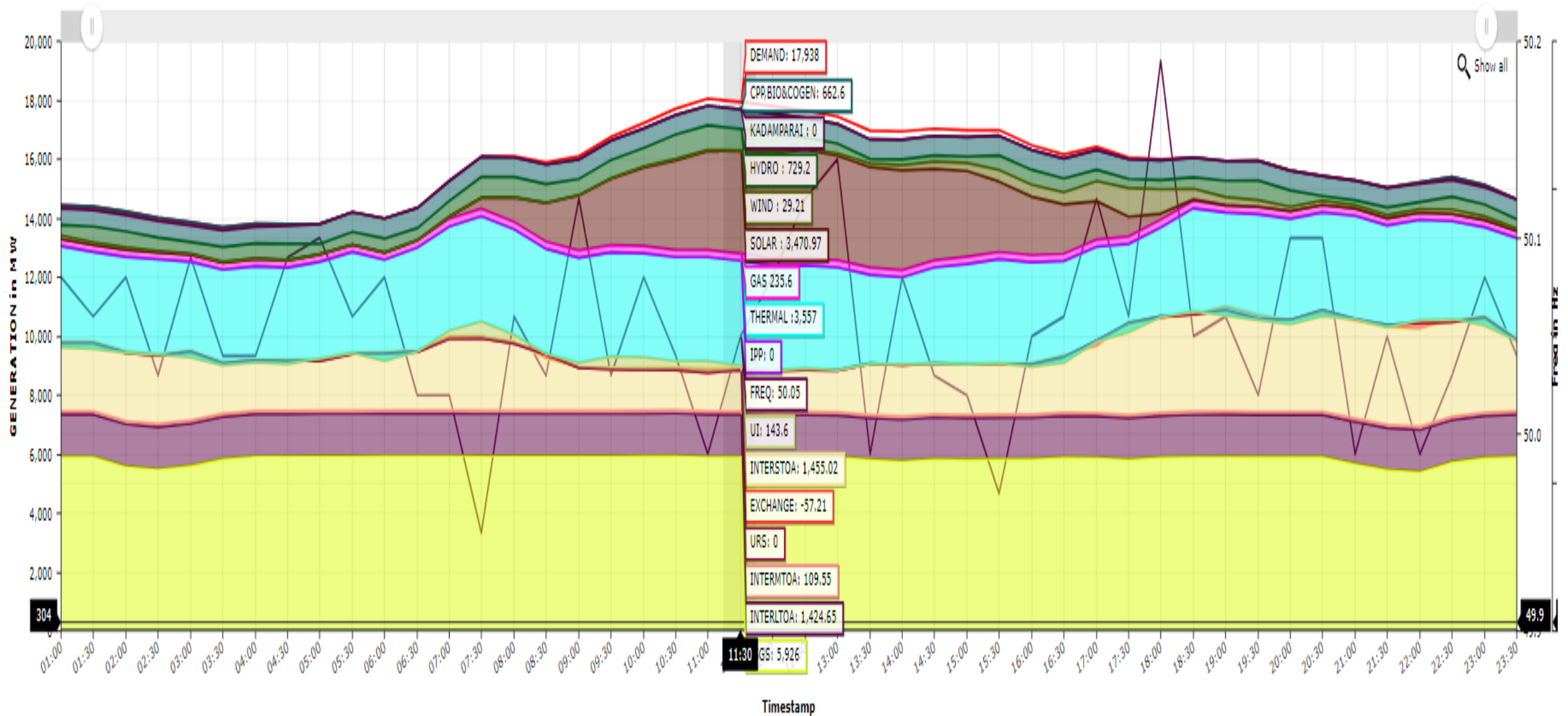
# LOAD PROFILE WITH RE-PENETRATION





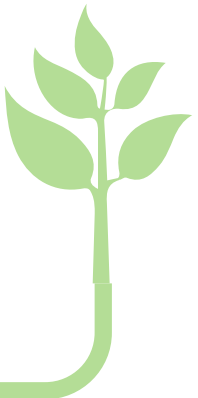
# TN LOAD PROFILE 16-03-2023

TN DAILY VIEW FOR 16-03-2023

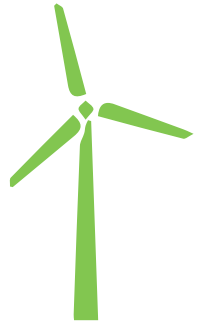


# RE INTEGRATION CHALLENGES

- WIND & SOLAR RE GENERATION ARE INTERMITTENT IN NATURE
- DUE TO DIURNAL & SEASONAL VARIATIONS, SHORTER TIMESCALE, RE POWER HAVE GREATER IMPACTS ON THE GRID BALANCE
- 30-35% VARIATION FROM JUNE TO SEPTEMBER
- 5-10% VARIATION DURING REMAINING MONTHS
- RENEWABLE ENERGY MANAGEMENT CENTRE
- FORECASTING & SCHEDULING RESPONSIBILITIES
- CHALLENGE FOR OPERATORS, PLANNERS, REGULATORS & POLICY MAKERS



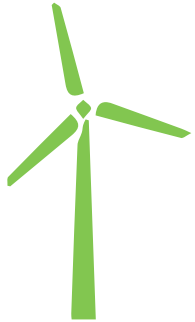
# Challenges in Grid Management



01

High wind generation penetration causes

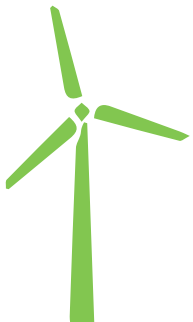
- High variation in deviation quantum (more under drawal)
- Shoot up in Frequency
- Voltage drop and nil reactive power contribution



02

when there is a sudden drop in WIND generation

- will impact heavily on grid



03

**Based on the scheme of connection**

fast-ramping conventional energy sources, energy storage, demand side management must be carried out to meet demand.

During high Wind Season to accommodate maximum Wind Energy, the following steps are carried out to reduce the Generation from Conventional Generators as per the Merit Order list to the quantum of 2500 to 4000 MW

01

Backing down of TANGEDCO owned Thermal generation up to the technical minimum.

02

Surrendering the share of Central Generating Stations in the URS category.

03

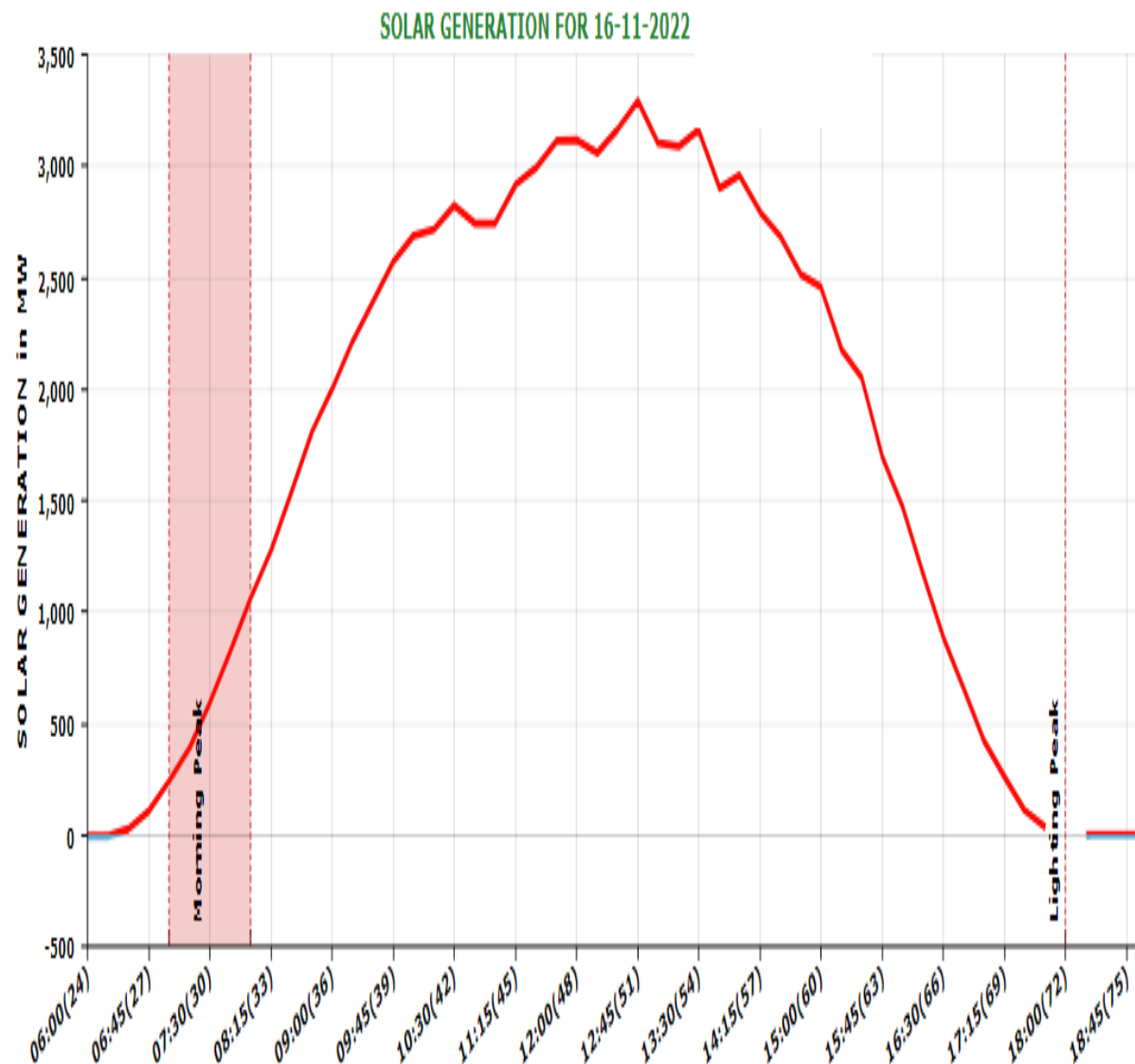
Maintaining the Reserve shutdown of TANGEDCO owned Thermal stations as required including IPP's in the Tamil Nadu

04

Not scheduling the full agreed quantum in case of power purchase from LTA, MTOA Generators.

# Balancing Issues with Renewable Energy

- Solar is available in day time –
- Evening hours thermal is only solution.
- TN – solar peak 3800 MW –
- 6800 MW next-year
  - Total thermal capacity 4320 MW
  - Technical Minimum operation 2100 MW so flexibility for absorption is only 2100 MW
- Forecasting is very rudimentary
  - Requires satellite imagery for precise cloud movement.
- DSM penalty Rs. \*\*\*\*/annum.
- Shifting load to day time.





# Balancing Issues with Renewable Energy

Affecting Pump mode operation :

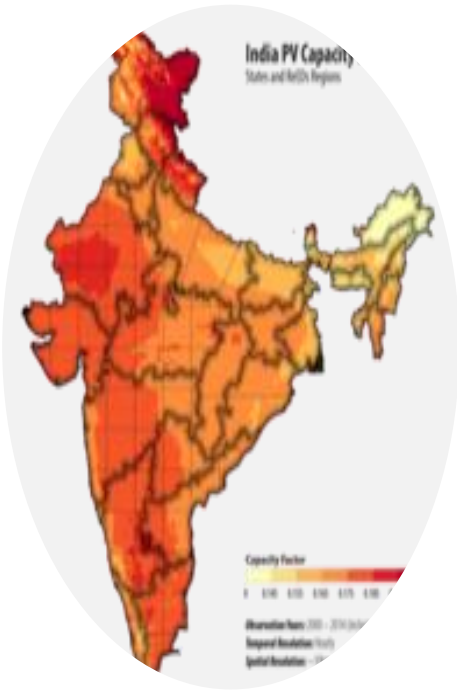
- During this season, Kadamparai pumped storage scheme with a capacity of 4\*100MW has to be operated mostly in generator mode to utilize the free inflow in the upper reservoirs due to Southwest monsoon. Hence utilization of surplus wind power for pump mode operation is also restricted.

As against the total Hydro installed capacity of 2308 MW, the actual available power for balancing the wind variation from Hydel source in normal course is only about 500 MW.

# NEED FOR SINGLR RPO

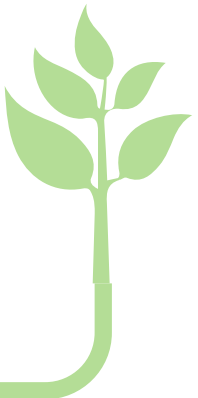
- Single RPO can be fixed instead of categorizing solar and non-solar for the State.

Considering the RE resources of the state, state specific RPO's can be fixed and REC trading can be made accordingly.



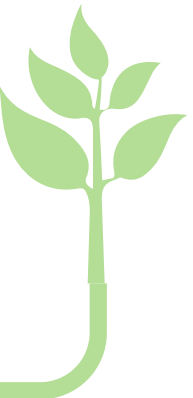
# GREEN ENERGY OPEN ACCESS

- ❖ Grid Connectivity and Intra-State Open Access Regulations, 2014
- ❖ We have almost 6,500 MW of captive wind generation and almost 3500 MW of solar in the open access segment.
- ❖ Tamil Nadu has always promoted open access projects.
- ❖ For instance, almost a decade ago, the limit for open access was brought down from 1 MW to 100 kW of connected load for HT consumers.
- ❖ Currently best placed for next level transitions



# FUTURE PLANS

- ❖ FLEXIBILITY IN THERMAL PLANTS
- ❖ EXPANSION OF SMART METER IMPLEMENTATION SEGMENT WISE
- ❖ GIS INTERCONNECTS
- ❖ WIND-SOLAR HYBRID
- ❖ BATTERY STORAGE
- ❖ PENETRATION OF EV





Thank You