Best Practices in Power System Operation & Grid Management

Sri Lankan Power System Operations and Transmission Planning Experience

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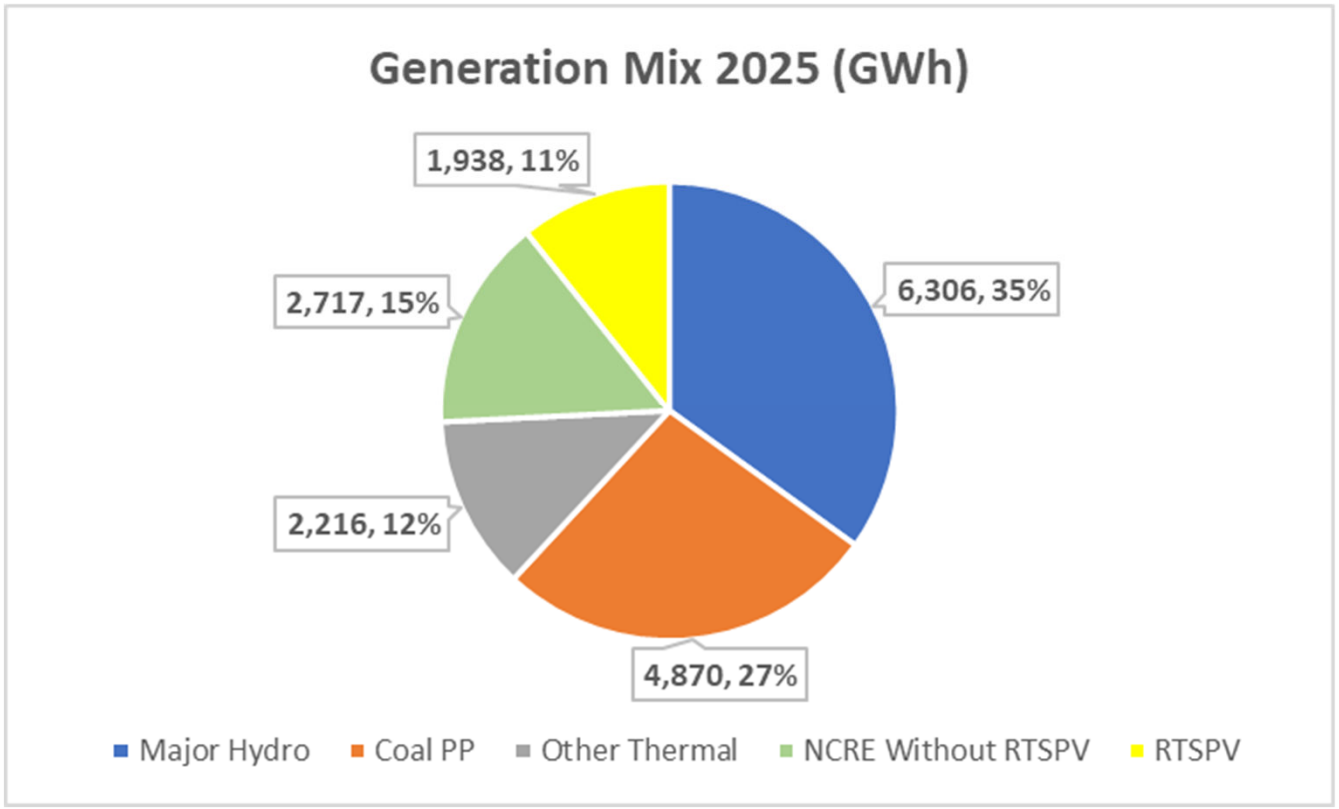
Installed Generation Capacity in the Country

Plant Type	Installed Capacity (MW)
Conventional Hydro	1,512
CEB Coal	900
CEB Oil Thermal	612
IPP Thermal	582
Firm Power	3,606
CEB Mini Hydro	20
NCRE	3,562
Total Generation	**7,188**

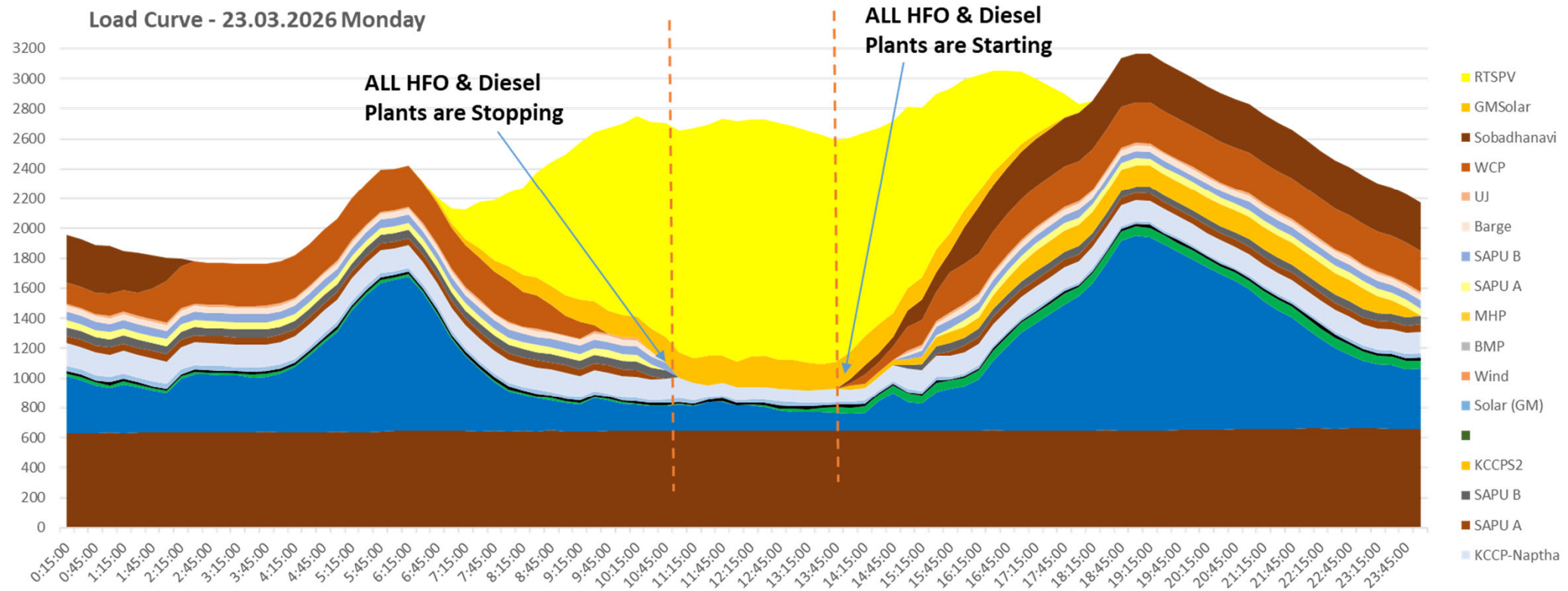
NCRE Plant Detail Distribution

NCRE Plant Type	Installed Capacity (MW)
Mini Hydro	436
GM Solar	411
Mannar Wind	100
IPP Wind	163
BIO Mass	57
RT Solar	2,395
Total Generation	**3,562**

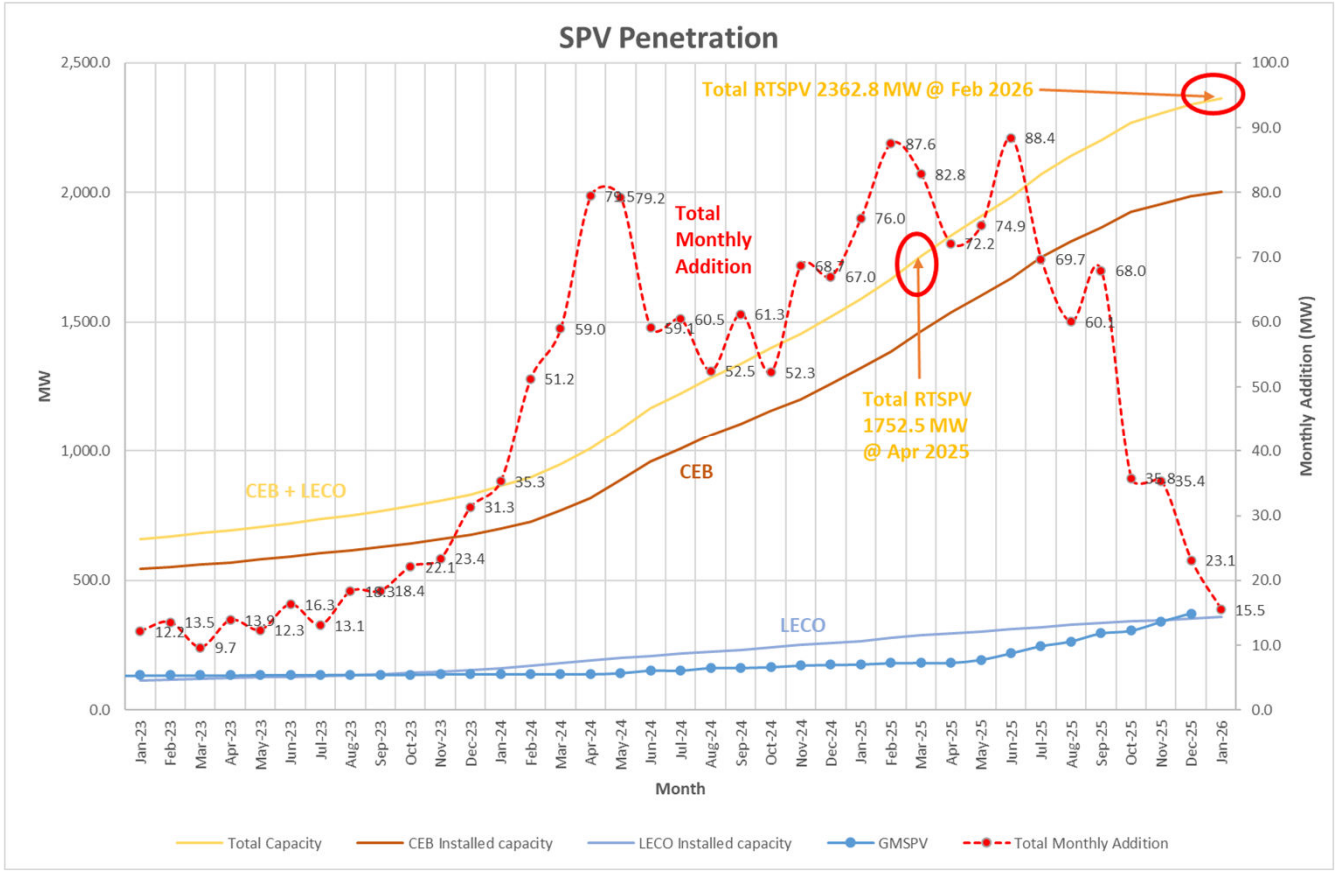
Generation Mix 2025



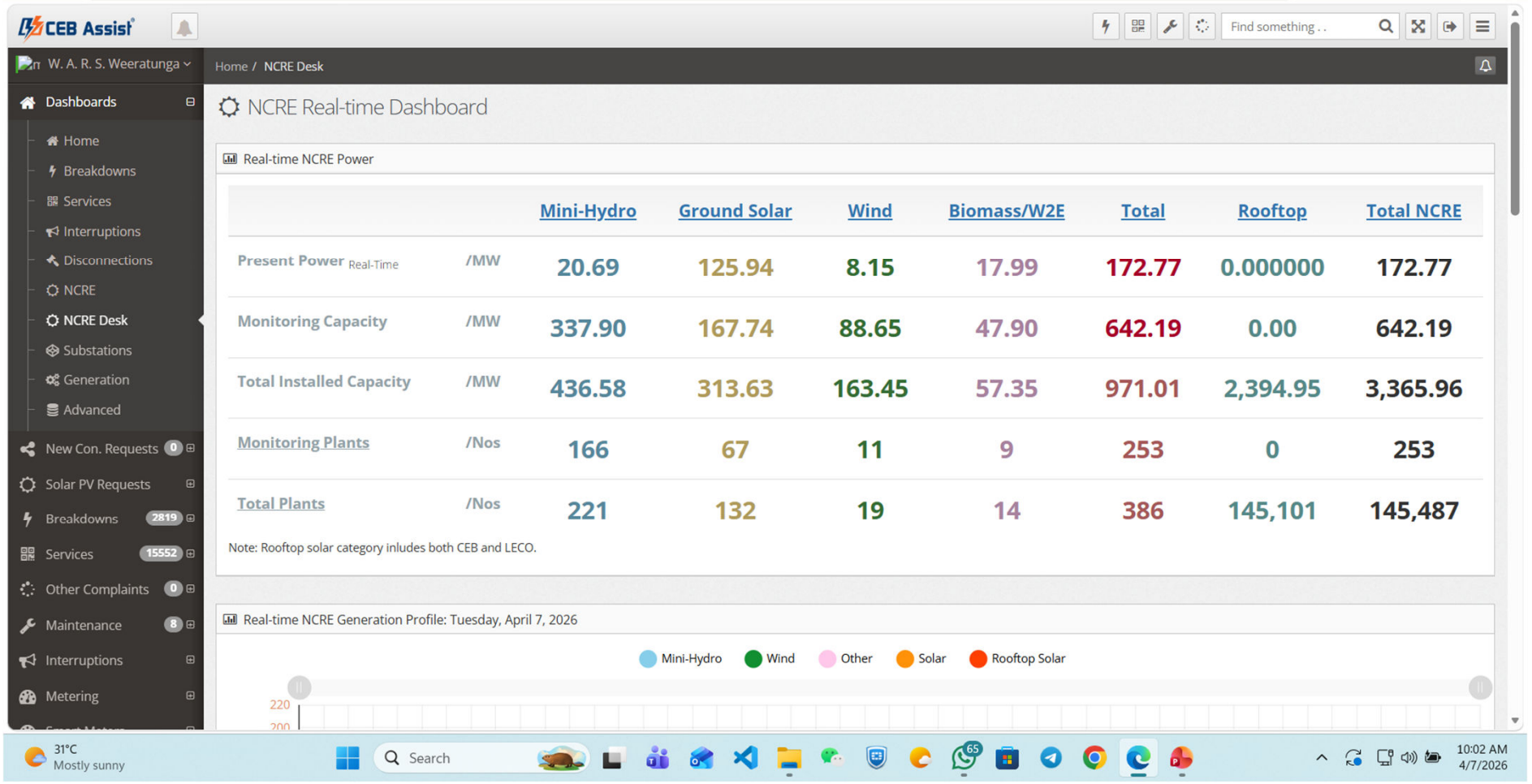
Energy Contribution form Gen. Plants



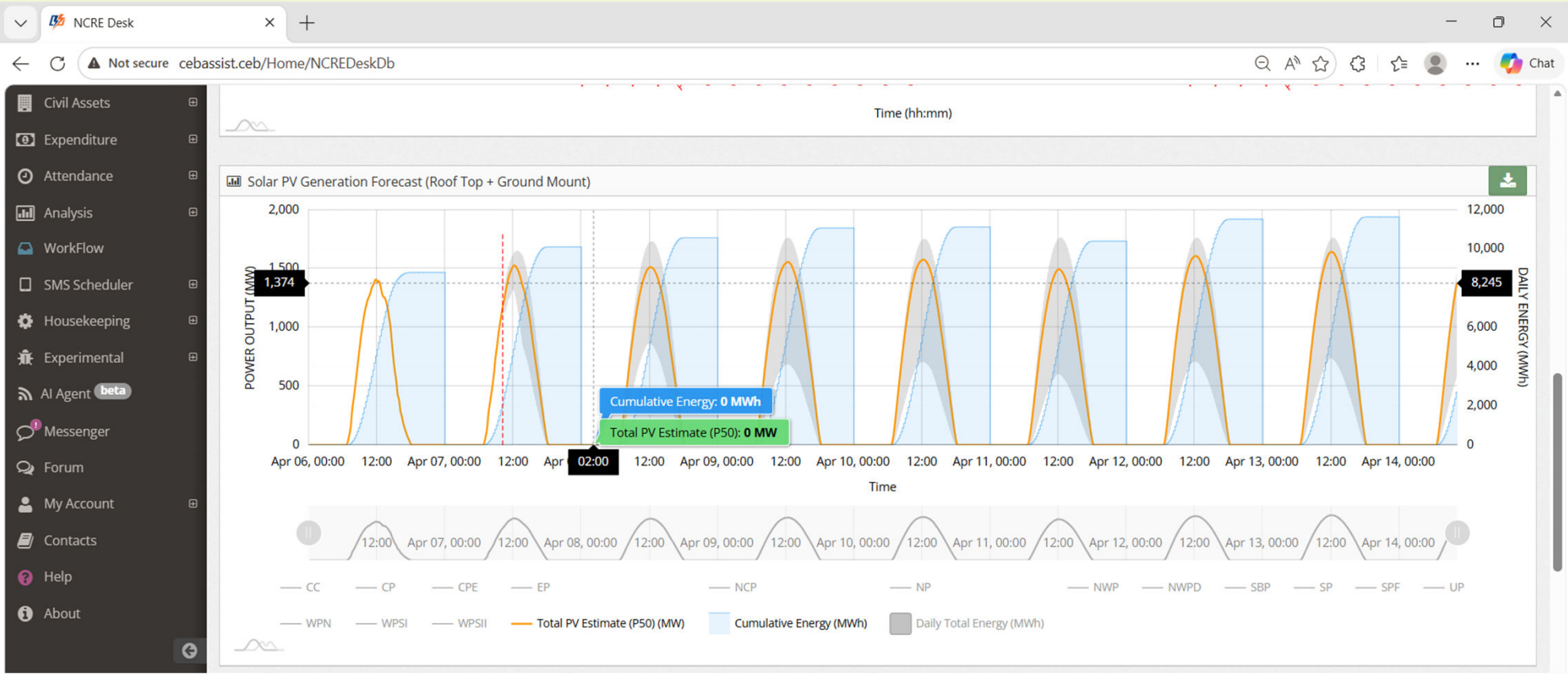
Solar PV Penetration



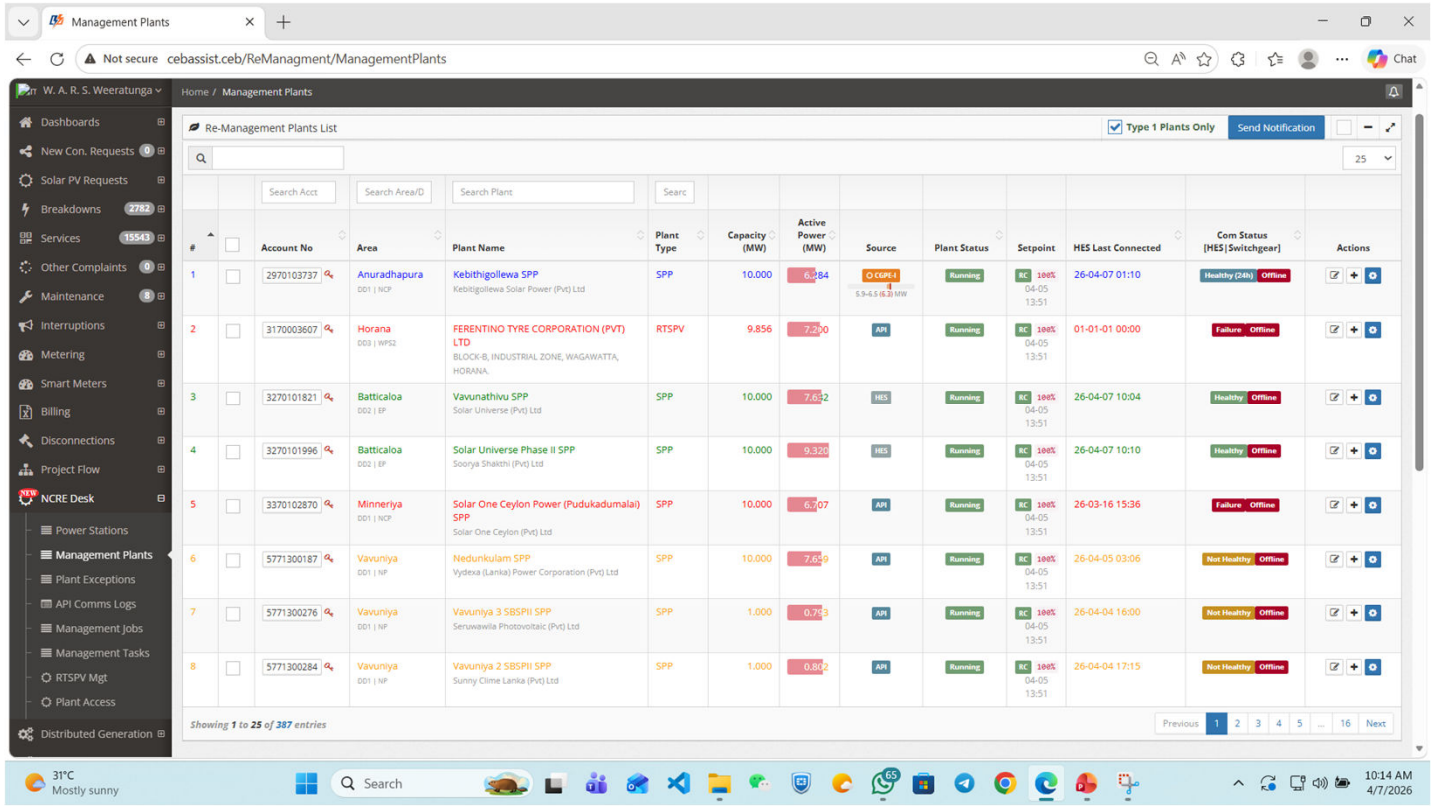
Homegrown Solutions to Maintain Grid Reliability



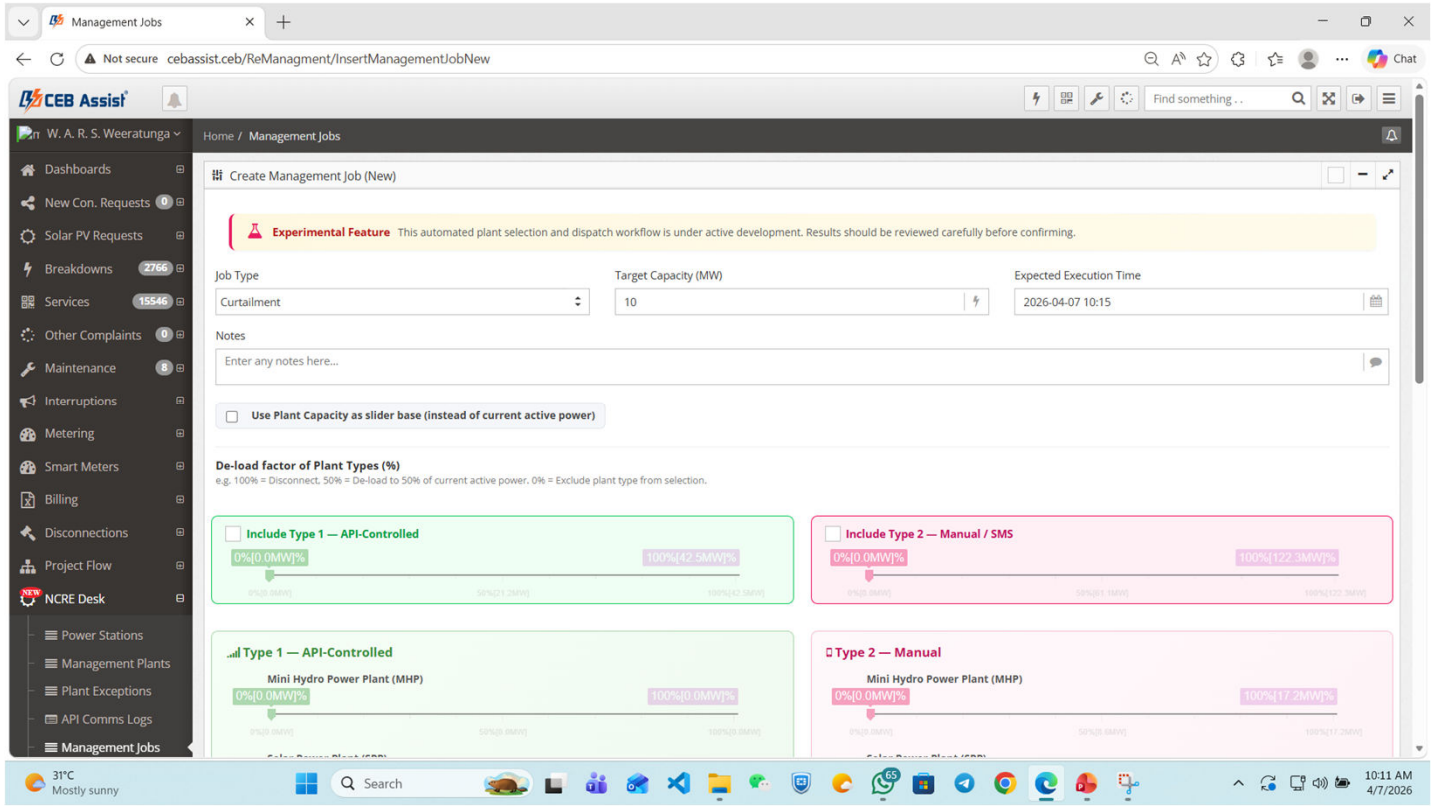
Introduce Solar PV Generation Forecasting System



Monitoring And Controlling from CEBAssist Via API



Real Time Controlling of Solar Plant Generation Through CEBASSIST



Solutions For Power System Management

Energy Shifting Batteries (BESS)

160 MW/
640 MWh

100 MW Grid Forming BESS

Energy Shifting Batteries (BESS)

300 MW/
1200 MWh

PLANNING–OPERATION COORDINATION

A continuous feedback loop for a reliable, efficient, and future-ready grid

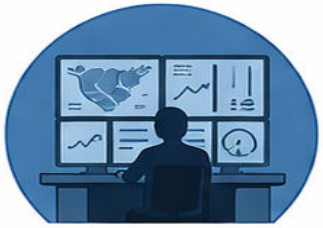
PLANNING
(Long-Term)

Plan the future grid

- Demand forecasting
- Generation & transmission expansion
- Reliability studies
- Network reinforcement plans

FEEDBACK LOOP FROM SYSTEM CONTROL
Operational insights drive smarter planning

OPERATIONAL DATA
(SCADA, PMU, EMS, Metering, Outages)



SYSTEM CONTROL
(Real-Time Operation)

REAL-TIME ACTIONS
(Dispatch, Switching, Voltage Control, Contingency Management)

USE OF OPERATIONAL DATA IN PLANNING
Improves grid demand forecasts, investment decisions, and reliability

OPERATION
(Real-Time)

Operate the grid reliably

- Monitor system conditions
- Manage supply & demand
- Ensure reliability & security
- Respond to disturbances

OPERATIONAL CONSTRAINTS → NETWORK REINFORCEMENT

Real-time operational limits guide where and when to strengthen the grid.

Line Loading
(Overload / Congestion)

Transformer Loading
(Overload / Aging)

Voltage & Stability
Constraints

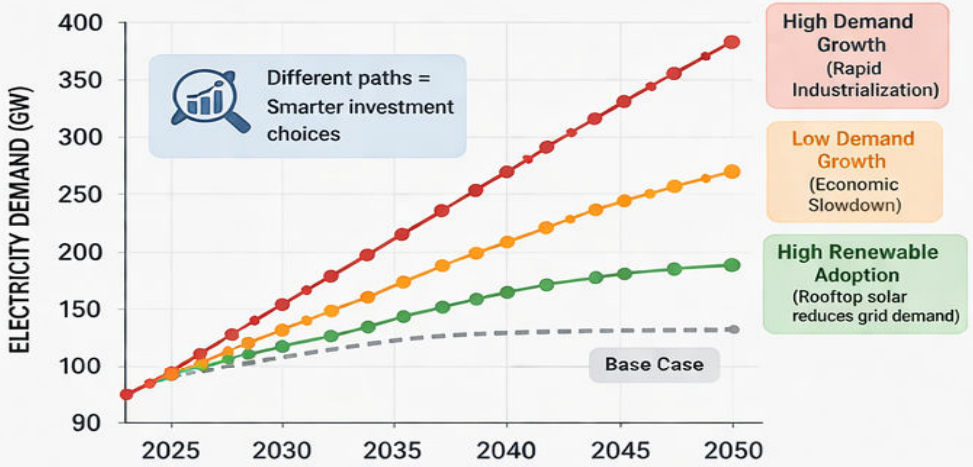
NETWORK REINFORCEMENT
(New Lines, Upgrades, New Substations)

BETTER DATA → SMARTER PLANS → RELIABLE OPERATION → STRONGER GRID

DEMAND FORECASTING & AVOIDING STRANDED ASSETS

MULTI-SCENARIO DEMAND FORECASTING

Plan for multiple possible futures, not a single estimate.



ECONOMIC AND POLICY UNCERTAINTIES

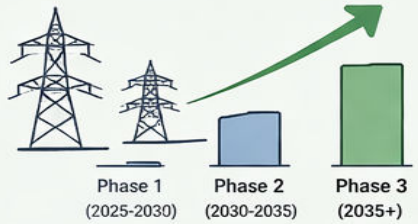
GDP growth, fuel prices, technology costs, carbon policies, and regulations can change the future.

AVOIDING STRANDED ASSETS

Build the right assets, at the right time, in the right way.

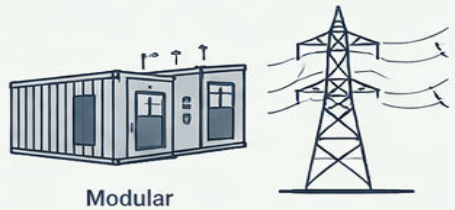
PHASED TRANSMISSION EXPANSION

Build in stages as demand grows.



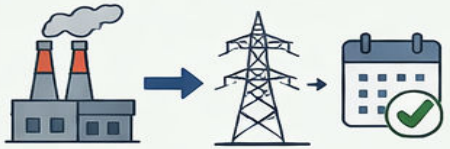
FLEXIBLE DESIGNS

Use modular and scalable solutions.



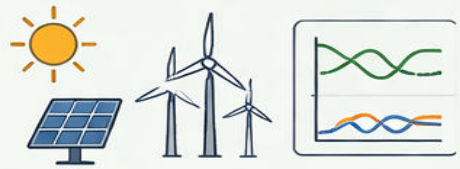
ALIGN GENERATION & TRANSMISSION TIMING

Ensure assets are ready when needed.



CONSIDER RENEWABLE UNCERTAINTY

Design for variability in solar and wind generation.



Plan for variability, ensure grid flexibility

SMART FORECASTING + FLEXIBLE PLANNING = RELIABLE SYSTEMS, LOWER RISKS, NO STRANDED ASSETS

Invest wisely. Stay ready for change. Deliver long-term value.

RELIABILITY PLANNING

Ensuring a secure, stable, and resilient power system today and in the future

N-1 CRITERIA

System remains operational after the loss of any one (N-1)

Loss of one element (line, transformer, generator)

BENEFITS

- Minimize outage risk
- Ensure supply continuity
- Meet regulatory standards

STABILITY STUDIES

Evaluate the power system's ability to remain in a stable operating condition after a disturbance.

Rotor Angle Stability | Voltage Stability | Frequency Stability

KEY ACTIVITIES

- Simulate disturbances (faults, load/generation changes)
- Identify potential instability issues
- Recommend mitigation (control actions, reinforcements)

REACTIVE POWER PLANNING

Ensure adequate reactive power to maintain voltage within acceptable limits.

Maintain Voltage Profile | Reduce Losses | Improve System Stability

KEY SOLUTIONS

Capacitor Banks | STATCOMs / SVCs | Synchronous Condensers

RELIABILITY BY DESIGN, RESILIENCE BY PLANNING

Stronger systems. Fewer outages. Greater confidence.

THANK YOU

Questions & Discussion