



Best Practices in Power System Operation & Grid Management

**Sri Lankan Power System Operations and
Transmission Planning Experience**

By

Eng Ruwan Weerathunga

Eng Kushan Marambage



Installed
Generation
Capacity in
the Country

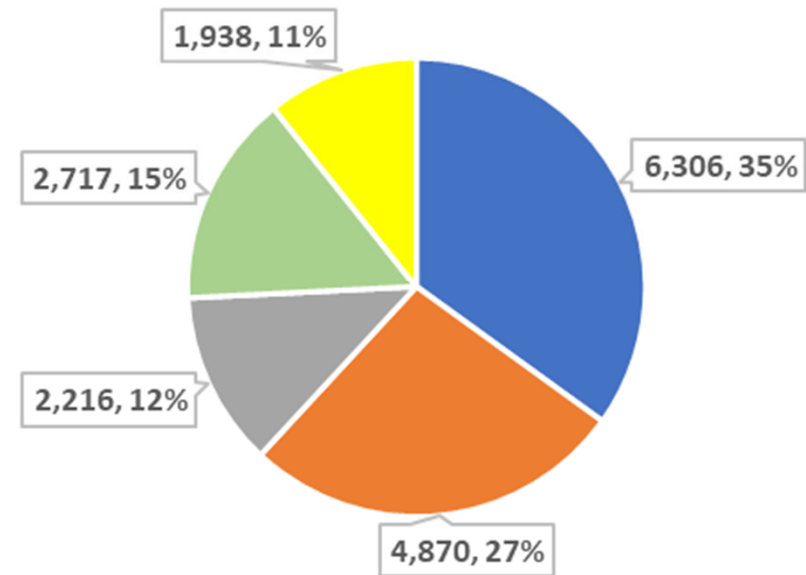
Plant Type	Installed Capacity (MW)
Conventional Hydro	1,512
CEB Coal	900
CEB Oil Thermal	612
IPP Thermal	582
Firm Power	3,606
CEB Mini Hydro	20
NCRE	3,562
Total Generation	7,188

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

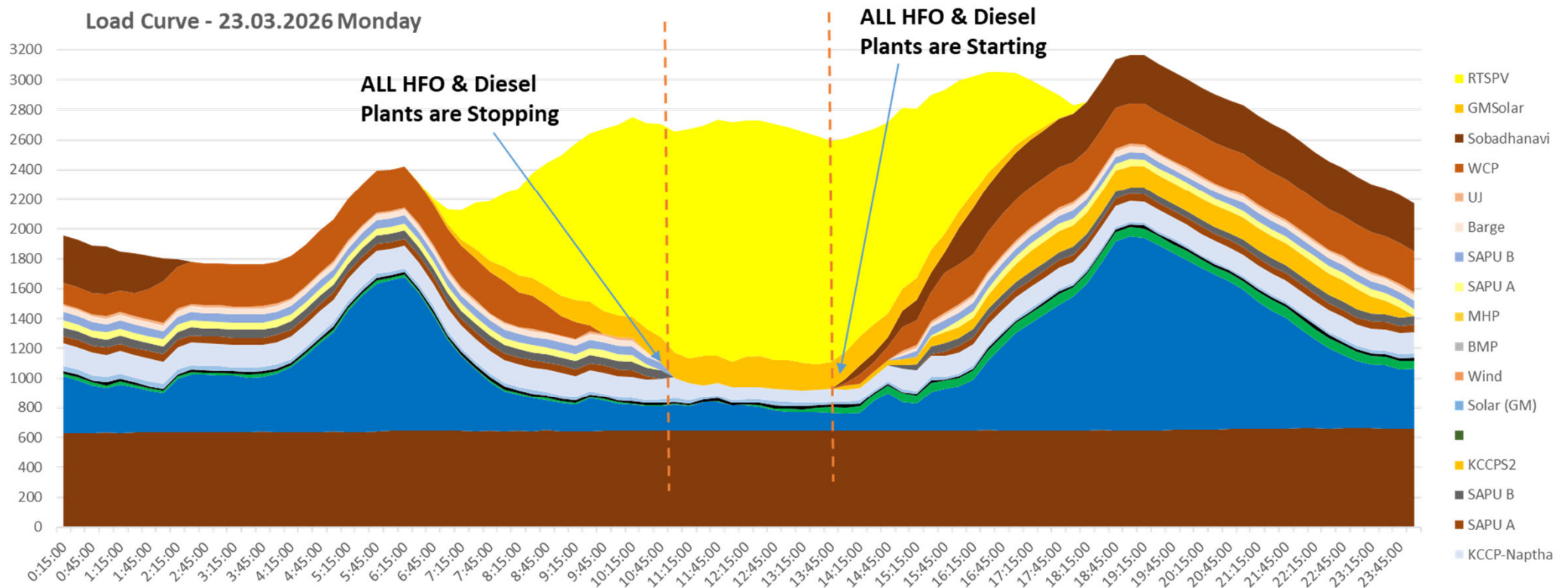
Generation Mix 2025

Generation Mix 2025 (GWh)

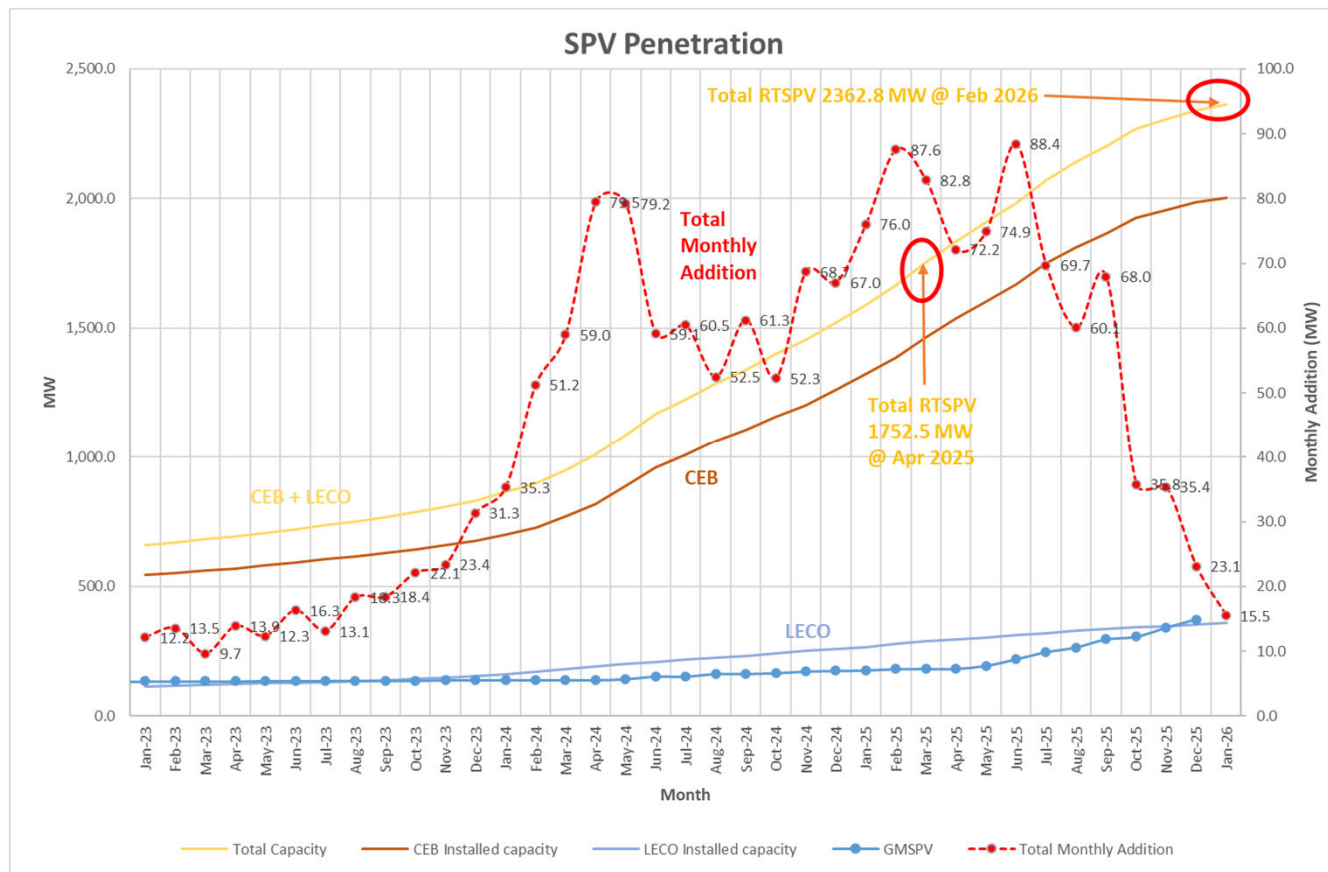


■ Major Hydro ■ Coal PP ■ Other Thermal ■ NCRE Without RTSPV ■ RTSPV

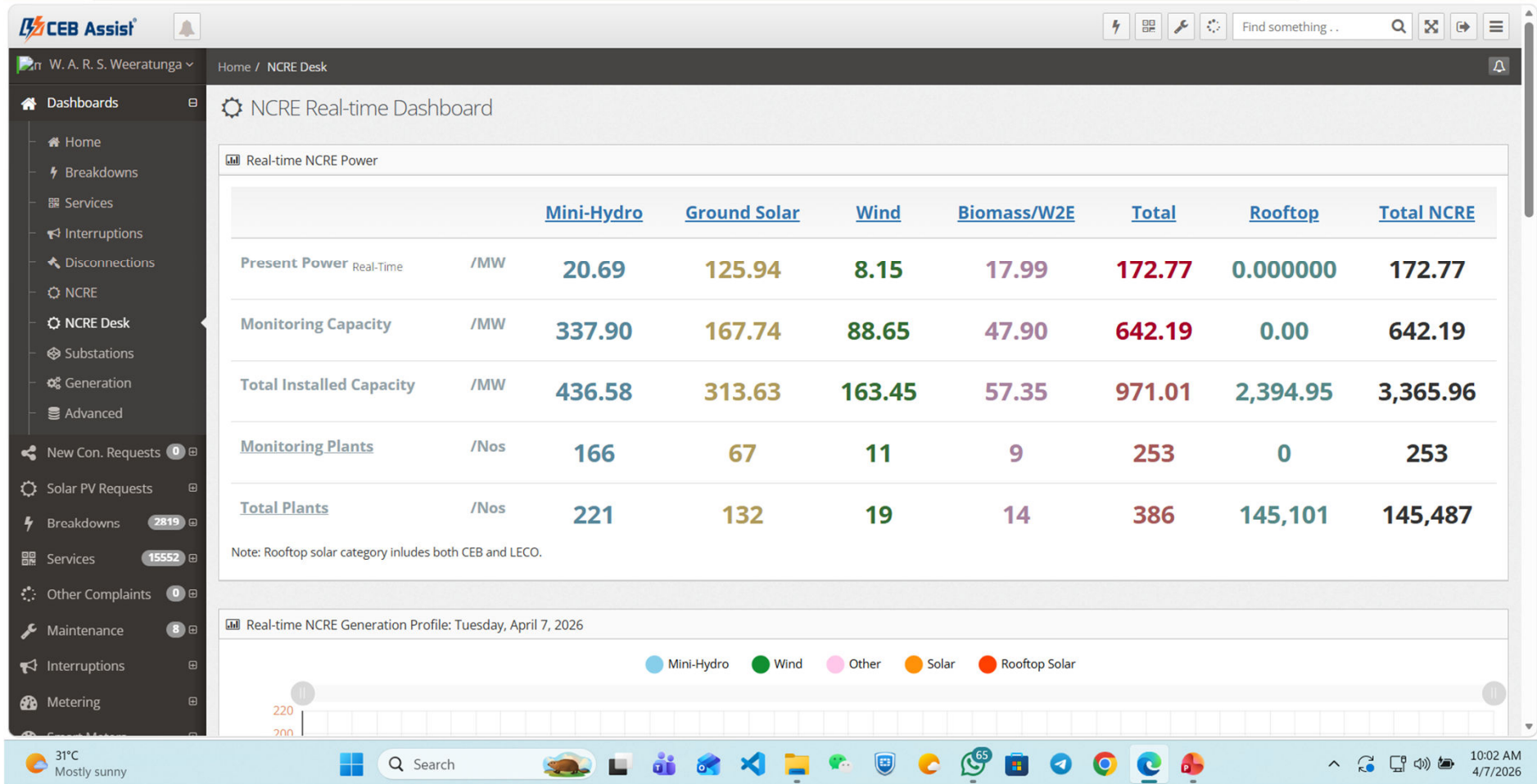
Energy Contribution from Gen. Plants



Solar PV Penetration

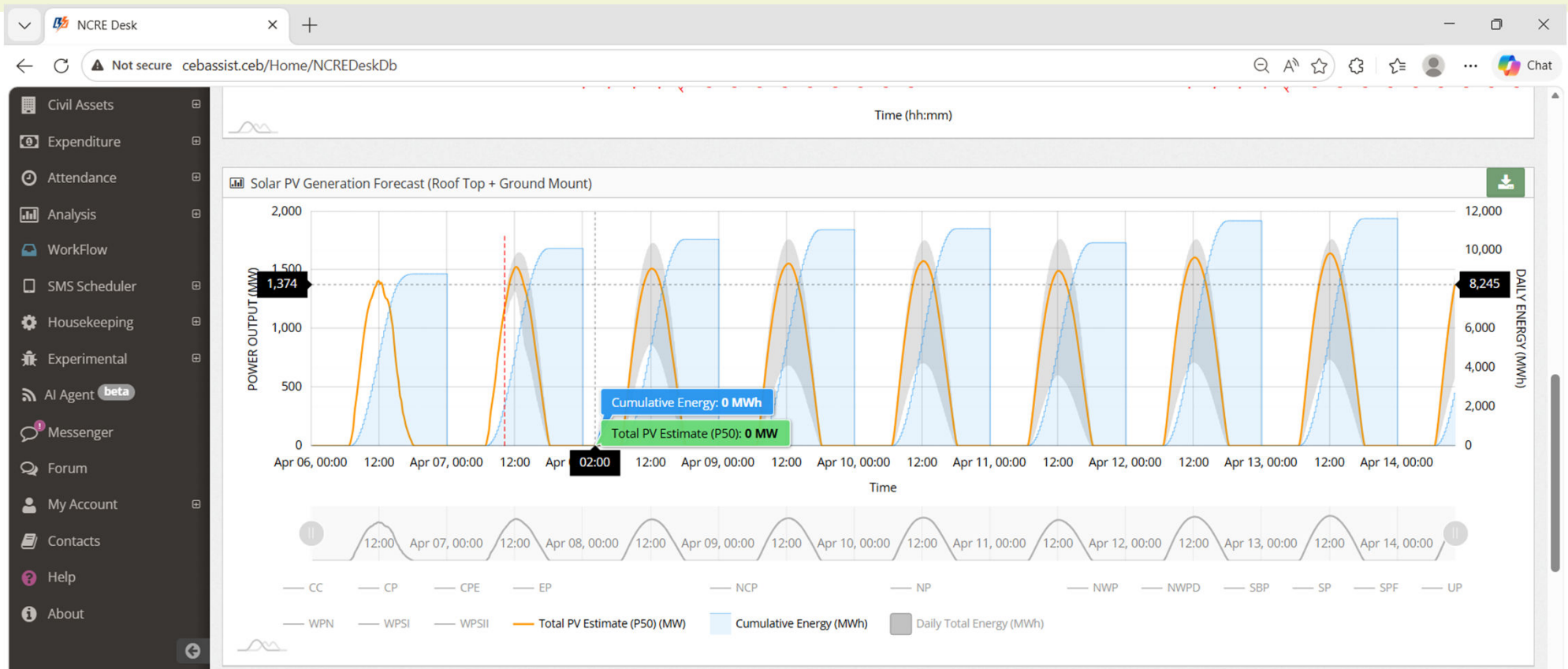


Homegrown Solutions to Maintain Grid Reliability



INTERNAL. This information is accessible to ADB Management and Staff. It may be shared outside ADB with appropriate permission.

Introduce Solar PV Generation Forecasting System



INTERNAL. This information is accessible to ADB Management and Staff. It may be shared outside ADB with appropriate permission.

Monitoring And Controlling from CEBAssist Via API

The screenshot displays the 'Management Plants' interface in a web browser. The page title is 'Re-Management Plants List'. A search bar is visible at the top. The main content is a table with the following columns: #, Account No, Area, Plant Name, Plant Type, Capacity (MW), Active Power (MW), Source, Plant Status, Setpoint, HES Last Connected, Com Status [HES] [Switchgear], and Actions. The table lists 8 plants, with the first one being 'Kebithigollewa SPP' and the last one being 'Sunny Climate Lanka (Pvt) Ltd'. The interface also shows a sidebar with navigation options like 'Dashboards', 'New Con. Requests', 'Solar PV Requests', 'Breakdowns', 'Services', 'Other Complaints', 'Maintenance', 'Interruptions', 'Metering', 'Smart Meters', 'Billing', 'Disconnections', 'Project Flow', 'NCRE Desk', 'Power Stations', 'Management Plants', 'Plant Exceptions', 'API Comms Logs', 'Management Jobs', 'Management Tasks', 'RTSPV Mgt', 'Plant Access', and 'Distributed Generation'. The bottom of the screen shows a Windows taskbar with the date 4/7/2026 and time 10:14 AM.

#	Account No	Area	Plant Name	Plant Type	Capacity (MW)	Active Power (MW)	Source	Plant Status	Setpoint	HES Last Connected	Com Status [HES] [Switchgear]	Actions
1	2970103737	Anuradhapura	Kebithigollewa SPP Kebithigollewa Solar Power (Pvt) Ltd	SPP	10,000	6,384	CEPEL 59-4.5.16.3 MW	Running	AC 100% 04-05 13:51	26-04-07 01:10	Healthy (24h) Offline	🔍 + 🔄
2	3170003607	Horana	FERENTINO TYRE CORPORATION (PVT) LTD BLOCK-B, INDUSTRIAL ZONE, WAGAWATTA, HORANA.	RTSPV	9,856	7,200	AM	Running	AC 100% 04-05 13:51	01-01-01 00:00	Failure Offline	🔍 + 🔄
3	3270101821	Batticaloa	Vavunathivu SPP Solar Universe (Pvt) Ltd	SPP	10,000	7,032	HES	Running	AC 100% 04-05 13:51	26-04-07 10:04	Healthy Offline	🔍 + 🔄
4	3270101996	Batticaloa	Solar Universe Phase II SPP Soorya Shakti (Pvt) Ltd	SPP	10,000	9,320	HES	Running	AC 100% 04-05 13:51	26-04-07 10:10	Healthy Offline	🔍 + 🔄
5	3370102870	Minneriya	Solar One Ceylon Power (Pudukadumalai) SPP Solar One Ceylon (Pvt) Ltd	SPP	10,000	6,707	AM	Running	AC 100% 04-05 13:51	26-03-16 15:36	Failure Offline	🔍 + 🔄
6	5771300187	Vavuniya	Nedunkulam SPP Vydeka (Lanka) Power Corporation (Pvt) Ltd	SPP	10,000	7,050	AM	Running	AC 100% 04-05 13:51	26-04-05 03:06	Not Healthy Offline	🔍 + 🔄
7	5771300276	Vavuniya	Vavuniya 3 SBSPII SPP Senawawila Photovoltaic (Pvt) Ltd	SPP	1,000	0,753	AM	Running	AC 100% 04-05 13:51	26-04-04 16:00	Not Healthy Offline	🔍 + 🔄
8	5771300284	Vavuniya	Vavuniya 2 SBSPII SPP Sunny Climate Lanka (Pvt) Ltd	SPP	1,000	0,810	AM	Running	AC 100% 04-05 13:51	26-04-04 17:15	Not Healthy Offline	🔍 + 🔄

INTERNAL. This information is accessible to ADB Management and Staff. It may be shared outside ADB with appropriate permission.

Real Time Controlling of Solar Plant Generation Through CEBASSIST

The screenshot displays the 'Create Management Job (New)' interface in the CEBASSIST web application. The browser address bar shows the URL 'cebassist.ceb/ReManagement/InsertManagementJobNew'. The application header includes the CEB Assist logo and a search bar. A left-hand navigation menu lists various system components such as Dashboards, New Con. Requests, Solar PV Requests, Breakdowns (2766), Services (15546), Other Complaints (0), Maintenance (8), Interruptions, Metering, Smart Meters, Billing, Disconnections, Project Flow, and NCRE Desk. The main content area features a yellow warning banner for an 'Experimental Feature'. Below this, there are input fields for 'Job Type' (set to 'Curtailment'), 'Target Capacity (MW)' (set to '10'), and 'Expected Execution Time' (set to '2026-04-07 10:15'). A 'Notes' section is present with a text area. A checkbox option 'Use Plant Capacity as slider base (instead of current active power)' is visible. The 'De-load factor of Plant Types (%)' section provides a legend: 'e.g. 100% = Disconnect, 50% = De-load to 50% of current active power, 0% = Exclude plant type from selection.' Four plant type selection cards are shown: 'Include Type 1 - API-Controlled' (0% [0.0MW]%, 100% [42.5MW]%), 'Include Type 2 - Manual / SMS' (0% [0.0MW]%, 100% [122.3MW]%), 'Type 1 - API-Controlled Mini Hydro Power Plant (MHP)' (0% [0.0MW]%, 100% [0.0MW]%), and 'Type 2 - Manual Mini Hydro Power Plant (MHP)' (0% [0.0MW]%, 100% [17.2MW]%). The Windows taskbar at the bottom shows the system tray with a temperature of 31°C, the date 4/7/2026, and the time 10:11 AM.

INTERNAL. This information is accessible to ADB Management and Staff. It may be shared outside ADB with appropriate permission.

Solutions For Power System Management

**Energy Shifting
Batteries (BESS)**

**160 MW/
640 MWh**

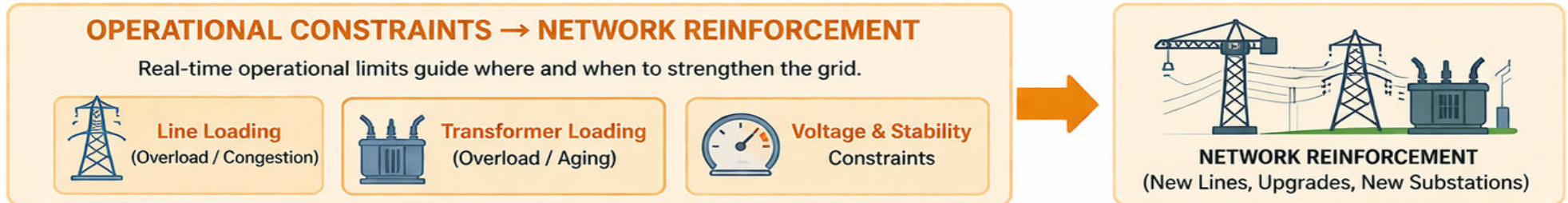
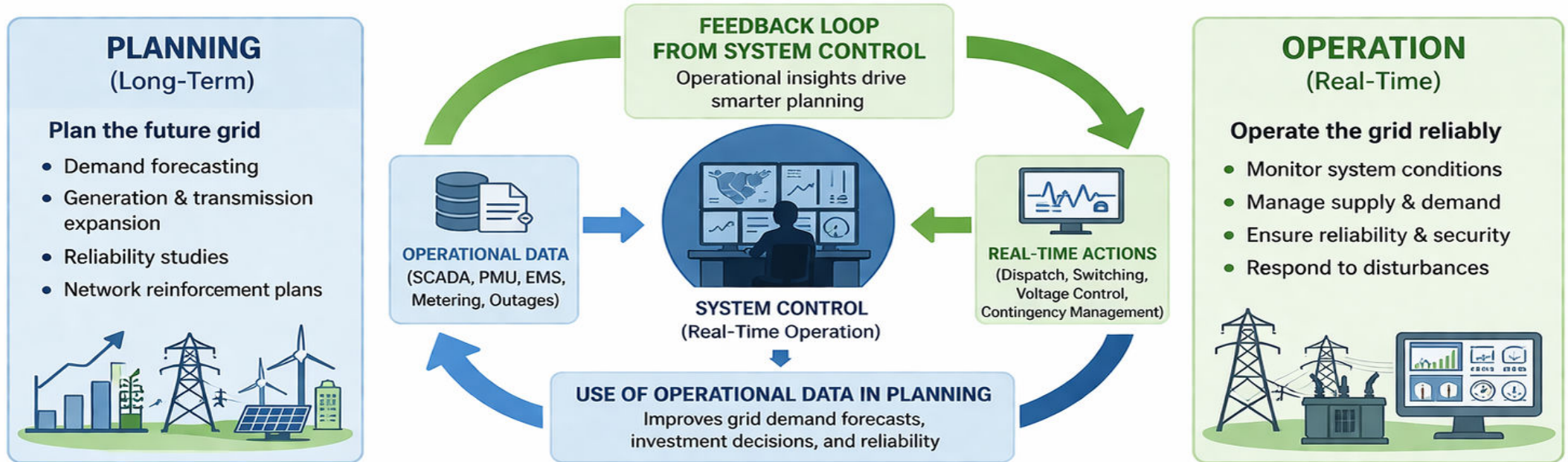
**100 MW Grid
Forming BESS**

**Energy Shifting
Batteries (BESS)**

**300 MW/
1200 MWh**

PLANNING–OPERATION COORDINATION

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

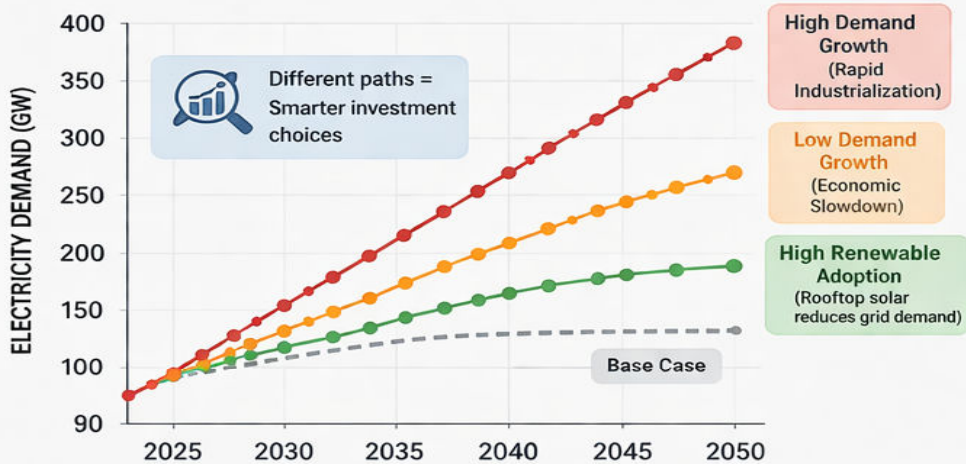


BETTER DATA → SMARTER PLANS → RELIABLE OPERATION → STRONGER GRID

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.

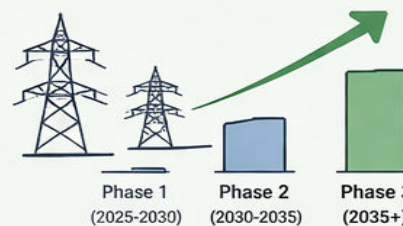


AVOIDING STRANDED ASSETS

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

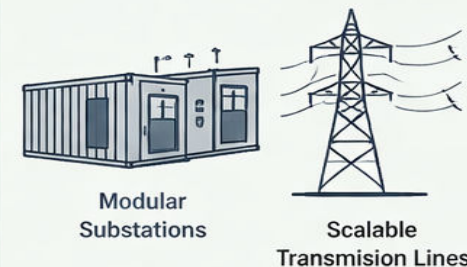
PHASED TRANSMISSION EXPANSION

Build in stages as demand grows.



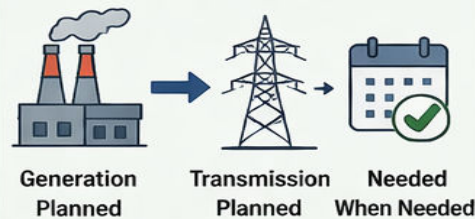
FLEXIBLE DESIGNS

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.



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

