ASIAN BATTERY CONFERENCE

UNLOCKING THE FULL POTENTIAL OF AGM VRLA BATTERY FOR ENERGY STORAGE SOLUTION

Speaker: Antara Bhattacharjee

Exide Industries Limited

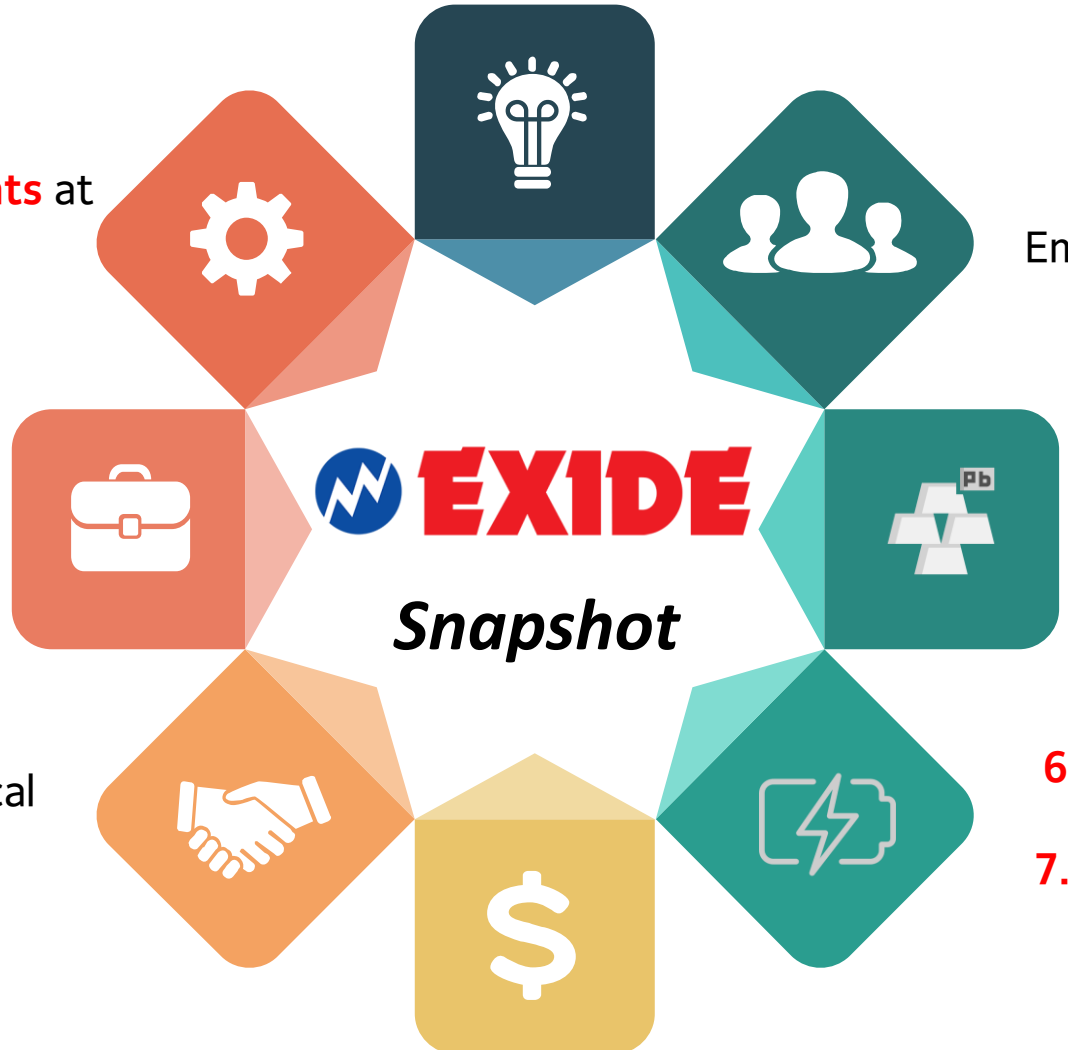
ENERGY BEHIND INDIA'S ENERGY

Legacy of **75+ years** of operations in India

10 manufacturing plants at strategic locations

5200+ Employees

Diversified product portfolio with batteries from **2.5Ah to 20200 Ah**



500 K MT Lead & Lead Alloy Consumption (FY 2023-24)

5 overseas Technical collaborations

66 Mn Automotive batteries & **7.6 Bn Ah** Industrial batteries

US $ 2.0 Bn Revenue & **US $ 3.6 Bn** Market Cap (FY 2024-25)

Sustainability is core to our business & strategy

Hybrid working policy for young mothers

75% *Recycled lead & lead alloys*
~17% *Recycled plastics*

INR 3,602 Cr. *already invested in Green Technology Solution*

20% *energy consumption from renewable sources in FY25*

15% *of last-mile deliveries are via EVs*
Usage of LNG *trucks for primary logistics in select factories*

India's Climate Condition in 2025

Northern states experienced 60-99% **below-average snowfall** in January-February followed by **sudden severe snowstorm** in early March

A January that didn't **feel like winter** and a May that did not **feel like summer**. The winter months witnessed highest temperature in past 125 years while the summer months received record high rainfall.

Central India saw temperatures exceeding **40°C in February** while Delhi & Rajasthan recording temperatures around **45°C in April**.

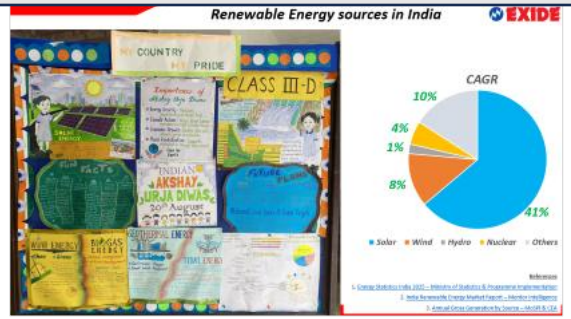
Stark disparities, with **surpluses in arid regions** and **deficits in traditionally rain-heavy areas**, disrupting agriculture and water security

Polluting

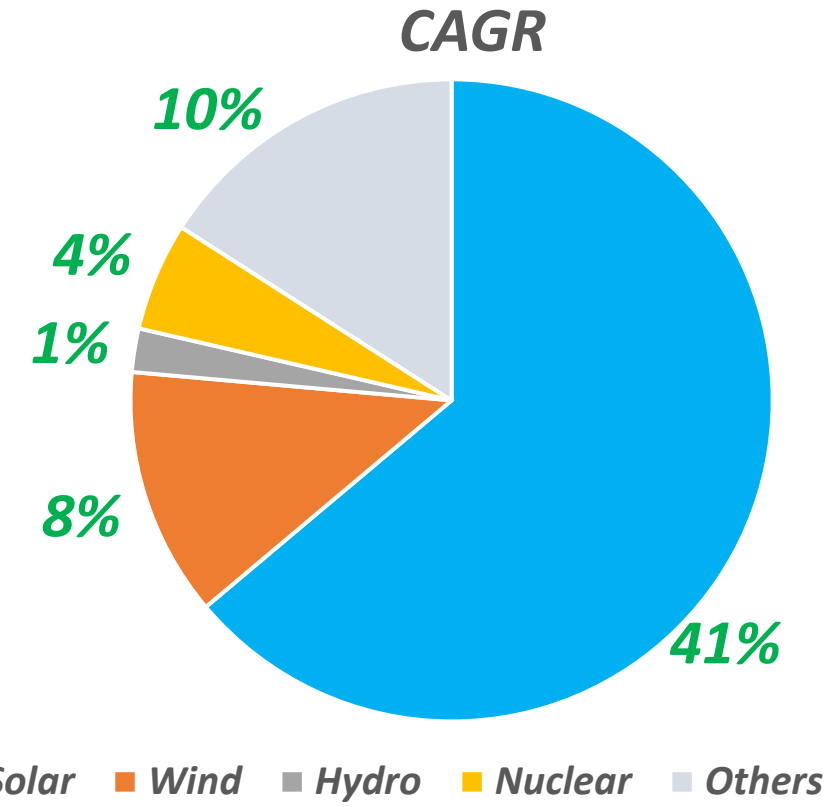
Continual supply

Green electricity

Intermittent Supply



Renewable Energy sources in India



References

1. Energy Statistics India 2025 – Ministry of Statistics & Programme Implementation
2. India Renewable Energy Market Report – Mordor Intelligence
3. Annual Gross Generation by Source – MoSPI & CEA

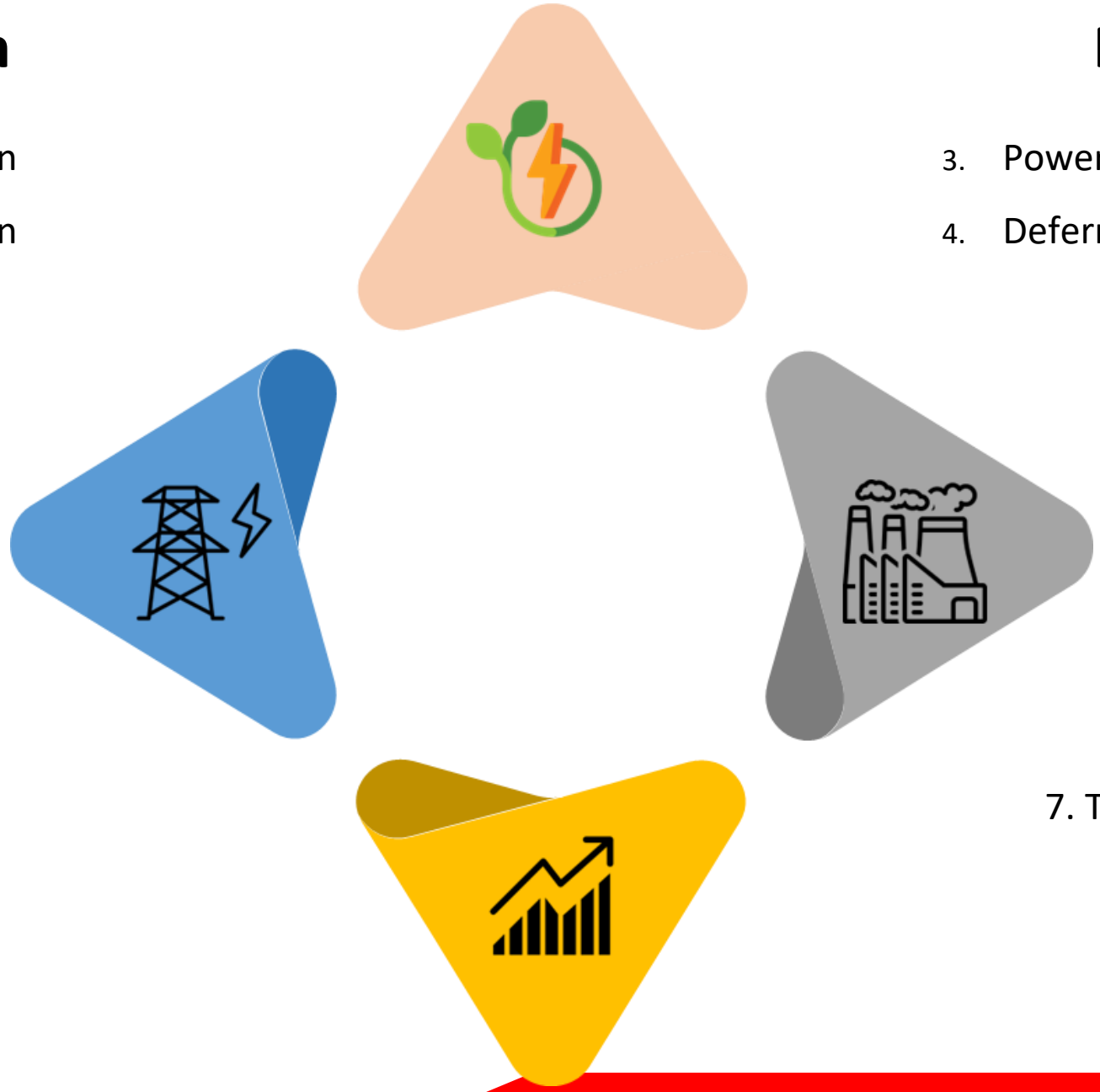
BESS Application Scenario

RE Integration

1. Large-scale PV co-location
2. Wind Colocation

Rural Electrification

3. Power Supply to off-grid locations
4. Deferment of new Grid investments

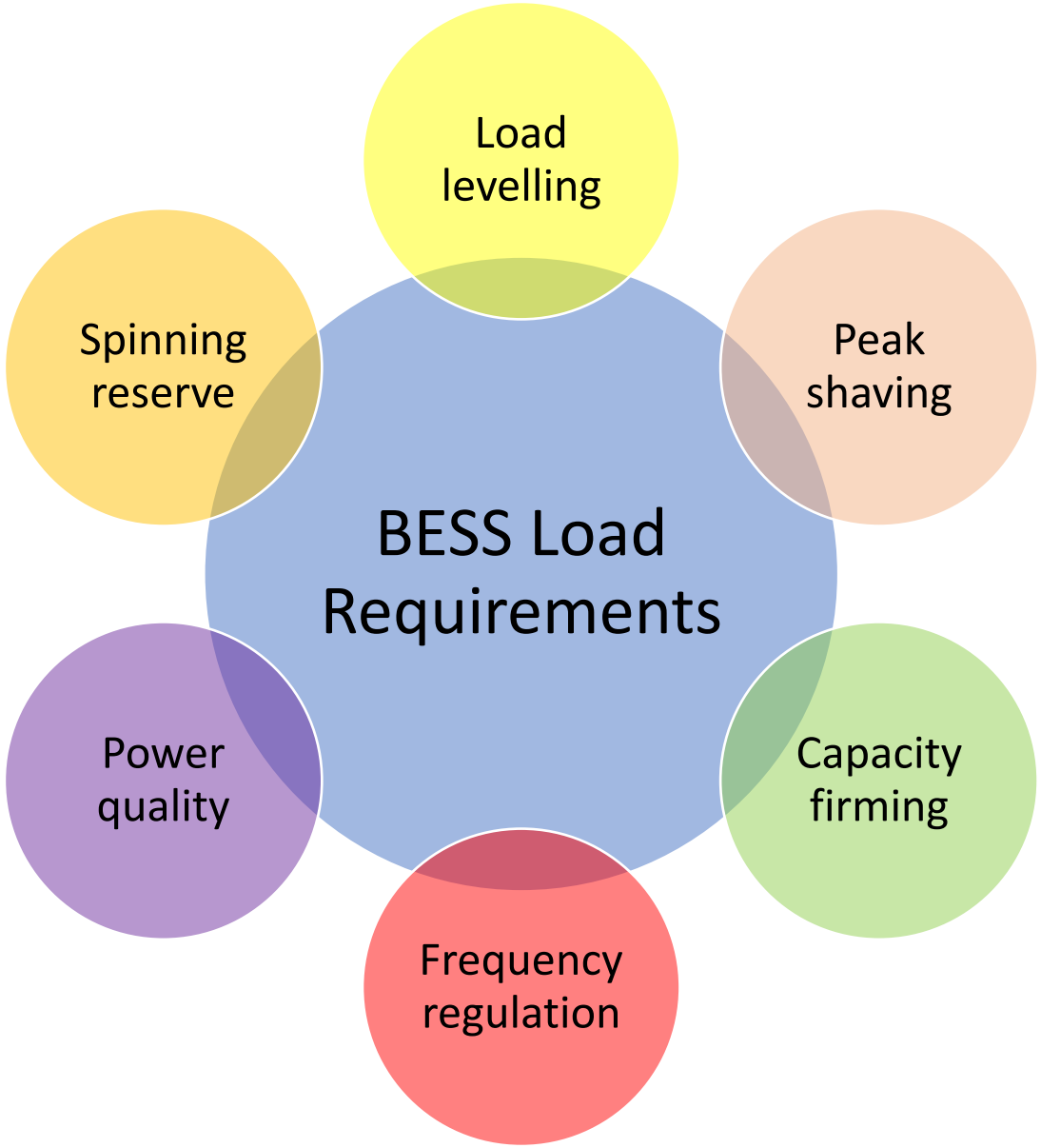


Grid Support

5. Active Support
6. Ancillary Services

DG Offset

7. Temporary Power requirement



- ✓ *Lead-acid batteries remain competent, consistent and cheap for many ESS application scenarios*

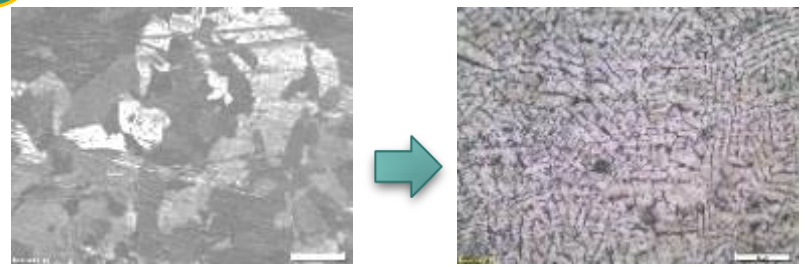
Our Strengths

- ❖ *No air-conditioning*
- ❖ *No high-end electronic safeguards*
- ❖ *Immunity to high temperature*
- ❖ *No fire hazard*
- ❖ *Local, abundant availability of principal raw material i.e., lead*

❖ ***95% Recyclable***

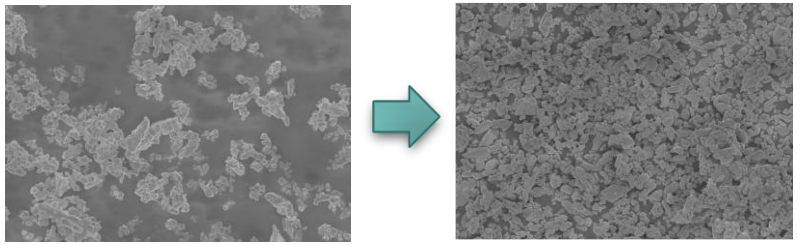
BESS Product Features

1 Enhanced Corrosion Resistance



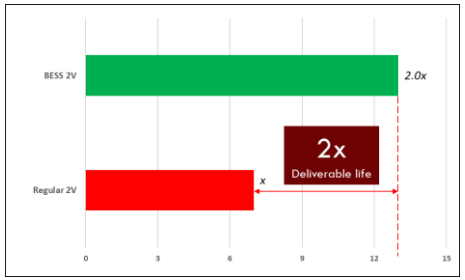
- *Uniform Small-sized Grain Structure of Grid Alloy Enhances Corrosion Resistance & Helps Deliver Longer Life*

2 Unique Expander Formulation

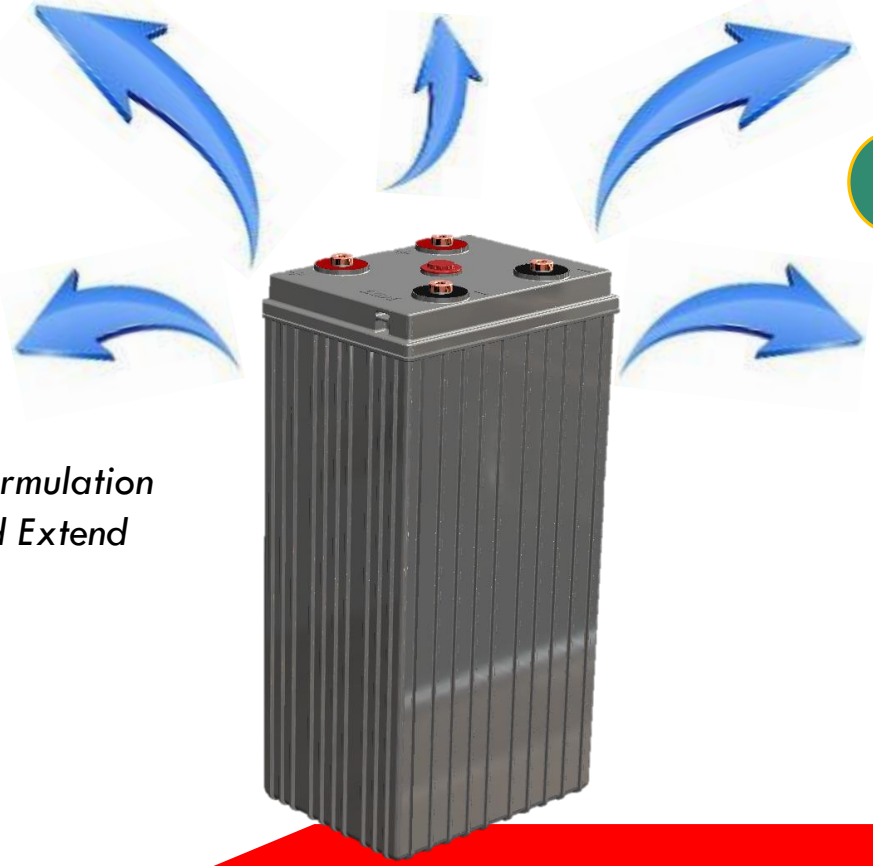


- *Uniformly dispersed and Long-Lasting Additive Formulation Helps Maintain a Large Specific Surface Area and Extend Cyclability*

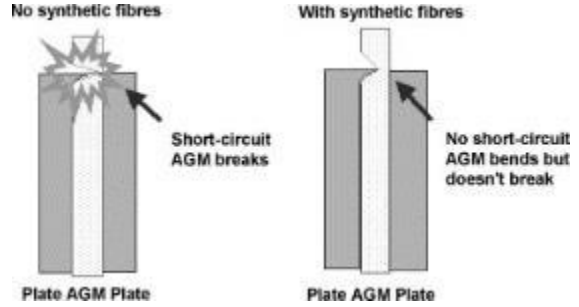
3 High Density Paste Recipe



- *High Density Paste Improves Cycle Life*

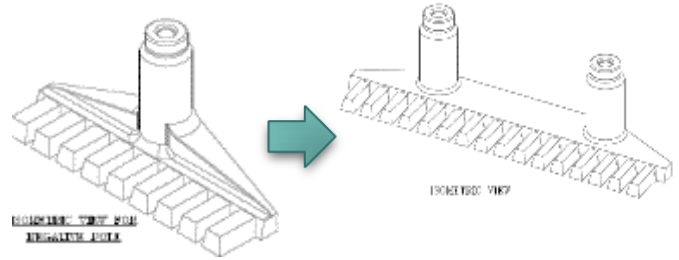


4 Composite AGM Separator



- *Network of Synthetic Fibers Reinforces the Surface Strength, increasing Puncture Resistance & Resilience Property*

5 Multi-Pole Terminal Design



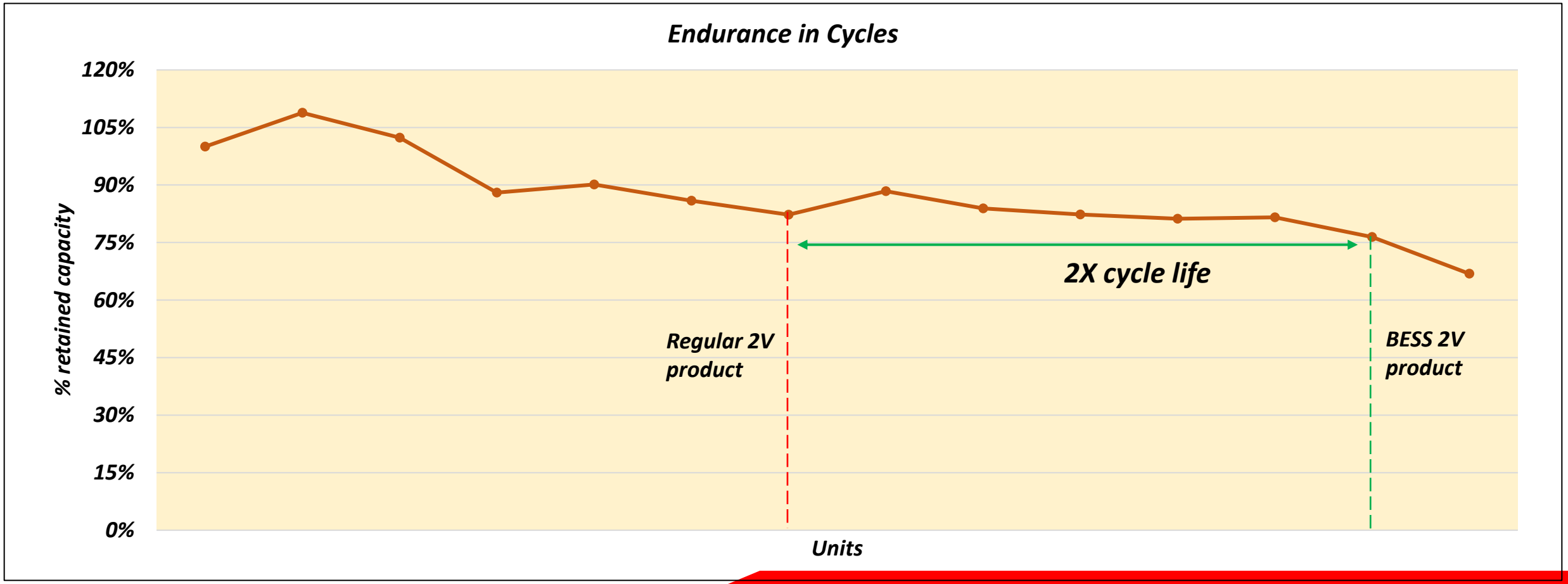
- *Increased number of Terminal Poles Lower Resistance, Cause Lesser Heating & Improve Output Characteristics*

Endurance in Cycles

Test Specification	IS 15549
Test Condition	55 ±3°C
OTC	2.4 x C10 A till 1.74 VPC
Cycle DCH	1.92 x C10A for 3 Hrs
No. of Cycles / unit	30
Minimum Requirement	5 Unit, Capacity >80% of OTC

Cycling between

0% - 60% DoD

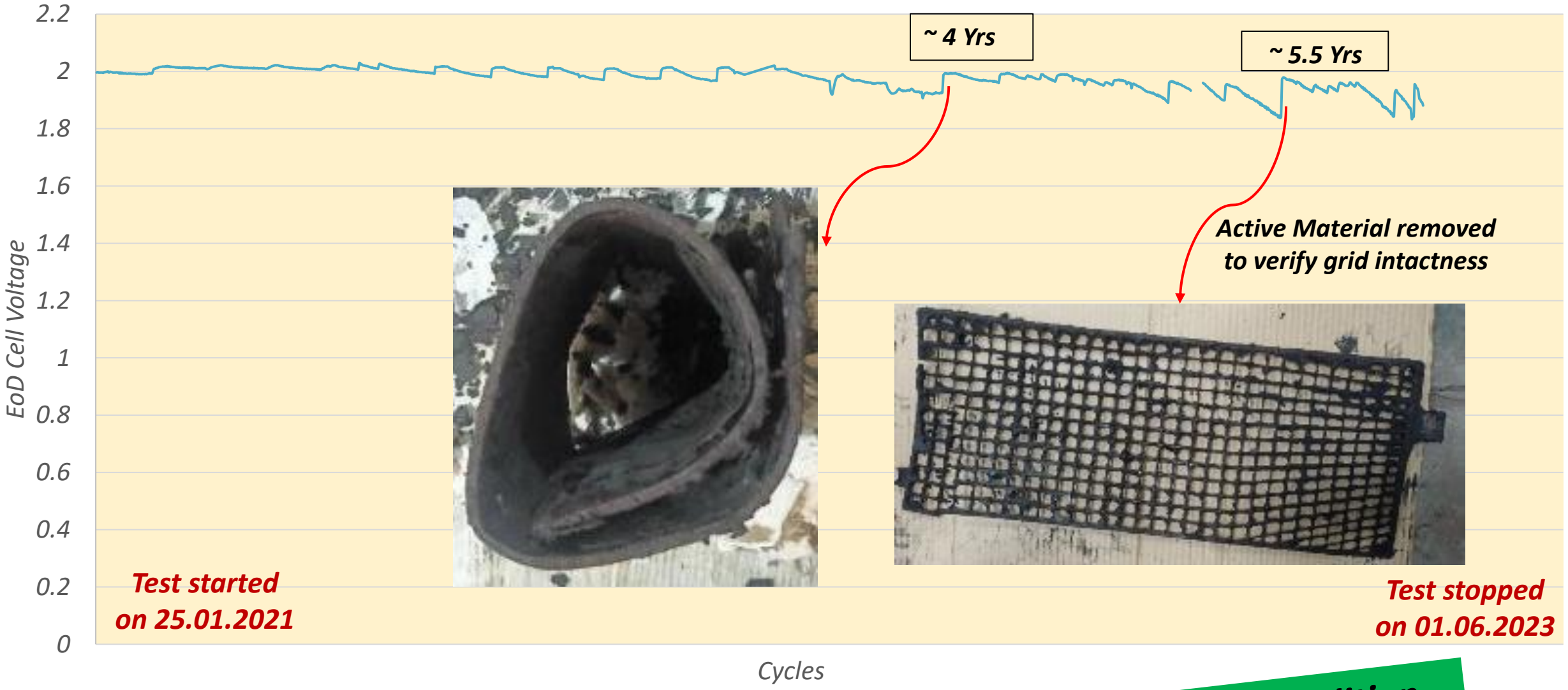


Low Rate Partial SoC Cycling

Cycling between

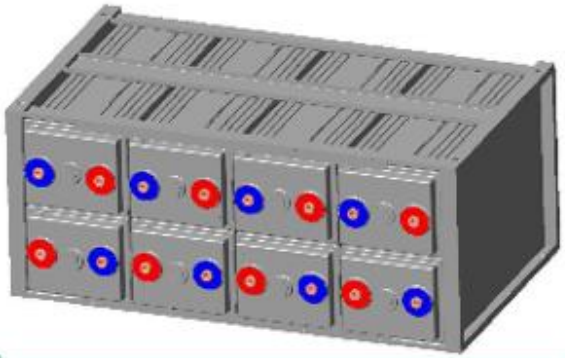
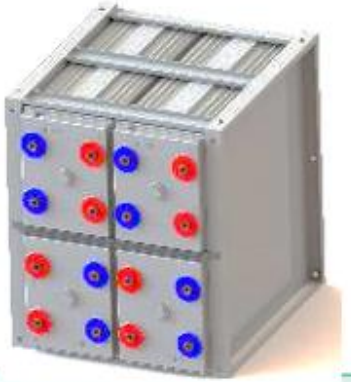
10% - 70% DoD

Discharge Voltage Trend



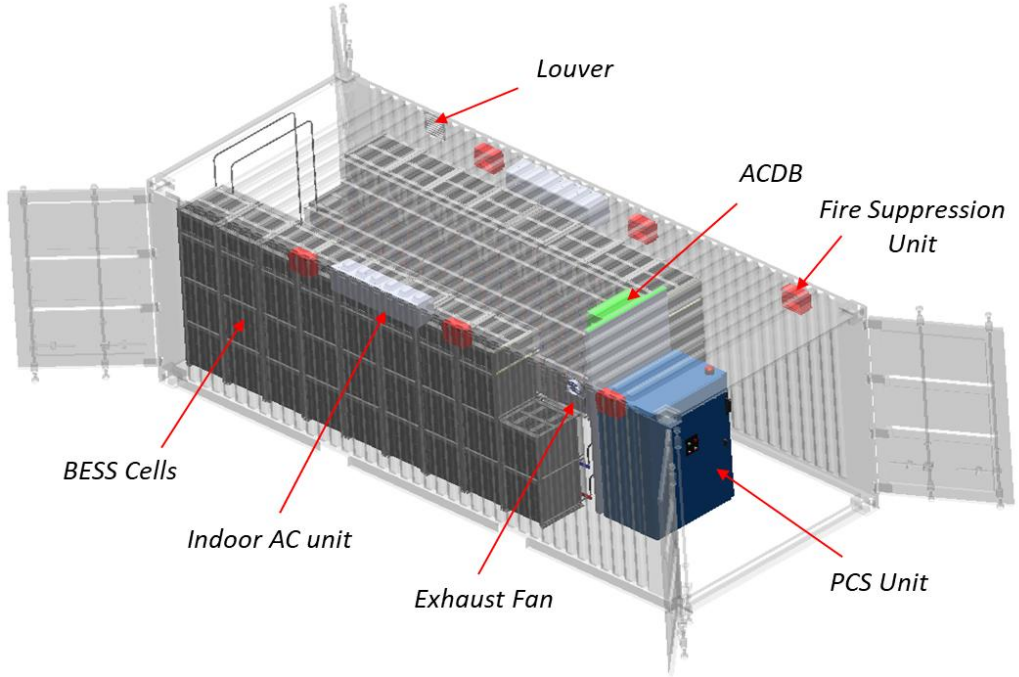
Robust plate condition

BESS Present Product Basket

Battery Type	BESS300	BESS600	BESS1000
			
Nominal voltage (V)	24V	16V	8V
Rated C10 (Ah), 1.80 Vpc, 27°C	300	600	1000
Length (mm)	635 ± 5	841 ± 5	465 ± 5
Width (mm)	568 ± 10	594 ± 10	540 ± 10
Height (mm)	385 ± 5	353 ± 5	540 ± 5
System weight (kg)	258 ± 5%	350 ± 5%	288 ± 5%
Max. Discharge Current (A)	180	360	600
Max. Charging Current (A)	90	180	300
Operating Temp. Range	0°C - 35°C		

We are offering 5 years warranty for this product range for BESS application @60% DOD

BESS Product Features



- LDES (8 Hrs): 980 KWh
- SDES (2 - 4 Hrs): 680 – 880 KWh

- LDES (8 Hrs): 470 KWh
- SDES (2 - 4 Hrs): 315 – 425 KWh

- LDES (8 Hrs): 210 KWh
- SDES (2 - 4 Hrs): 145 – 190 KWh

BESS Site - I

EXIDE

STATCON ENERGIAA

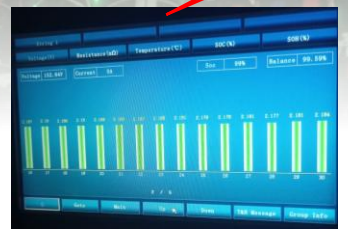
Inspire • Innovate • Implement

Application: Solar

Energy storage & back up

BESS: 40kW / 2hr

BESS Site - II



Application: Back up at Toll gates (2 Nos.) of Chennai – Surat Highway

BESS: 40kW / 2hr

Levelized Cost of Storage (LCoS)

Site: *Back up at Toll gates (2 Nos.) of Chennai – Surat Highway*

Installed: *July 2024*

Input Parameters

- *System Power: 40 kW*
- *Duration: 2 hour*
- *Nominal System Voltage: 240 V*
- *Project Life: 10 years*
- *PCS Efficiency: 94 %*

System Configuration	*80 kWh*
Round-trip Efficiency	*85%*
Cycle Life	*2500*
System Cost	*119.03 $/kWh*
RE Power Cost	*0.04 $/kWh*
Cycles per year	*365*
LCOS	***0.12 $/kWh***

Levelized Cost of Storage (LCoS)

Targeted LCoS with enhanced cycle life & Round-trip efficiency

2025-26

Input Parameters

- *System Power: 40 kW*
- *Duration: 2 hour*
- *Nominal System Voltage: 240 V*
- *Project Life: 10 years*
- *PCS Efficiency: 94 %*

System Configuration	*80 kWh*
Round-trip Efficiency	***90%***
Cycle Life	***4500***
System Cost	*119.06 $/kWh*
RE Power Cost	*0.03 $/kWh*
Cycles per year	*365*
LCOS	***0.084 $/kWh***

Other solutions offered by Exide – GEL VRLA

Harnessing the green energy

BESS Site - III

Ref. Site – Adhoura, Bihar

Typical Application Condition	
Power	15 kW
Backup Requirement	7 h
Contract Load Load per house 117 W; No. of houses - 99 nos.	11.6 kW
Battery Size	240V SG700
Footprint	10 ft container

Levelized Cost of Storage (LCoS)

Site: *Off-grid application in Adhuora village*

Installed: *2018-19*

Input Parameters

- *System Power: 15 kW*
- *Duration: 7 hour*
- *Nominal System Voltage: 240 V*
- *Project Life: 10 years*

System Configuration	*105 kWh*
Round-trip Efficiency	*75%*
Cycle Life	*1800*
System Cost	*96.38 $/kWh*
RE Power Cost	*0.04 $/kWh*
Cycles per year	*300*
LCOS	***0.13 $/kWh***

Levelized Cost of Storage (LCoS)

Targeted LCoS with enhanced cycle life & Round-trip efficiency

2025-26

Input Parameters

- *System Power: 15 kW*
- *Duration: 7 hour*
- *Nominal System Voltage: 240 V*
- *Project Life: 10 years*

System Configuration	*105 kWh*
Round-trip Efficiency	*90%*
Cycle Life	*6000*
System Cost	*106.02 $/kWh*
RE Power Cost	*0.03 $/kWh*
Cycles per year	*300*
LCOS	***0.08 $/kWh***

BESS Site - IV

CESC's First Grid Connected BESS

Exide Industries Limited in collaboration with CESC Limited has started a pilot project from Jan'2021 onwards wherein EIL is operating a 750V 420 Ah battery bank in several application modes with excellent storage efficiency and is continually operating at PSOC.

<u>East Calcutta 132kV Sub-station, Kankurgachi</u>

750V 420Ah Battery Energy Storage System
375 nos. 6OPzV 420 (C10 420Ah)

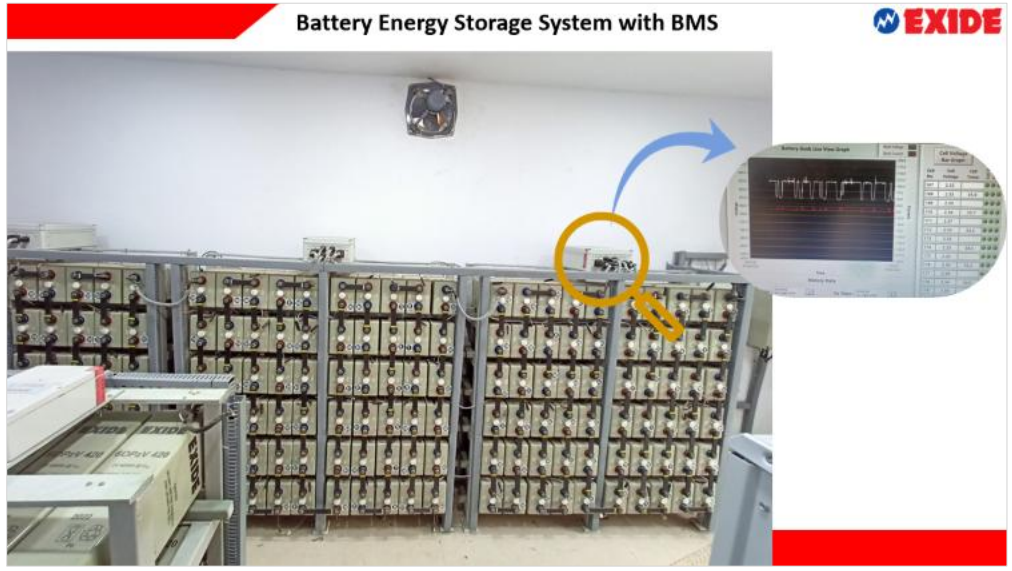
BESS Site – V

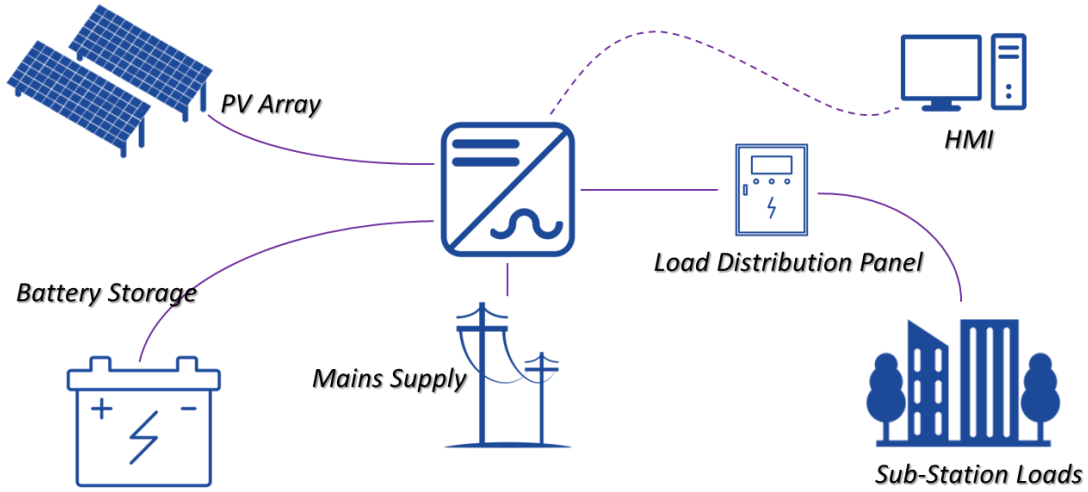
CESC, Chakmir 132kV Sub-station

***Objective:** Preventing disruption of Sub-Station loads through seamless transition between available energy sources*

- *Ensuring optimal energy mix for supply to load*
- *Provision for revenue generation from excess PV energy generation*

Battery Energy Storage System at CESC, Chakmir 132kV Sub-station



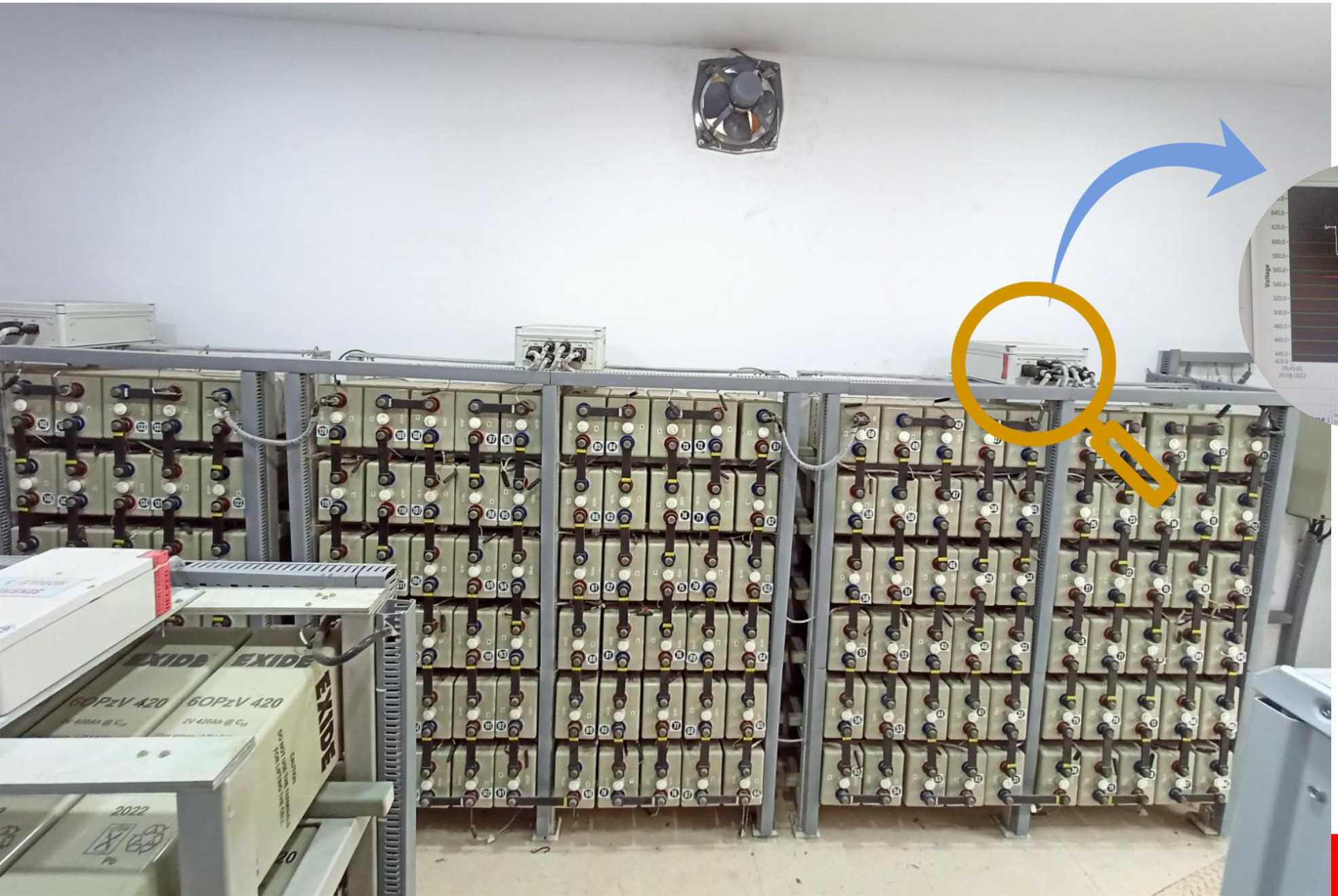


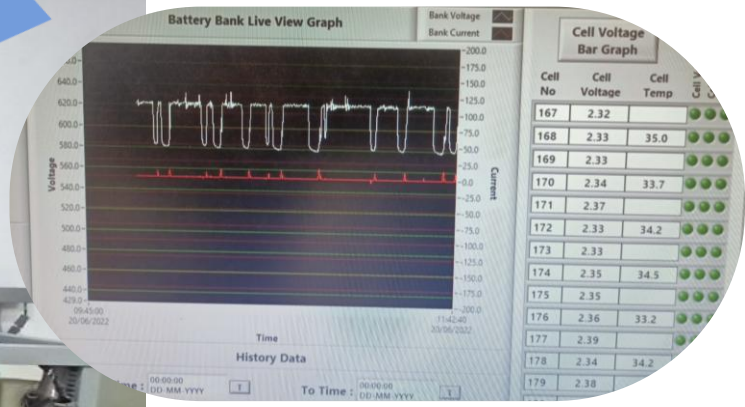
CESC Chakmir 132kV Sub-station

520V 420Ah Battery Energy Storage System
260 nos. 6OPzV 420 (C10 420Ah)

Floating PV Array

Battery Energy Storage System with BMS





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