



## **Energy Storage Solution with Lithium Ion Battery**

**Stationary Applications**

**Exicom Telesystems Ltd.**





## Naveen Sharma, Business Head, Exicom Tele-systems

Naveen has built and runs the the core business of Telecom and Energy Storage Solutions from scratch. He is associated with Exicom for the last 10 years.

# Exicom – Business Verticals

**Stationary ESS Solutions**



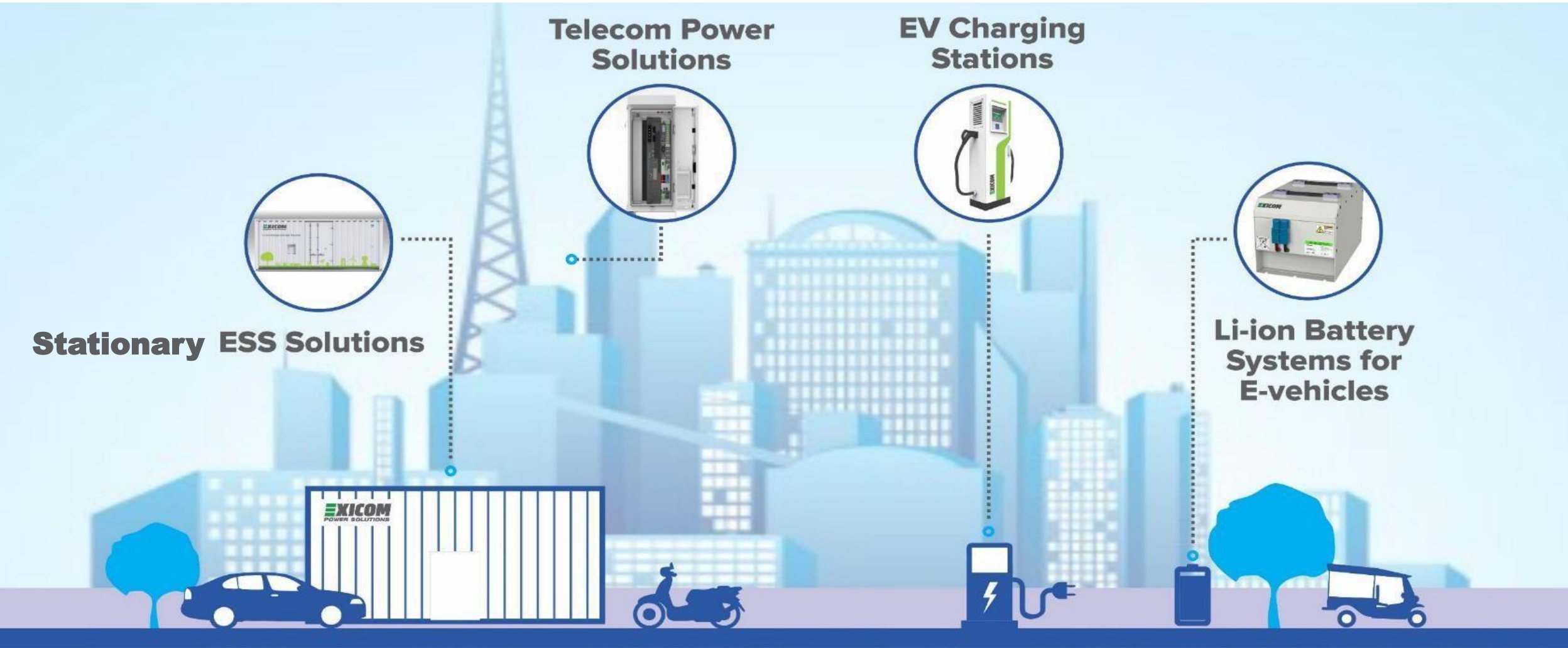
**Telecom Power Solutions**



**EV Charging Stations**



**Li-ion Battery Systems for E-vehicles**



# Product spectrum—Stationary Energy Storage Solutions

## Low voltage (24–72V)

- Telecom
- Small-scale commercial and industrial applications
- Low voltage extended back up solutions
- Automatic Guided Vehicle (AGV)



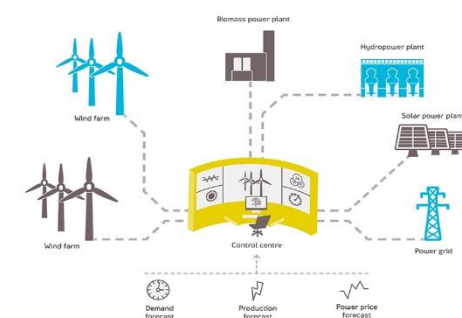
## Mid voltage (300–600V)

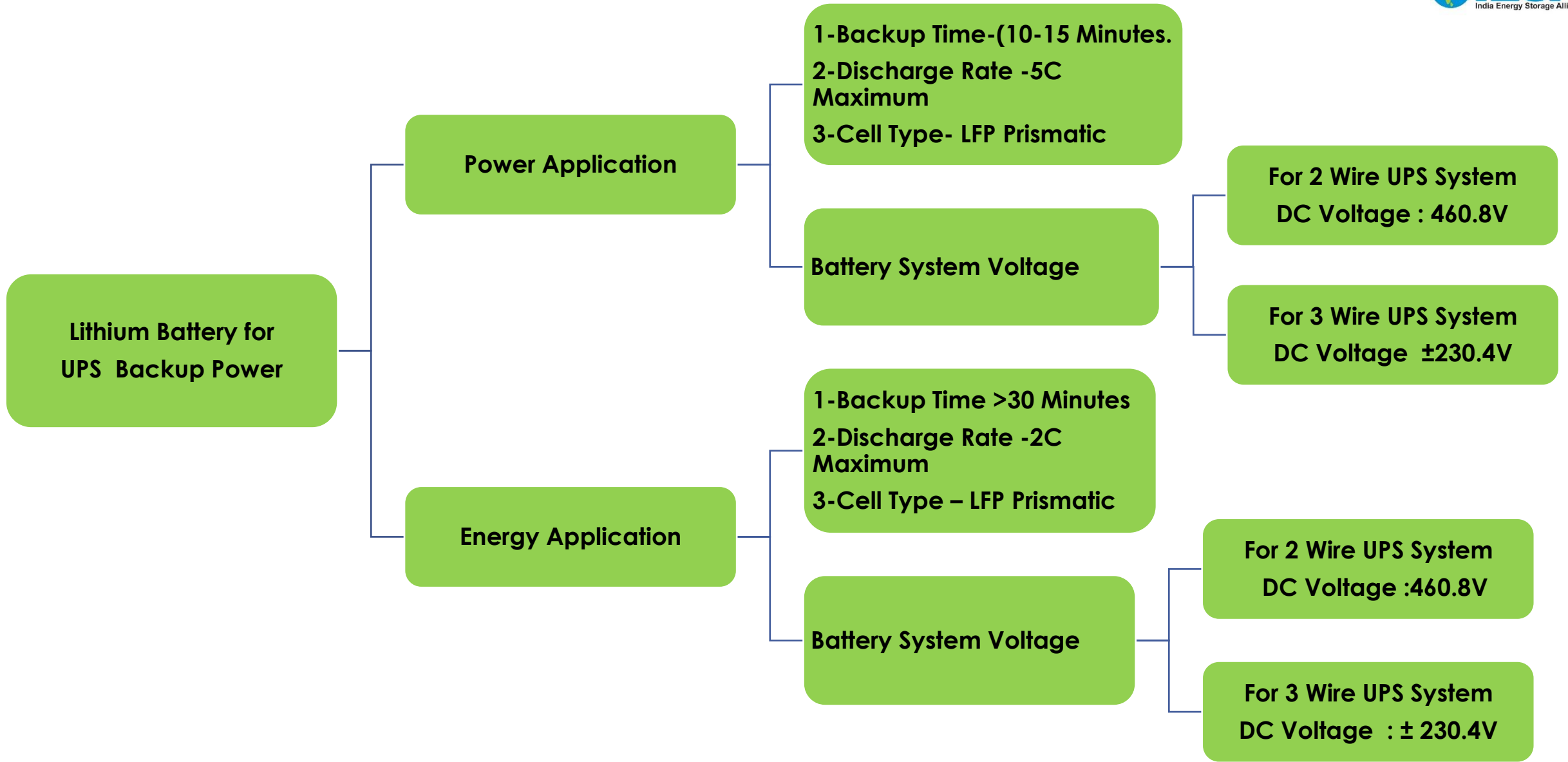
- UPS applications
- Data center applications
- Commercial and industrial applications
- Industrial UPS Segments



## High voltage (600–1500V)

- Renewable Energy Storage
- Large-scale Grid-connected commercial & industrial projects
- Demand-supply applications







# Battery System Architecture (G1)

## Multiple Battery Rack

Details	Module with Energy Cell /Power Cell
Nominal (rated) voltage	76.8V
Voltage range	67.2–86.4V
Module capacity	100AH/50Ah
Nominal energy	7.68 KWh / 3.84KWh
Connection method/cell quantity	24S1P/24
Cycle life @25°C	3,500 @ 80% DOD
Operating temperature	Charge: 0°C to +55°C, Discharge: -20°C to +55°C
Communication	Can Bus /RS-485

## Battery system architecture and features of battery modules

### Battery Rack



**Up to 10 Battery Rack ( 460.8KWh ) can be connected in Parallel**

### Battery Module

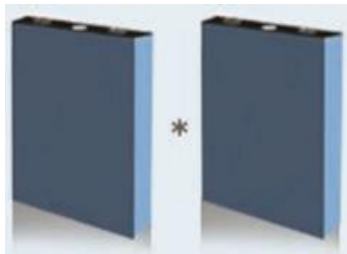


**Rack content 6 battery module (144S1P)**

Energy: 46.08KWh (460.8V/100Ah) For 30 Min Backup

Energy: 23.04KWh (460.8V/50Ah) For 15 Min Backup

### Battery Cell



#### LFP Prismatic Cell

3.2V/100 Ah-Power Application

3.2V/100 Ah-Energy Application

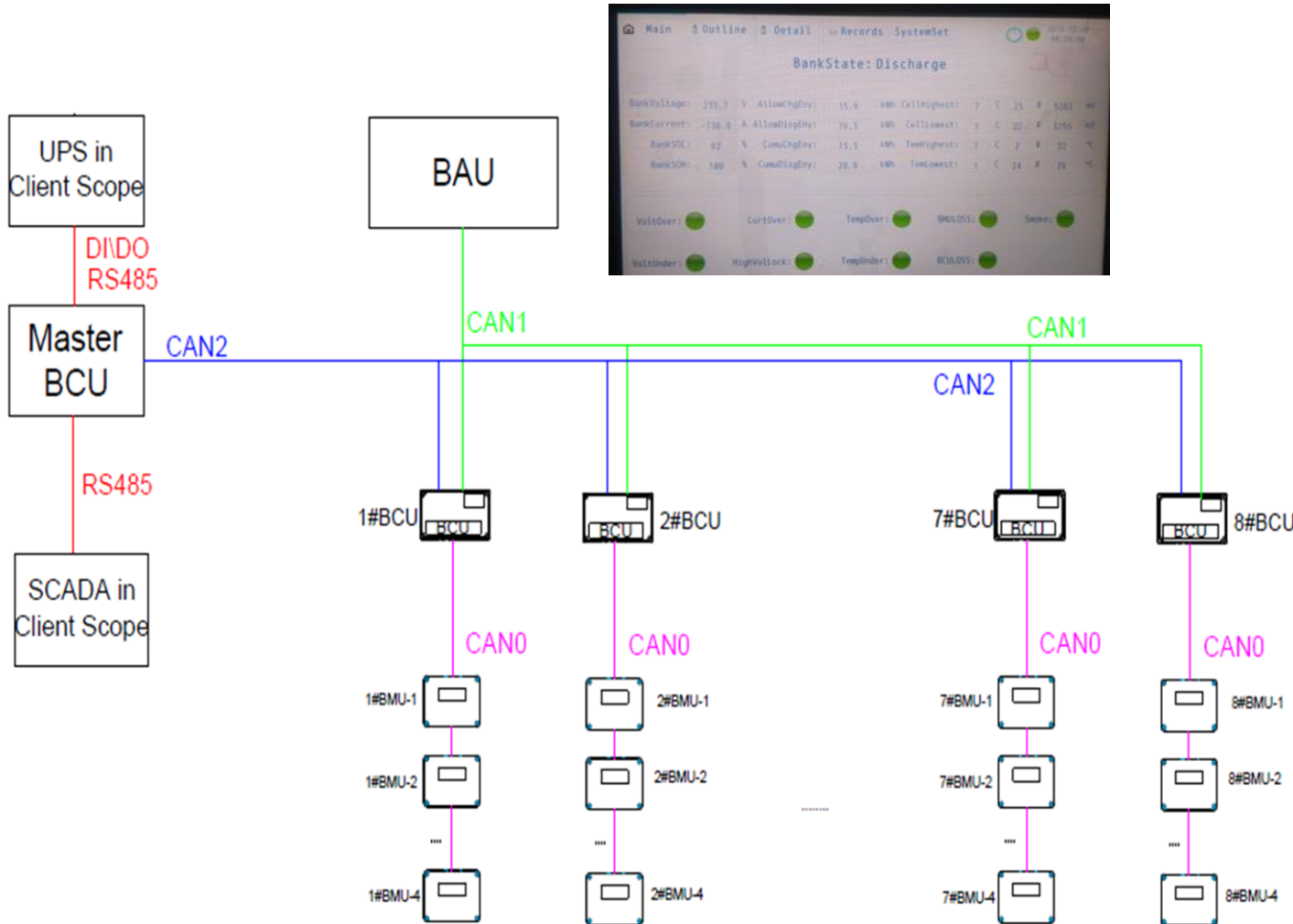
**Module Connection : (24S1P)**

**Capacity : 100Ah**

**Voltage : 76.8V**

**Energy : 7.68KWh**

# Battery Management System Architecture – G1



## BMS DETAILS:

### Layer-1: Master BCU:

- Master BCU communicate with Cabinet BCU and UPS Controller to control the Charge /Discharge functions.

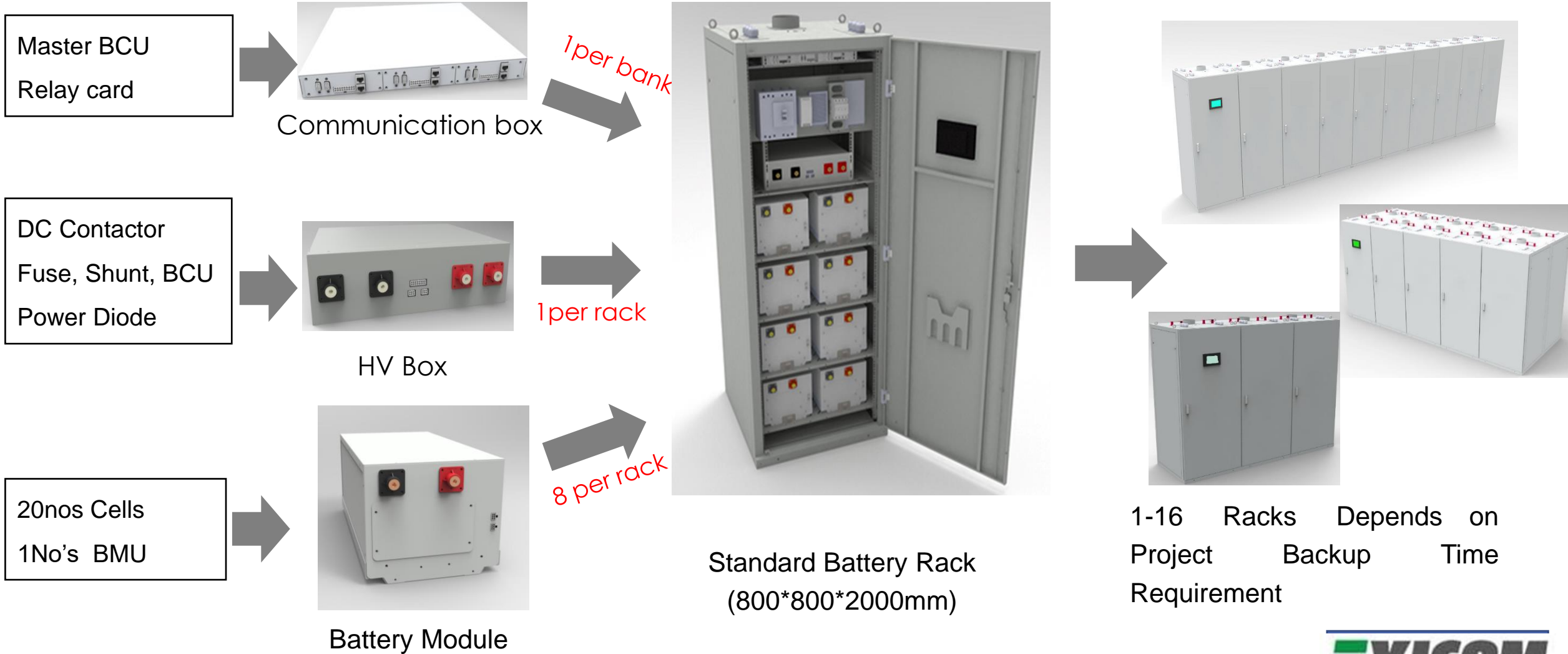
### Layer-2: BCU:

- Detection of Charge/Discharge.
- Fault Diagnosis and protection system control.
- Voltage and Current Measure,
- SOC and SOH Calculation,
- Data communication with BAU;

### Layer-3: BMU

- Cell Voltage and Temperature Measurement
- Cell Balance Management

# 2nd Generation Battery System Architecture (G2)





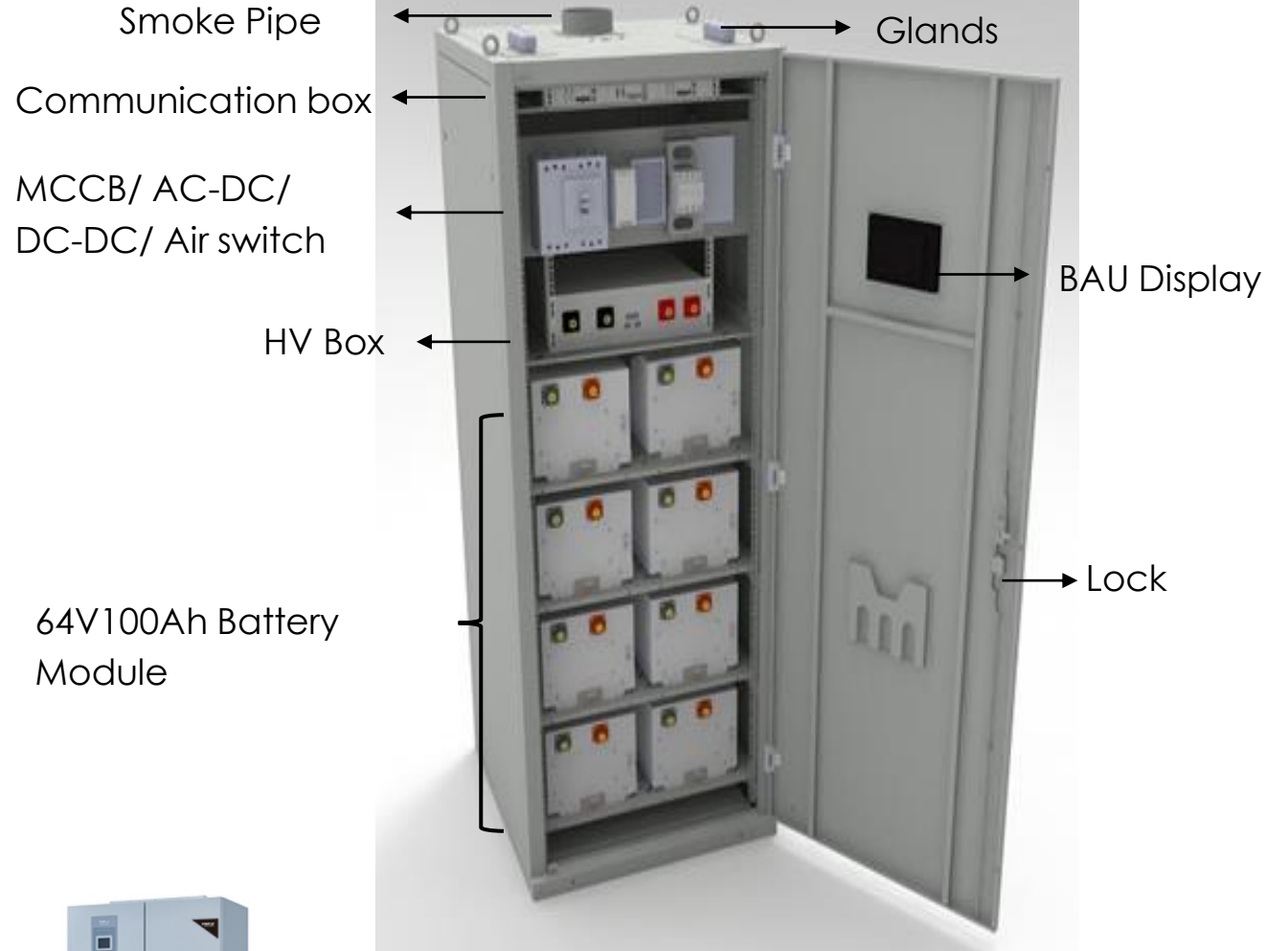
# Standard Battery System – G2

## Standard Battery Module

- Nominal Voltage : 64V
- Nominal Energy : 6,400 Wh
- Cell : LFP 3.2V/105AH
- Configuration : 20S1P cell

## Standard Battery Cabinet

- Nominal Voltage : 512V/ ± 256V
- Nominal Energy : 51.2 kWh
- Configuration : 8S1P module
- Maximum Discharge : 120-150 kW



Without DAM Board / Front Cover



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Powering Business Worldwide



**DELTA**



**Schneider Electric**



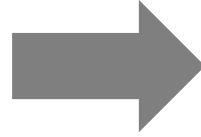
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We drive industry

**XICOM**  
POWER SOLUTIONS

# Battery Module Transformation from G1 to G2



G1 Battery Module



G2 Battery Module

Parameter	G1 Battery Module	G2 Battery Module
No of Cell	24 Cells	20 Cells
Temperature Sensor	8 No's	20 No's
Voltage/Capacity	76.8V/100Ah	64V/100Ah
Dimension	480.8*504.8*265.9 mm	310*616*274.5 mm
Weight	68Kg	58Kg
Terminal	Plug Type	Screw Type
Energy/Module	7.68KWh	6.4KWh

# Battery Rack Transformation from G1 to G2

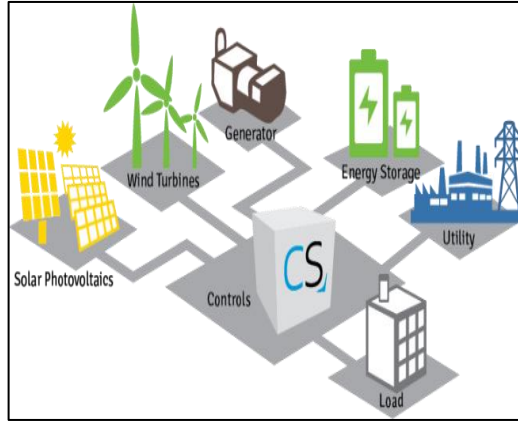


## G1 Battery Cabinet

## G2 Battery Cabinet

Dimension (W*D*H)	600*800*2200mm	800*800*2000mm
Module Quantity	6 No's	8No's
String Compatibility	Either support 460V(2Wire) or $\pm 230V$ (3Wire) system	Support Both 512V( 2 Wire) & $\pm 256V$ ( 3 Wire )
Total Energy/Cabinet	46.08KWh	51.2Kwh
Installation/Maintenance	(2.2m, Need forklift)	Easy (battery module 1.5m)
Safety	Without Dam Board	With Dam Board
Cable Entry	Top	Top
Material	<b>SGCC (Steel Galvanized Cold Common)</b>	

# Various applications/use cases of Exicom 'S Grid ESS



## Black start

- Ramping control
- Time shifting
- Capacity firming
- Diesel offset
- Frequency regulation (Primary Control Reserve)
- Peak load management

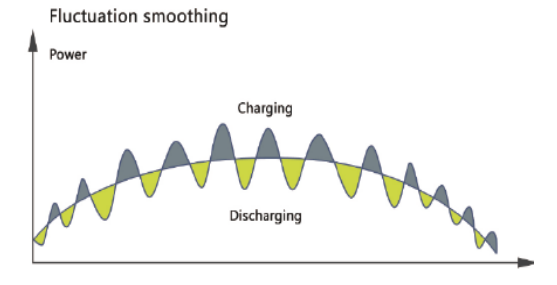
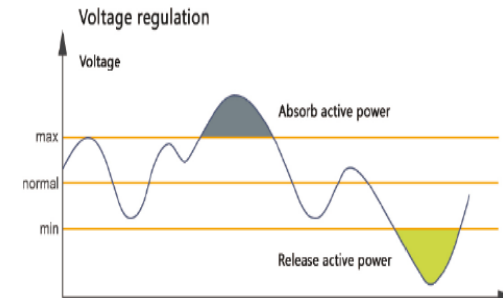
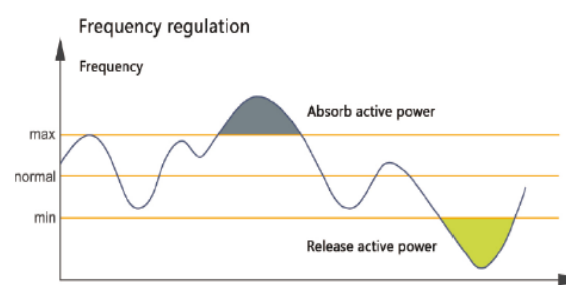
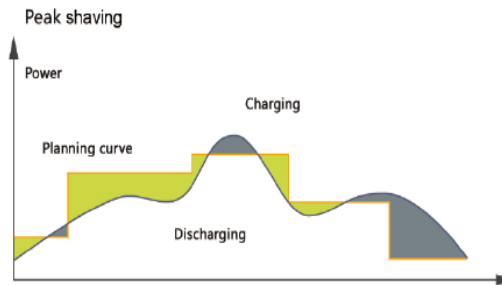
## Black start

- Backup energy
- Diesel offset
- Peak load saving

## Ramping control

- Time shifting
- Capacity firming

- Peak load management
- Ramping control
- PV Smoothing



PGCIL Project – First two projects of this kind executed by Exicom in JV

500 KW Li ion BESS project executed in JV for PGCIL catering to frequency/voltage regulation

- Two battery Energy Storage Systems for Frequency and Voltage regulation
- 500KW for 30min Lithium ion Battery Solutions
  - 10 years life with 4,000 cycles
  - 90% DC-DC round trip efficiency
  - Charging rate: 3 Hrs from rated DoD to fully capacity
  - 2P6S configuration of 80Ah 3.2V cells and 36 such modules in series making 690V per string and 4 such string in parallel making 398KWH
- 500KW for 30min Advanced Lead Acid Battery Solution





## Exicom Energy Storage Experience—BHEL 100KW/300KWh Energy Storage System

### Need:

- 300Wh Grid Connected BESS for Solar PV smoothening, Energy Time Shift
- Frequency regulation - Voltage support - Capacity firming

### Project details:

- Advanced Lead Acid batteries (Lead Carbon Chemistry)
- Deployment – Operational from August 2018

### Exicom scope:

- Supply of 300KWh Advanced lead Acid Battery Bank of requisite chemistry
- Battery Monitoring System (BMS of 720V)
- Container
- Hydrogen sensor
- Invertor transformer
- Local HMI

100 KW/300 KWh grid connected BESS project for BHEL for frequency regulation and voltage support



## Exicom Energy Storage Experience—CEL Advanced Lead Acid BESS Project

### Need:

- 25KWh Grid Connected Battery Bank for UPS application
- Frequency regulation - Voltage support - Capacity firming

### Project details:

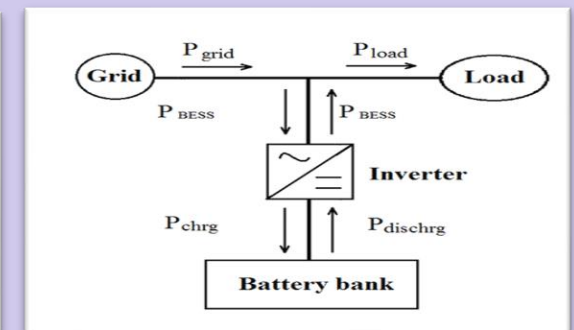
- Advanced Lead Acid batteries
- Installed in 2017

### Exicom scope:

- Supply of 25KWh Advanced lead Acid Battery Bank + 30KVA Indoor Invertor
- DC contactors, AC circuit breakers
- Invertor transformer
- Local HMI



25 KWh Advanced Lead Acid BESS project for CEL for voltage support and capacity firming



# ESS Deployments at a glance

S. No.	ESS Category	Application	UPS/PCS	Installed Kwh	Locations
1.	Low Voltage	Robotic App.	-	1.6 Kwh	Chennai
2.	Low Voltage	Robotic App.	-	2.4 Kwh	Chennai
3.	Low Voltage	Robotic App.	-	3.2 Kwh	Chennai
4.	Low Voltage	Hybrid Solar Inverter App.	-	3.6Kwh	Bangalore
5.	Low Voltage	Hybrid Solar Inverter App.	-	192.0Kwh	Nasik
6.	Low Voltage	Hybrid Solar Inverter App.	-	38.00Kwh	Agra
<b>7.</b>	<b>Low Voltage</b>	<b>Telecom Application</b>	-	<b>1500 Mwh</b>	<b>PAN India</b>
8.	Medium Voltage	Data Centre	600 KVA x 3	900 Kwh	Hyderabad
9.	Medium Voltage	Data Centre	600 KVA x 3	900 Kwh	Hyderabad
10.	Medium Voltage	Data Centre	250 KVA x 3	375 Kwh	Chennai
11.	Medium Voltage	Data Centre	75 KVA x 2	92.16 KWh	Lucknow
12.	Medium Voltage	Data Centre	75 KVA x 2	92.16 KWh	Gujarat
13.	Medium Voltage	Data Centre	75 KVA x 2	92.16 KWh	Mumbai
14.	Medium Voltage	Data Centre	75 KVA x 2	92.16 KWh	Kolkata
15.	Medium Voltage	Data Centre	75 KVA x 4	184.32 Kwh	Bhopal
16.	Medium Voltage	Data Centre	75 KVA x 2	92.16 Kwh	Howrah
17.	Medium Voltage	Data Centre	75 KVA x 4	184.32 Kwh	Mohali
18.	Medium Voltage	Data Centre	75 KVA x 4	184.32 Kwh	Ranchi
19.	Medium Voltage	Data Centre	75 KVA x 2	92.16 Kwh	Lucknow



# ESS Deployments at a glance

S. No.	ESS Category	Application	UPS/PCS	Installed Kwh	Locations
20.	Medium Voltage	Data Centre	75 KVA x 2	92.16 Kwh	Chennai
21.	Medium Voltage	Data Centre	75 KVA x 2	92.16 Kwh	Madurai
22.	Medium Voltage	Data Centre	250 KVA x 2	276.48 Kwh	Mangalore
23.	Medium Voltage	Data Centre	250 KVA x 2	276.48 Kwh	Chennai
24.	Medium Voltage	Data Centre	250 KVA x 2	276.48 Kwh	Mumbai
25.	Medium Voltage	Data Centre	250 KVA x 3	414.72 Kwh	Pondicherry
26.	Medium Voltage	C&I	600 KVA x 6	966 Kwh	Hyderabad
27.	Medium Voltage	C&I	600 KVA x 4	644 Kwh	Hyderabad
28.	Medium Voltage	Data Centre	240 KVA x 6	608.16 Kwh	Chennai
29.	Medium Voltage	Data Centre	240 KVA x 2	202.72 Kwh	Mumbai
30.	Medium Voltage	Data Centre	80 KVA x 1	46.08 Kwh	Gurgaon
31.	Medium Voltage	Grid Connected App.	25 KVA x 1	30 Kwh	Sahibabad
32.	High Voltage	Micro-grid App.	500KW x 1	250.00 Kwh	Pondicherry
33.	High Voltage	Micro-grid App.	500KW x 1	250.00 Kwh	Pondicherry
34.	High Voltage	Micro-grid App.	100KW x 1	300.00 Kwh	Hyderabad
35.	High Voltage	Electric Vehicle	20Kw x 1	19.2 Kwh	Bangalore
<b>Total Capacity Installed</b>				<b>1510 Mwh</b>	





## Battery Repairing Centre

- ❑ State of the art repair facility for PAN India deployment.
- ❑ The current facility is capable of having BMS & Cell level repair.
- ❑ The facility equipped with all world class equipment's like cell Charger/discharger, Module charger/discharger, BMS Automatic test setup and all kind of power equipment's.
- ❑ The Current facility is equipped to handle a repair and return of 1000 pack/month.
- ❑ Current facility having cell balancing/Module Balancing/ String Balancing features are available hence practically a mini facility.



## PAN India Support

Exicom has created a Dedicated Technical Helpdesk **Toll free:18001035845** for their Battery division vertical:

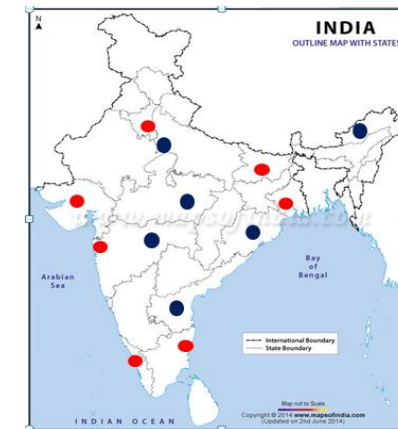
- ❑ Extend On line technical support to it's customer so to rectify the problem through ON- Line solutions.
- ❑ Logging their complaints for ON Site Support.
- ❑ Presence of more than 160 manpower at PAN India locations to provide onsite support .
- ❑ Progress report shared on daily basis in order to solve the problems.

### North:

- ✓ Delhi NCR
- ✓ UP East
- ✓ UP West
- ✓ Haryana
- ✓ Punjab
- ✓ Rajasthan

### South:

- ✓ Kerala
- ✓ AP
- ✓ Karnataka
- ✓ Chennai



### West:

- ✓ Mumbai
- ✓ Maharashtra
- ✓ Gujarat

### East:

- ✓ Bihar & Jharkhand
- ✓ Kolkata
- ✓ ROB



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Presented By: Naveen Sharma  
Designation: V.P.- ESS  
Mail: [naveen.sharma@exicom.in](mailto:naveen.sharma@exicom.in)

**Contact us:**

India Energy Storage Alliance  
C/o Customized Energy Solutions  
A-501, GO Square, Aundh  
Hinjewadi Link Road, Wakad  
Pune -411057, Maharashtra, India  
Phone: 91-20-32407682  
Mail: [contact@indiaesa.info](mailto:contact@indiaesa.info)  
Website: [www.indiaesa.info](http://www.indiaesa.info)

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