


# Promising Energy Storage Options

Ketan Chitnis

**Topics covered**

- Application Areas – Grid Services
- Distributed ESS
- Building Blocks for ESS – Small DES
- LeBlock Solution for Grid scale ESS.

- Arbitrage
- Asset life extension (T&D)
- AT&C loss reduction
- Black start
- Demand response
- Diesel displacement
- Peak shaving

- Grid congestion relief
- Power smoothing
- Ramp rate control
- Seamless power backup
- VAR control
- Frequency & voltage regulation

## Applications of ESS

### Grid services

- T&D deferral
- Peaker substitution
- Arbitrage
- Frequency regulation
- Voltage & reactive power regulation
- Ramp rate control
- Black start
- Grid congestion relief

### Micro grid

- Diesel displacement
- Island operation
- Ramp rate control
- Hybrid generation control

### Off grid

- Independence
- Power availability
- Hybrid generation control

### Virtual Power Plant

- Aggregation of decentralized sources
- Peak delivery
- Load-aware power generation
- Arbitrage
- Energy trading
- Remote control

### Demand management

- Demand response
- Load shifting
- Demand charge reduction

### Residential ESS

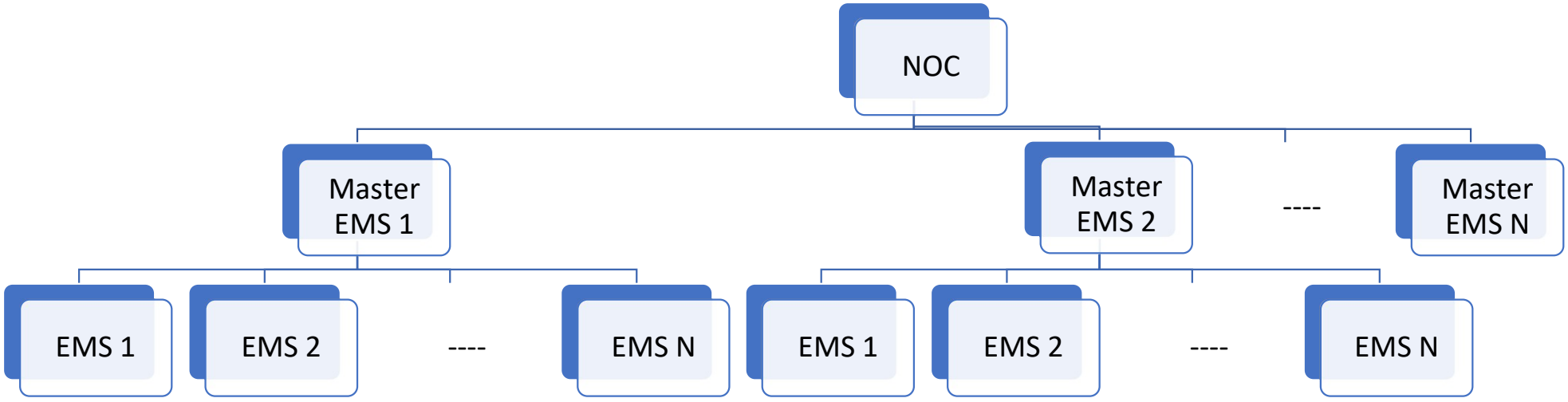
- Self-consumption
- Back-up / UPS
- Energy cost management
- Smart Grid integration
- Vehicle to Grid

nexcharge
Exide Leclanche Energy Private Limited

# Distributed Energy Storage (DES)

The Indian Electricity Grid Code (IEGC) 2010 defines ancillary services in power system as “services necessary to support the power system (or grid) operation in maintaining power quality, reliability and security of grid. With stricter framework including ancillary services through FRAS and governance, the frequency remains in the acceptable band to a large extent, but still, it remains over and above the upper limit of 50.05Hz for around 25% times. T&D network upgradation can also be deferred with the use of BESS.

## DES Architecture




# Project Introduction - Solution:

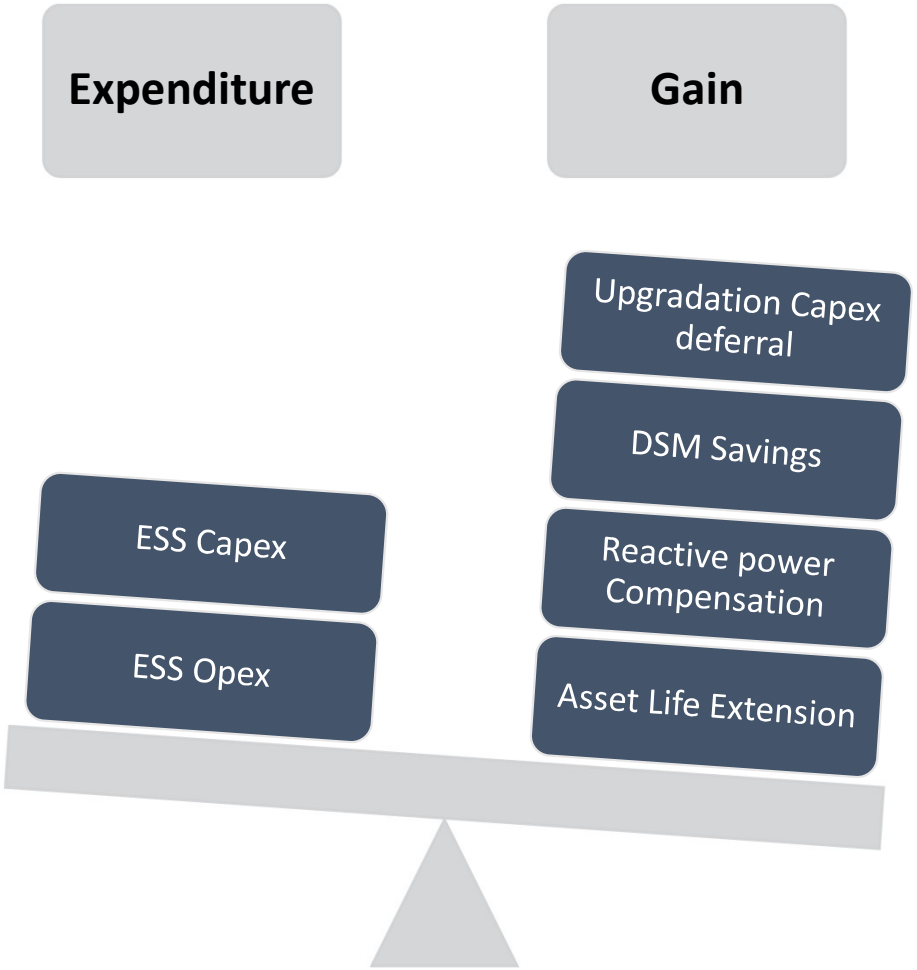
- **Project : Community Energy**
- **Storage System (CESS)**
- **Location : Delhi, India**
- **Rating : 150 kW / 528 kWh**
- **Status : Commissioned**
- **COD : In operation**
- **Scope : Turn-key EPC Contract**

# Applications

CESS System of 250kW/ 528kWh was provided at Tata Power DDL Sub-station for following applications required by TPDDL:

- Deviation settlement mechanism (DSM) loss minimization
- Peak shaving
- Privileged services to preferential consumers
- Frequency and voltage regulation
- Basic Building Block of the Distributed ESS

# Financial Net worth




- Deviation Settlement Mechanism
  - Savings on the penalties levied for under/ over draw.
- CAPEX deferral on the upgradation for peak capacity.
  - Savings of upgradation of equipment and infra
- Asset life extension due to optimal load utilization.
  - Savings due to increase in equipment life
- AT&C loss reduction calculation
  - Savings due to loss reduction

# NEXCHARGE MICROGRID & DES SOLUTION

Microgrid have traditionally relied on diesel generators for electric power, but with inclusion of renewable (Solar PV or Wind) energy, their dependence of diesel fuel decreases, however an Energy Storage System must be included with renewables to get maximum contribution from renewable energy.

Lithium-ion (Li-ion) batteries are the most suitable solution available for Energy Storage System because of high energy density that enables bigger systems to be deployed with a compact footprint.

## Application - DG Offset

BESS independently or with Solar PV can be used to offset the use of diesel generators up to a great extent. It helps in reducing the air pollution & noise pollution along with the reduction in levelized cost of energy for customer.

## Application – Island operation

In case of Grid unavailability/ outage BESS system can form an island grid and provide reference voltage & frequency for other sources (like Solar PV) to function.

## Application – Frequency & Voltage stabilization

BESS is connected to Grid and charge/ discharge based on an algorithm to keep grid frequency and voltage within desired ranges.

## Application – Spinning reserve

BESS can quickly respond to the variation in load on utility and enables generators to work at optimum level without the need to keep the idle capacity for spinning reserve.

## Application - T&D deferral

Enable deferral of utility investments by using relatively small amounts of storage for Congestion relief. This will also increase the life of infrastructure (ex. Transformer, distribution network etc.) by reducing the loading on them.

Capacity: 76.8 KWh
Chemistry : LFP
Inbuilt HVAC & Fire suppression

# LeBlock™

Intelligent Energy Integrated by Leclanché

ees AWARD 2021 FINALIST

Modular

Simplified logistic

Fast installation on site

Easy augmentation

Lower TCO

Minimal environmental footprint

Leclanché Energy Storage Solutions







nexcharge Exide Leclanche Energy Private Limited

# Different Blocks to build LeBlock™


**BatteryBlock**

- High density lithium-ion batteries including fire suppression system.
- 744 kWh with LFP technology.

**CombiBlock**

- Interconnection and protection of the batteries
- High efficiency temperature management for the batteries

Leclanché
Energy Storage Solutions



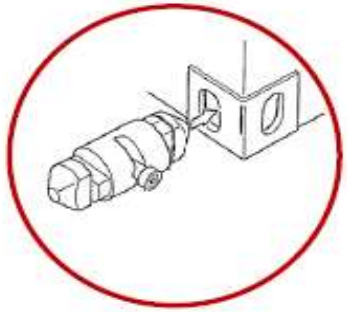




nexcharge
Exide Leclanche Energy Private Limited

# LeBlock™: Transportable as an ISO Container

- 4 Blocks interconnected becomes a 20-ft ISO container (ISO 668 - 1CCC)
- Connection with proven Intermediate Twistlocks
- Corner fittings and strength standardized by international standardization organization (ISO)
- Equipped with valid CSC safety approval plate



Leclanché
Energy Storage Solutions

 - Slide 7





nexcharge
Exide Leclanche Energy Private Limited



Leclanché Energy Storage Solutions



nexcharge Exide Leclanche Energy Private Limited

LeBlock™
Intelligent Energy Integrated by Leclanché

# Our Approach to Safety

**Fire Resistant Construction**
Enclosure walls with 90-minute fire rating with lockable doors and door sensors ensure safe operation by personnel.

**Fire Detection & Suppression System**
Gas, smoke and heat detection with automatic activation to detect and suppress a fire before it spreads to cells.

**Emergency Stop Function**
Controlled shutdown is automatically triggered by internal safety features and battery anomalies detected by the Leclanche EMS. A manual E-Stop can also be performed by operators or first responders.

**Isolation Monitoring**
Isolation monitoring on each DC busbar to detect faults and safely disconnect the batteries before a serious problem occurs.

**Deflagration Panel**
Each battery block is equipped with a Deflagration Panel to direct the force of any internal pressure upwards.

**Certificaton**
The LeBlock concept is designed to meet UL and IEC standards.
The system is certified UN38.3, UL9540A, IEC62933, NFPA 855, NFPA 68 and more.

Leclanché
Energy Storage Solutions







nexcharge
Exide Leclanche Energy Private Limited


## Thanks for connecting

**You can ask me questions and I shall be happy to answer. You may reach me on mail or phone.**

Ketan Chitnis
VP Stationary BU
Exide Leclanche Energy Pvt Ltd
ketan.chitnis@exideleclanche.com
+91-9833843355





nexcharge
Exide Leclanche Energy Private Limited