

Energy Box Solution Introduction

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Key Technologies for ESS

Safety, energy conversion efficiency, cost, life, specific energy, power, maintainability, environment-friendly

Key Technologies for ESS

Battery Storage System

- Storage Batteries
- Grouping Technology
- Battery Management System
- Thermal Management System

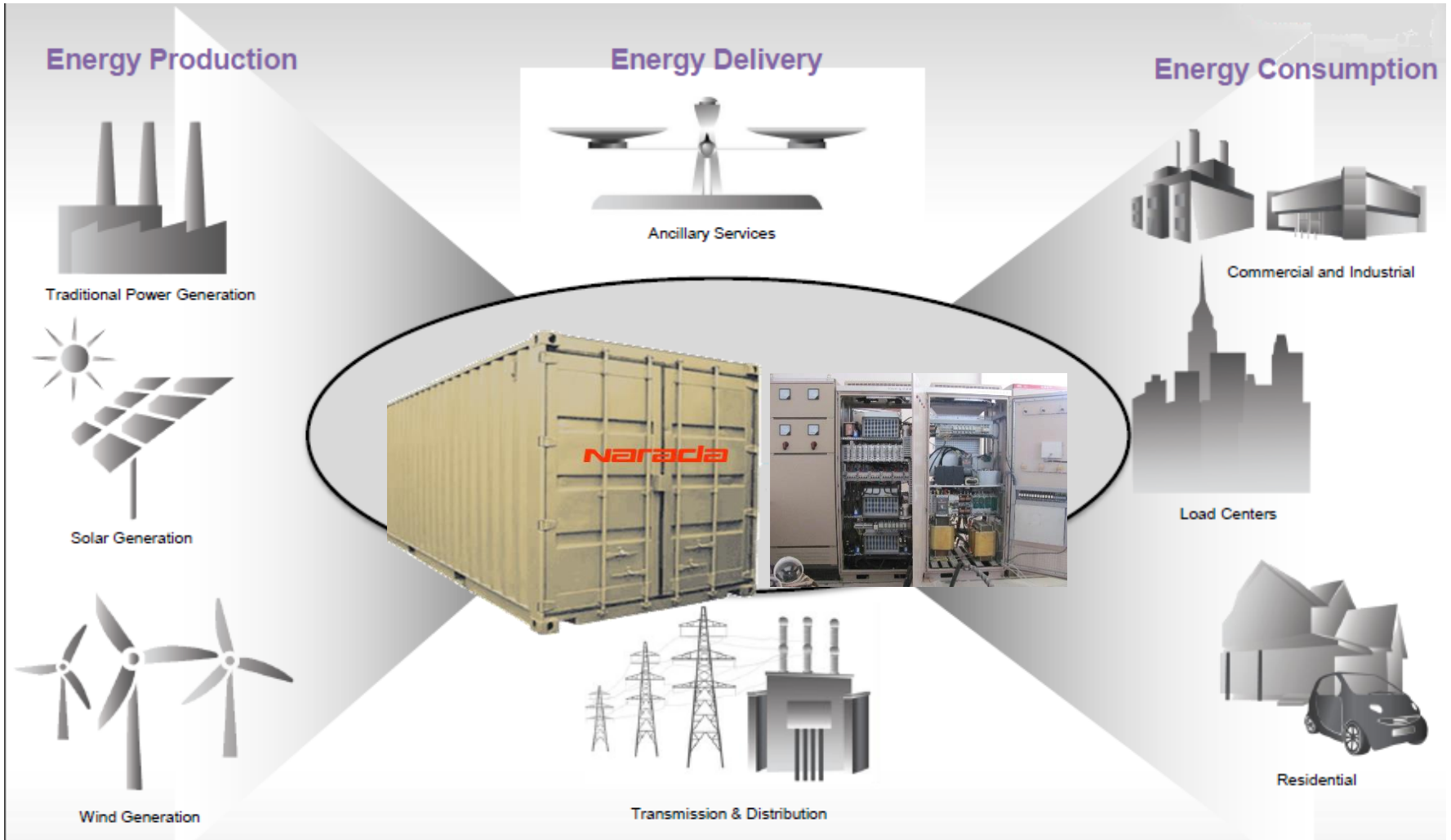
Energy Conversion System

- Charger & Inverters
- Energy Management system
- Load management system
- Remote monitoring system

Monitoring & Control

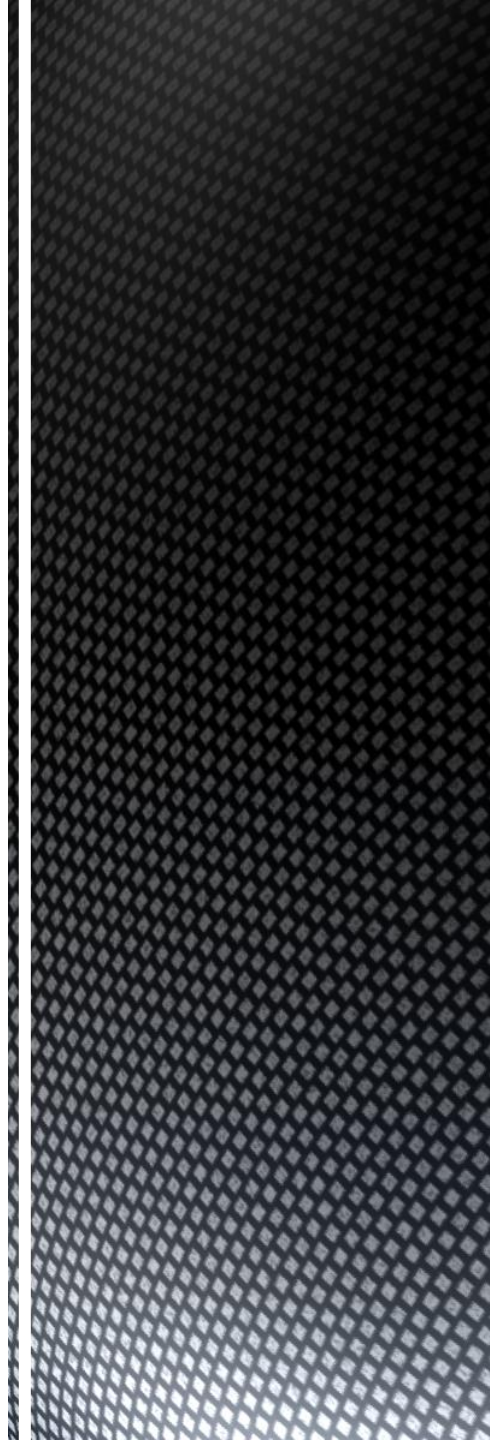
- Control
- Monitoring
- Security/ Alert
- Anti Theft
- Power Status

EES- Core of Smart Grid

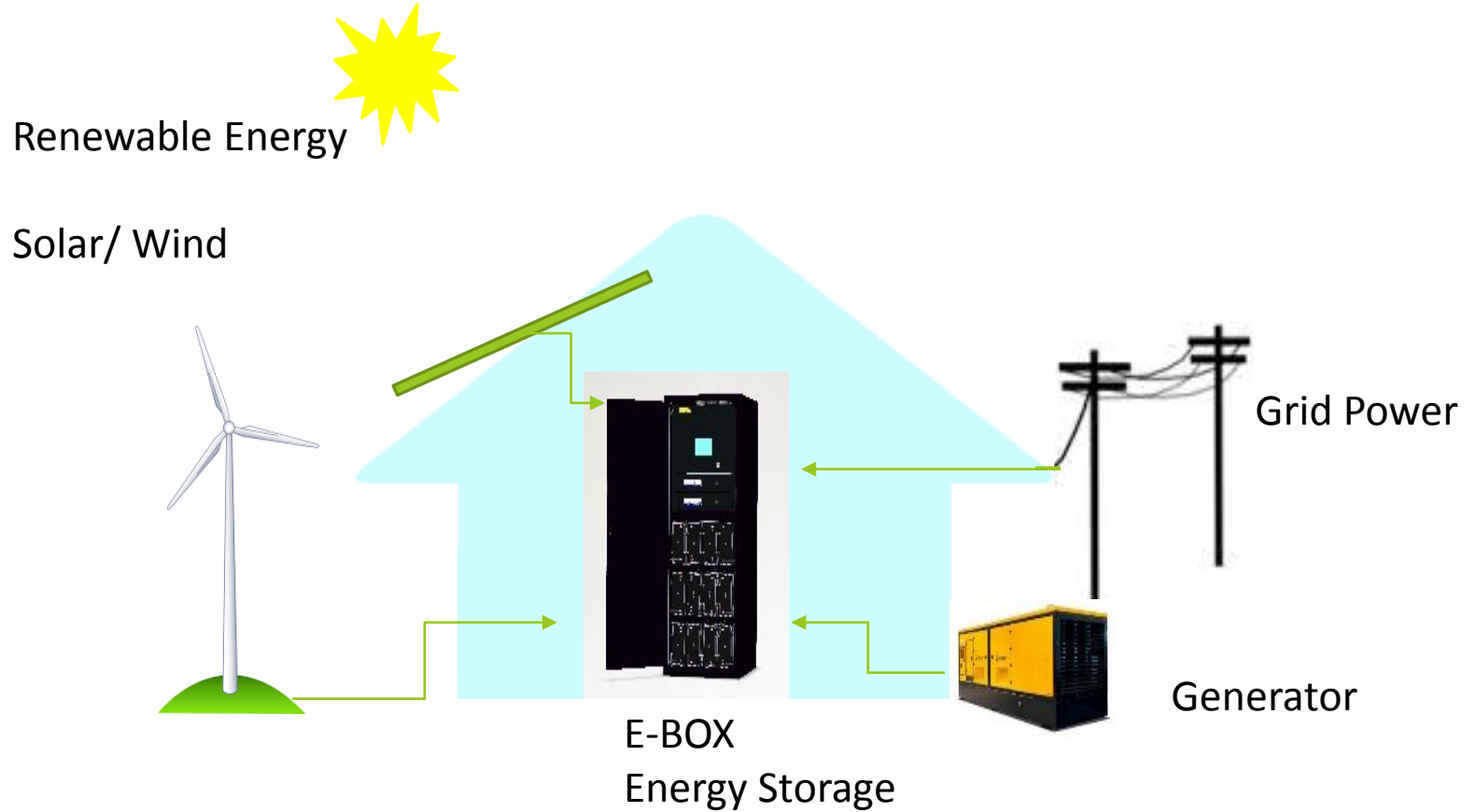


E-Box System

Modular Energy Storage System for
Telecommunication & Base Transceiver
Station



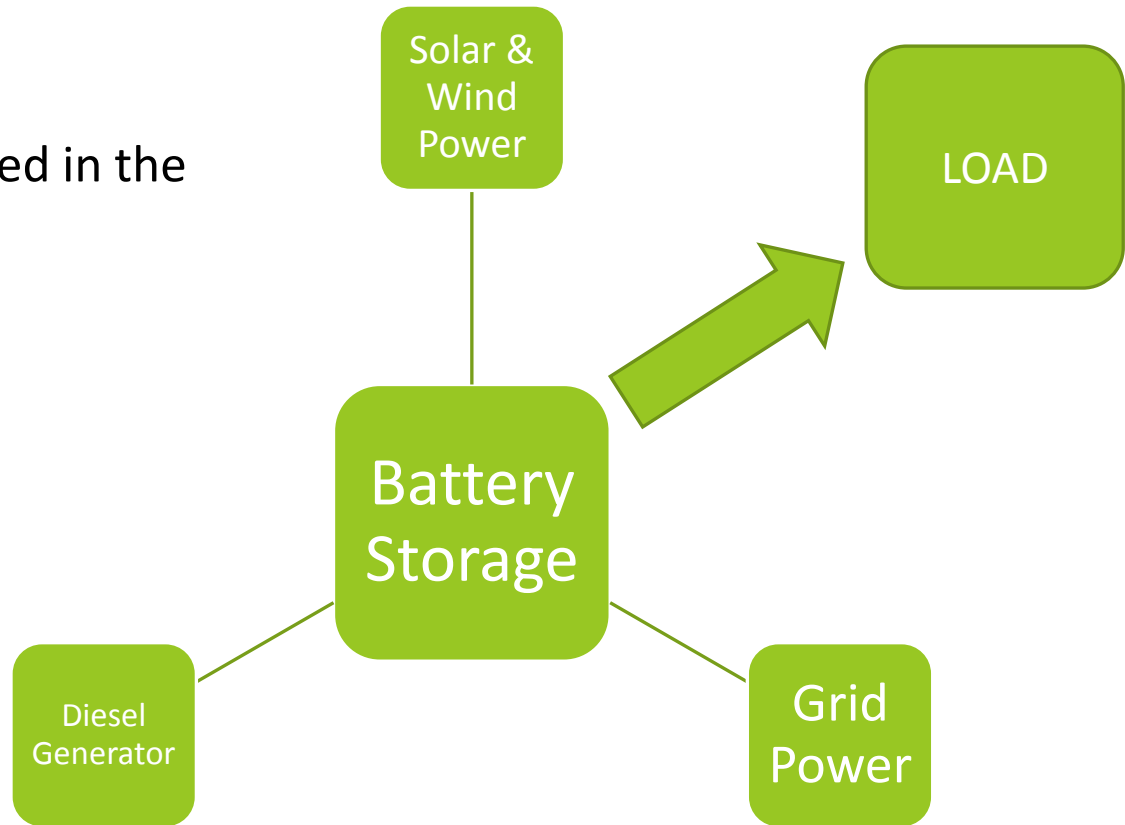
E-Box Hybrid Energy Solution



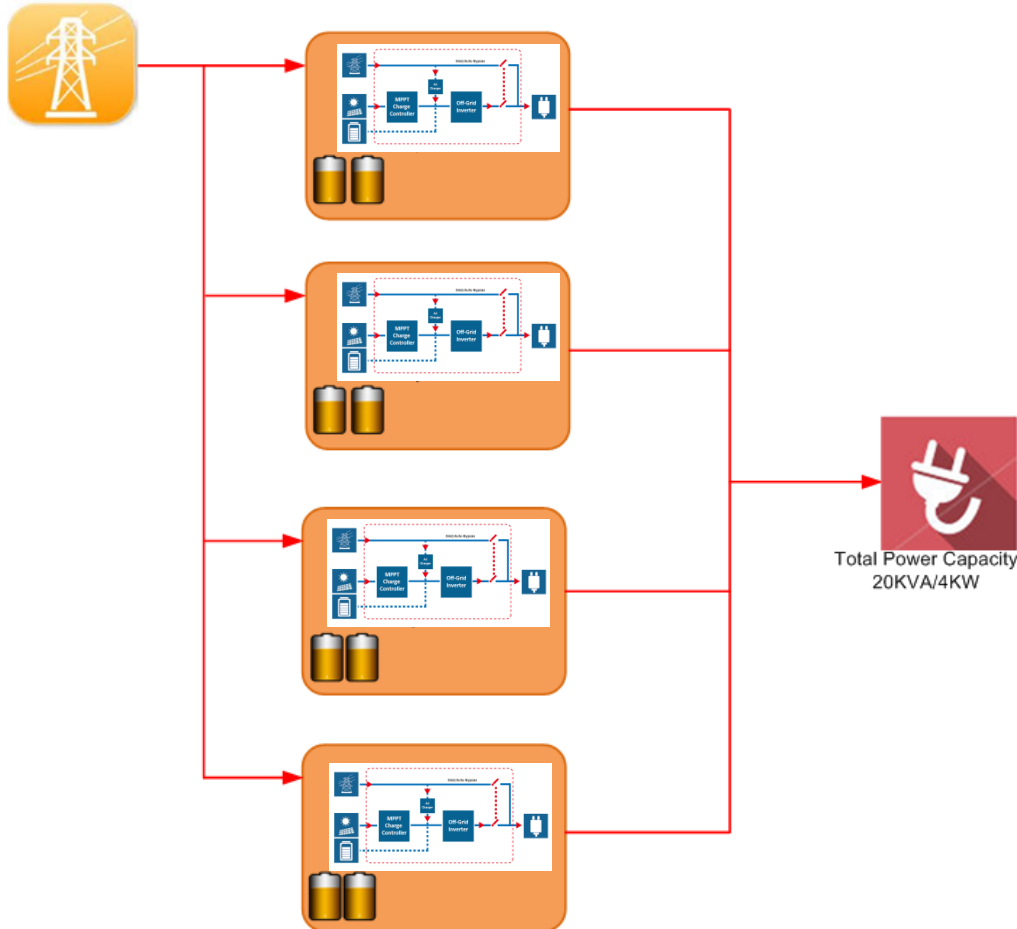
E-Box Hybrid Energy Solution

Battery System is charged in the following order by

- a. Renewable Energy
- b. Diesel Generator



Hybrid Energy Storage System



E-Box

Field Deployable Ready Modular Hybrid Energy System

- Hybrid Renewable Energy
- Scalable
- Modular
- Low Cost
- Rapid Deployment
- Simple to assembly
- Low Maintenance
- Turnkey Assembly Kit

Application

- Disaster Relief
- Village Communal Amenities
- Border Outpost
- Telcommunication Relay Station

5 Key Features of ESS

1. IPSOM



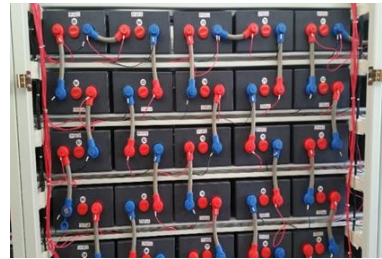
2. Electric distribution board



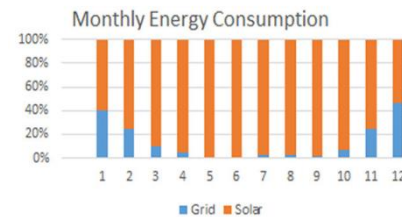
3. Hybrid inverter



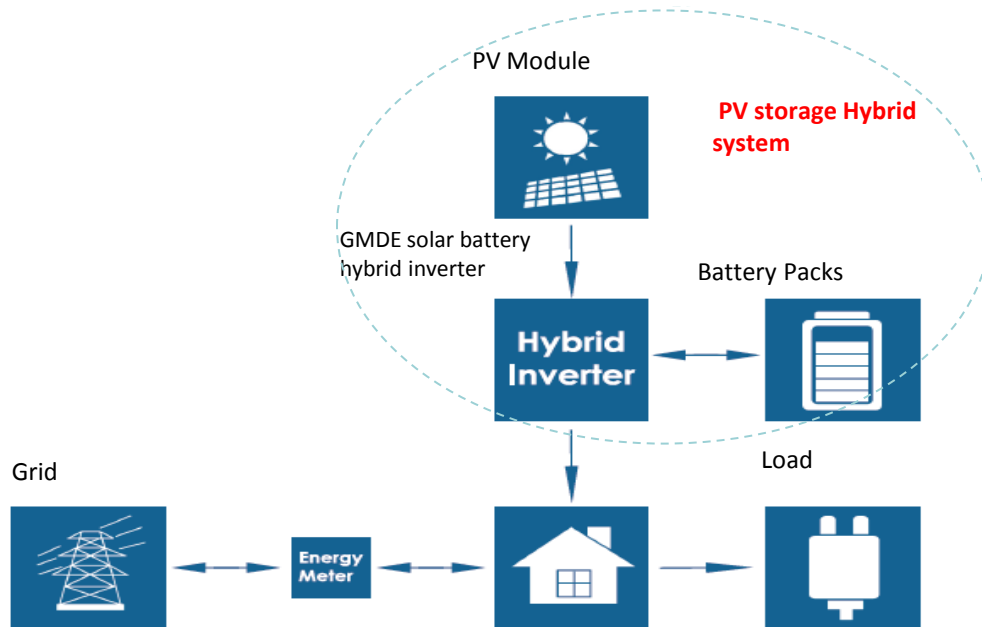
4. Battery Cluster



5. Remote Monitoring

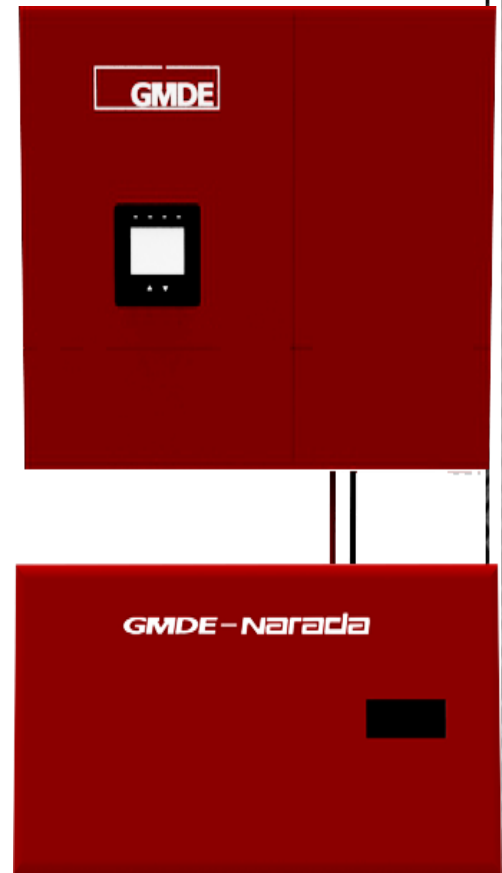


Single Phase PV-Storage System (Lithium battery)



Main feature:

- Low system cost, with only one Hybrid inverter to realize the optimized use of energy generated by PV
- Flexible to integrate different BMS communication protocol and work together with different battery brands
- 48V/2.4kWh lithium-ion battery module, be very cost-effective and support capacity expansion to 9.6kWh.
- When grid failure occurs, support off-grid operation and provide emergency power supply



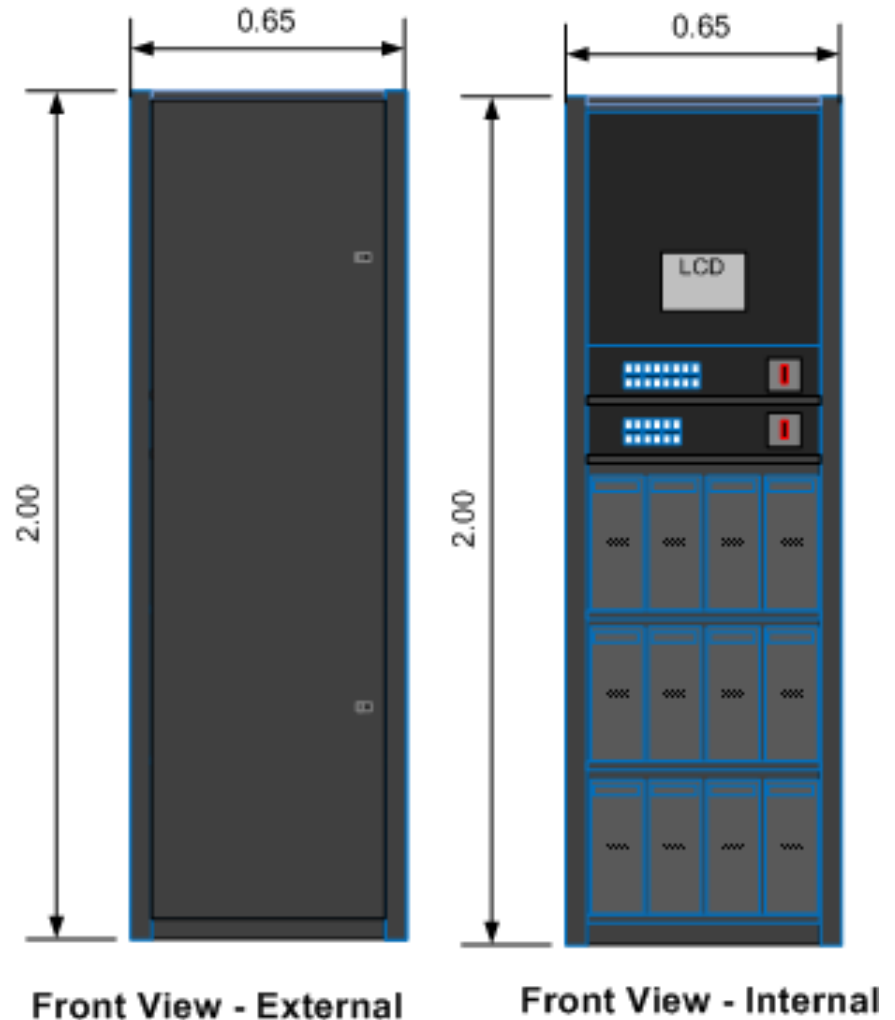
Features

- Integrated Energy Storage System
- Turnkey solution
- Scalable solution
 - From 5KVA to 30KVA in step of 5KVA
- Low maintenance
- Field replaceable part for fast turnaround
- Remote monitoring and control of system
- AC & Generator Automatic/ Manual Select
- Single Phase or 3 Phase system



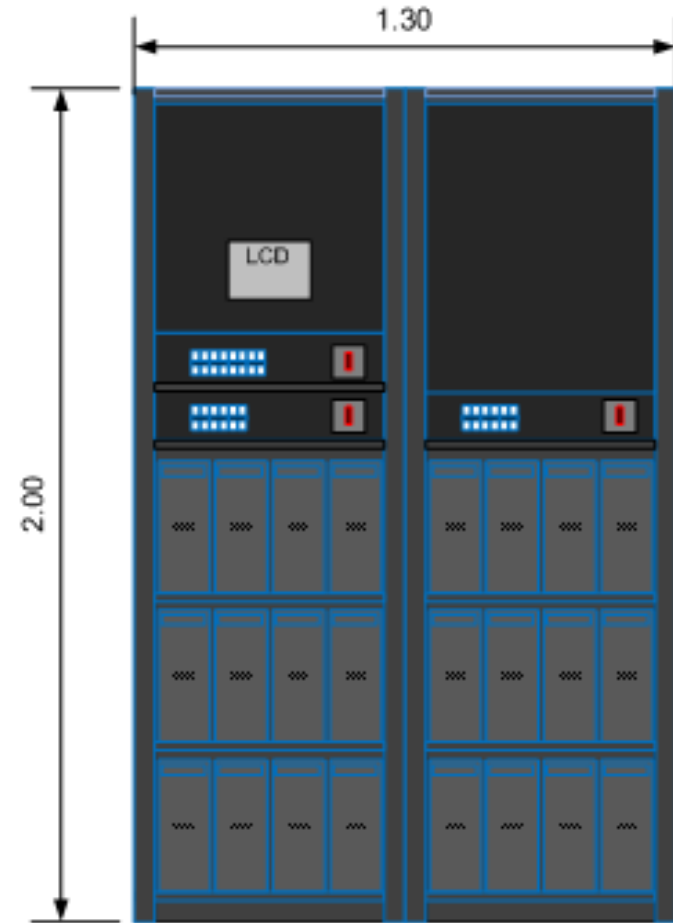
Single Stage E-Box

- 5KVA Output; 230Vac; 50/60Hz
- PV – Up to 3KWp
- Energy Storage – up to 22KWhr
- Dimension:
- 2m (H) 0.65(W) 0.7m(D)



Two Stage E-Box

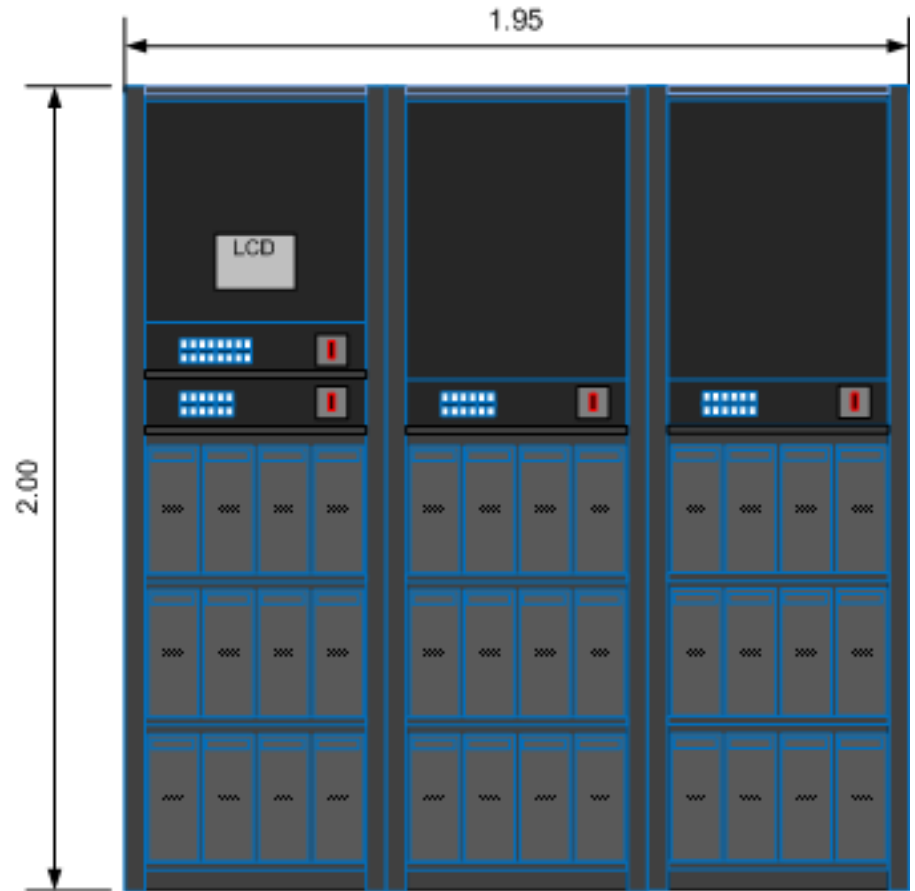
- 10KVA Output; 230Vac; 50/60Hz
- MPPT Charger– Up to 6KWp
- Energy Storage – up to 44KWhr
- Dimension:
- 2m (H) 1.3(W) 0.7m(D)



Front View - Internal

Three Stage E-Box

- 15KVA Output; 230Vac; 50/60Hz
or 3 Phase 400Vac; 50/60Hz
- PV – Up to 9KWp
- Energy Storage – up to 66KWhr
- Dimension:
- 2m (H) 1.95(W) 0.7m(D)



Front View - Internal



System in installation

Malaysia BTS Installation

Hybrid System

-Solar/Battery/D.G

15KVA- 1 Phase

44KWhr Energy Storage





Malaysia BTS Installation

Hybrid System

-Solar/Battery/D.G

30KVA- 3 Phase

65KW hr Energy Storage

Malaysia BTS Installation

Hybrid System

-Grid/Battery/D.G

10KVA- 1 Phase

58KW hr Energy Storage





Malaysia BTS Installation

Hybrid System

-Grid/Battery/D.G

10KVA- 1 Phase

32KW hr Energy Storage

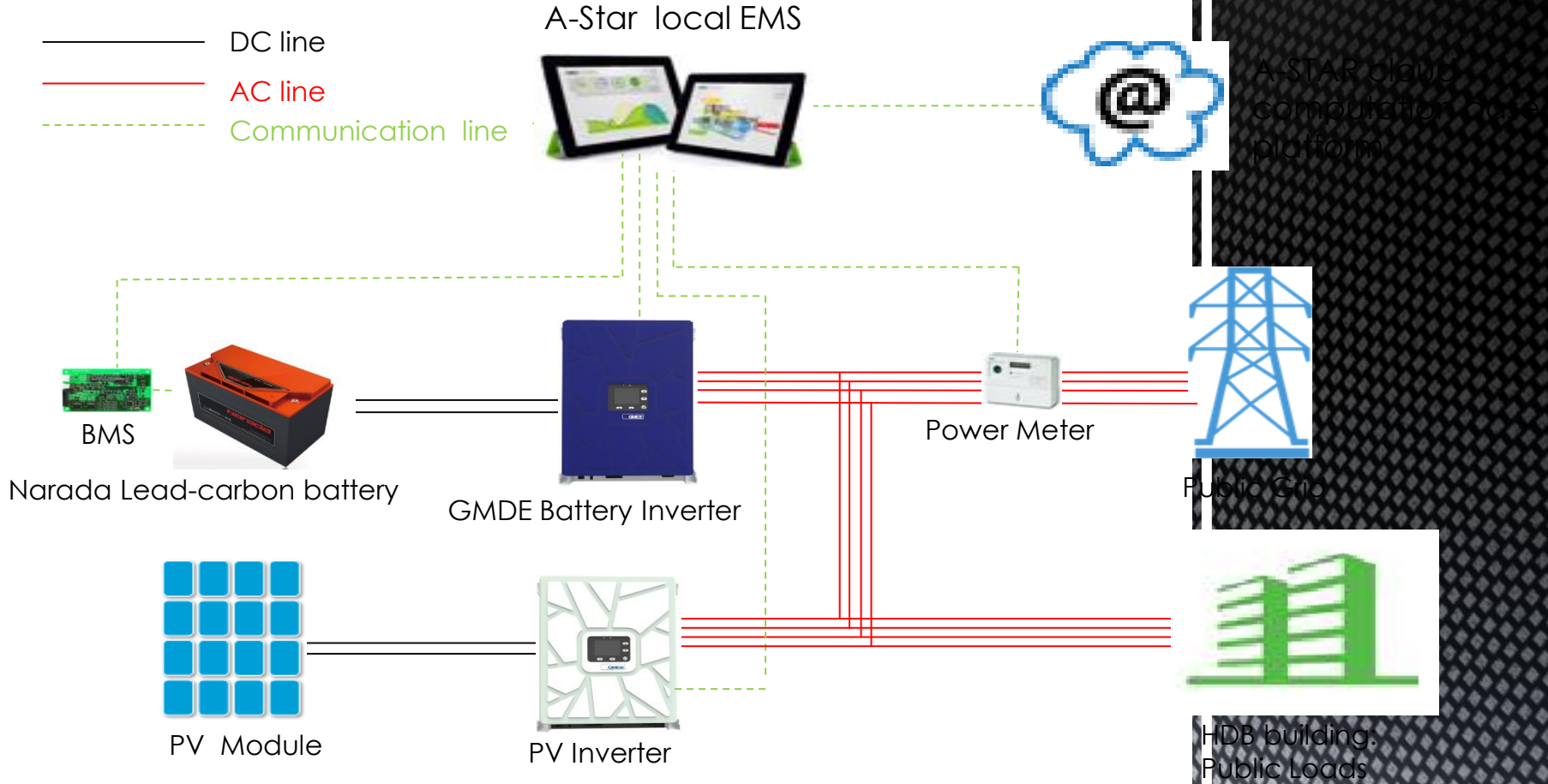
Modular Layout

□ Optimized container design enables modular layout and mobility of the energy storage power station for emergency and disaster relief



Astar-Narada ESS For Singapore HDB

System configuration:



Singapore Grid Tied System

Hybrid System

-Grid/Battery/Solar

68KVA- 3 Phase

250KWhr Energy Storage
System

50KWp PV System



Cambodia

Hybrid System
-Grid/Battery/Solar

5KVA- 1 Phase
21KWhr Energy Storage
3KWp Solar Panel



**Myanmar System
-Grid/Battery**

**10KVA- 1 Phase
28KWWhr Energy Storage**





Hybrid System
-Grid/Battery/D.G
230VdcAC & -48Vdc
6KW- 1 Phase
14KWhr Energy Storage
Li-Ion Battery



**48V Smart LiFePO4
Battery**



Application - Telecom

Lithium Battery Solution

48V/80Ah 2000VA system



NARADA OUTDOOR CABINET _ COOLSTAR



A/C cooling type



Fan cooling type



Coolstar outdoor cabinet Version 2.0

- operation feasible up to 50°C ventilated ambient air conditions.
- Easy site planning and installation with no need for temperature related float voltage adjustments.
- follow the EN 50272-2 and IEC60896 and can minimize thermal runaway incidents.
- Suitable for cycle use in harsh operating environment.
- Cabinet has a design life of 10 years.

Applications



Thank You