WAAREE | ESS

Empowering Every Watt with
Innovative, Reliable and Sustainable

ENERGY STORAGE SOLUTIONS

For more information visit us at www.waaree.com

From the chairman's desk

Dear Friends,

Greetings from Waaree!

At Waaree, we are proud to be a global catalyst in the transition to **clean, sustainable energy.** Our mission is to enable a greener future by delivering **fully integrated renewable energy solutions** that empower industries, communities, and nations.

With a presence across the entire green energy value chain — from **Solar Ingots, Wafers, Cells, and globally recognized PV Modules,** to **Inverters, Energy Meters, Green Hydrogen, Battery Energy Storage, Transformers,** and **Turnkey EPC Solutions** — Waaree offers a **seamless path to energy transition.**

Our diverse portfolio includes **Utility-Scale and C&I Energy Storage, ~7.35 GW of Renewable EPC,** and **cutting-edge Green Hydrogen Infrastructure,** providing customers with **end-to-end, future-ready energy systems.**

We are expanding rapidly through a **global network of partners,** ensuring that clean energy solutions are **accessible, adaptable, and impactful** in every region we serve.

By embracing innovation and sustainability, Waaree is redefining the possibilities of renewable energy — not just as a product, but as a global movement.

Together, let us accelerate the transition to a cleaner planet and a brighter future for generations to come.

Accelerating Global Energy Transition

Dr. Hitesh Doshi
Chairman & Managing Director, Waaree Group

Vision

Our vision is to provide high quality and cost-effective solar power across emerging markets, reducing carbon footprints and paving the way for a more sustainable energy future, thereby improving the quality of human life.

Mission

By virtue of our commitment to our stakeholders, we strive for continual improvement in the quality of our products & services.

Core Values

Safety

Customer First

Integrity

Vertically Integrated Manufacturing Facility Globally

15.1GW Solar Module Manufacturing in India

1.6GW* Solar Module Manufacturing in US
*Additional 1.6 GW under expansion

10GW* Ingot - Wafer - Cell Manufacturing
*Expansion Plan

6GW* Solar Module Manufacturing
*Expansion Plan

5.4GW Solar Cell Manufacturing

20GWh* Battery Manufacturing
*Expansion Plan

4GW* Inverter Manufacturing
*Expansion Plan

1GW* Electrolyser Manufacturing Facility
*Expansion Plan

Scan to watch our Corporate Film

For more information visit us at www.waaree.com

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Empowering Every Watt with Innovation, Reliable and Sustainable

Energy Storage Solutions

Waaree Group is a leading provider of advanced Battery Energy Storage Systems (BESS), tailored for commercial, industrial, and utility-scale use. With a focus on innovation, safety, and sustainability, Waaree offers scalable lithium-ion solutions that deliver high energy density, long life, and reliable performance for efficient energy management and grid stability.

Waaree's Roadmap to the Future of Energy Storage

State of the art **20 GWh*** Battery Energy Storage System (BESS) manufacturing facility, set to be fully operational in Gujarat.

*Expansion Plan

Why Waaree BESS?

A Legacy of Trust and Innovation - With over three decades of experience in renewable energy, Waaree Energies has extended its expertise and innovation to cutting-edge Battery Energy Storage Solutions (BESS).

Bankability - Waaree stands out for its strong financial health, consistent execution, and the trust of global financiers and industry leaders.

Safety in every Watt - At Waaree, safety is at the core of every product. Every BESS is built with explosion-proof exhausts, integrated fire detection and suppression to mitigate any safety hazards.

Supply Chain Assurance - Waaree ensures timely delivery through robust sourcing, multi-vendor strategies, and local partnerships—delivering on time, every time.

Performance at its Core - Waaree's BESS offers over 95% round-trip efficiency, over 10,000 cycle life, smart BMS, advanced liquid cooling system and stable operation in all conditions.

Waaree BESS Product Features

Highly Safe Design

- High thermal stability thanks to liquid cooling
- Multi-stage, active fire protection system, compliance to NFPA 855
- Use of highly safe prismatic LFP cells
- Dedicated cell monitoring and protection system
- Advanced thermal management and fail-safe mechanisms to ensure reliability

Waaree Inhouse Prismatic LFP BESS Cells

- 314 Ah high-capacity cells designed for long-duration energy storage.
- Exceptional cycle life ensuring reliability and lower cost of ownership.
- Advanced in-house technology with fully automated manufacturing for precision and consistency.
- Optimized for safety, performance, and scalability in utility and industrial applications.

State-of-the-Art Manufacturing Facility

- High-precision, fully automated process control delivering consistent quality output.
- Scalable production capacity designed to support multi-GWh expansion.
- Robust quality assurance framework aligned with global standards (UL, IEC, BIS).
- Integrated in-house design & engineering expertise enabling customization and innovation.
- Future-ready infrastructure to support evolving energy storage technologies.

Certifications & Compliance

- IEC 62619, IEC 62933, IEC 63056, IEC 61000
- UL 1973, UL 9540A, UL9540
- NFPA 68,69, 855
- UN 38.3, UN3556

Advanced Battery Management System (BMS)

- Real-time monitoring for performance optimization.
- Fault detection and automatic protection mechanisms.
- Predictive analytics for preventive maintenance.

Energy Management System (EMS) & Cloud Integration

- Remote diagnostics and real-time data insights.
- AI-driven optimization for energy efficiency.
- Seamless integration with grid and renewable sources.

WAAREE | ESS

BESS CONTAINER

5.015 MWh

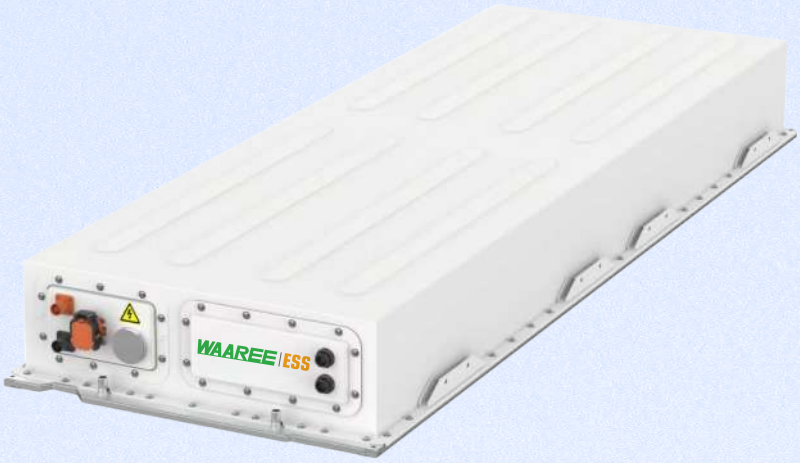
Liquid-cooled battery storage system

CHARACTERISTICS	PARAMETER
GENERAL SPECIFICATIONS	
Battery module configuration	1P104S
Number of battery modules	48
Number of strings	12
Number of racks	6
Configuration	12P416S
BMS Communication	Ethernet TCP/IP, CAN, RS485
Gravimetric	112.7 Wh/kg
Volumetric	117.25 Wh/l
Application altitude	< 3000 m
ELECTRICAL	
Nominal DC voltage	1331 V
Operating DC voltage range	1040 V – 1500 V
Nominal Energy @ DC terminals	5,015 kWh
Nominal SOC at delivery	40%
Nominal charge/discharge rate	0.5P/0.5P
Nominal Round Trip Efficiency (RTE)	>93.7% @0.5C >95.2 @0.25C
Life Cycle	>10,000
MECHANICAL	
Dimensions of ESS unit (W×D×H)	6058mm x 2438mm x 2896mm (238.5in x 96.0in x 114.0in)
Weight	44500 kg
IP rating	IP55
Anti-corrosion level (ISO 12944)	C5
Cooling method	Liquid
Operating ambient temperature	-30°C – 55°C
Storing ambient temperature	0°C – 35°C -40°C – 55°C short term, up to one month.
PRODUCT CERTIFICATIONS	
Certifications And Report:*	UL9540, NFPA68,NFPA69, NFPA855,IEC 62933-5-1,IEC 62933-5-2, UN3536
ENVIRONMENTAL	
Compliance	ROHS, REACH, Cobalt Free
Battery Regulation(EU)	2023/1542
COMPANY CERTIFICATIONS	
Certificates	ISO 9001, ISO 14001, ISO 45001

*under process

BATTERY PACK

Specification



CHARACTERISTICS	PARAMETER
Cell Type	LFP
Cell Capacity	314 AH
Battery Configuration	1P104S
Cooling Method	Liquid-Cooling
Coolant	Gyclol-water Coolant System
Temp. range (Charge/Dis.)	0°C~50°C/-20°C~50°C
Application Altitude	≤3,000 M
Nominal/Operating Voltage	332.8V / 260V-379.6V
Nominal Energy	104.5 KWH
Nominal Soc at Delivery	40%

Key Features

High Safety:

- Based on proven LFP cell chemistry offering strong thermal stability and low fire risk.
- Integrated liquid cooling system maintains uniform cell temperature and extends battery life.

Long Life & Reliability:

- Advanced cell design ensures an extended lifecycle with minimal capacity degradation.
- Optimized for daily cycling and high-efficiency operation under varying environmental conditions.

Smart Energy Control:

- Supports intelligent Battery Management System (BMS) integration for precise monitoring, balancing, and fault protection.

Low LCOS (Levelized Cost of Storage):

- Efficient energy throughput and superior cooling deliver reduced operating costs and high overall return on investment.

BATTERY CELL

Specification

CHARACTERISTICS	VALUE
Cell chemistry	LFP
Cell Weight (kg)	5.5
Cell Capacity (Ah)	314
Cell Voltage (V)	3.2
Energy	1004.8
Cell width	174.26
Cell Thickness	71.5
Cell total height	206.5
Cell body height	204.5
Tab distance	128
Internal Resistance	0.18±0.05mΩ (30% SOC, 1kHz)
Gravimetric Energy Density (Wh/Kg)	>178
Volumetric Energy Density (Wh/L)	389.0
Cycle Life	10000 (70% SOH)
RT Storage (28D@25C@50%SOC)	≤ 3 %/month
Standard Charge/Discharge (C rate)	0.5C/0.5C
Max Charge/Discharge (C rate)	1C/1C
Temperature Charging Limits (°C)	0-60
Temperature Discharge Limits (°C)	-20-60
Certifications And Report:	UL9540A, UL1973, IEC62619, UN38.3

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