ESS INC

ENERGY WAREHOUSE™

CLEANEST, LOWEST COST LONG-DURATION STORAGE WITH NO CAPACITY DEGRADATION

ENERGY STORAGE FOR CRITICAL PROJECTS

Utilizing earth-abundant iron, salt and water for its electrolyte, and simple materials for battery components, the Energy Warehouse™ (EW) from ESS Inc. is a durable, environmentally safe, long-duration storage solution that is ideally suited for:

- Time-shifting renewable energy on a daily basis.
- Managing a facility's demand or TOU charges.
- Smoothing the intermittency of renewables on a constrained grid.
- Increasing resiliency and fuel efficiency for remote locations.

The EW has a lifespan that exceeds 20,000 cycles, low maintenance requirements, and an energy capacity of 4+ hours. It is complementary to the 25-year life span of solar and wind projects, and supports those applications' low levelized cost of energy requirements.

Concurrent with serving these applications, the EW's inherent quick-response power electronics can perform ancillary services such as voltage and frequency support on microgrids and utility-scale applications.

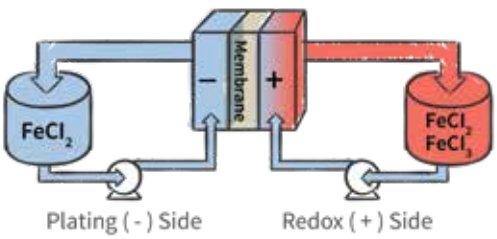
TECHNOLOGY

ESS Inc.'s all-iron redox (reduction-oxidation) flow battery technology is based on the simplicity of the electrochemical ferrous/iron plating reaction on the negative side and the ferrous/ferric redox reaction on the battery's positive side.

The EW is a flexible long-duration energy storage system that safely and effectively addresses the broadest range of energy and power applications at a lower Levelized Cost of Storage (LCOS) than other technologies on the market.

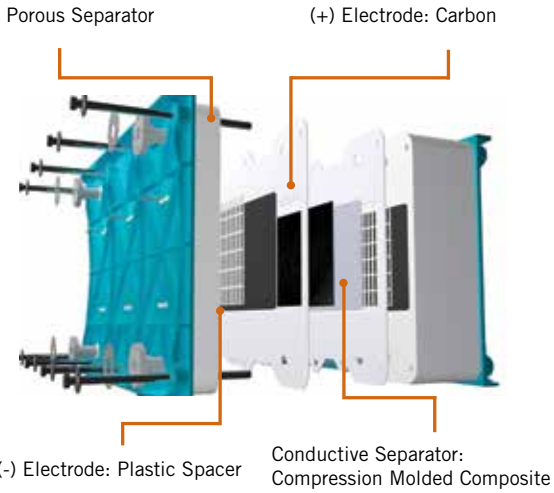
LIMITLESS CYCLING

The ESS team has cracked the code on this simple, yet elegant all-iron electrochemistry. The firm's patented electrode design and control system allow the battery to operate at high efficiency over literally an unlimited number of deep charge and discharge cycles, with no degradation or capacity fade over a 20+ year operating life with minimal annual operations & maintenance (O&M).



With the same electrolyte running on both the negative and positive sides, there is no cross contamination.

IDEAL FOR MULTIPLE USE CASES



Unlike typical batteries that are packaged as fixed cells or modules, a flow battery allows the power (the rate of electricity flow) to be decoupled from the capacity (the total amount of energy held). As a result, users have the flexibility to use the battery for a variety of use cases simultaneously on a project.

FEATURES AND BENEFITS

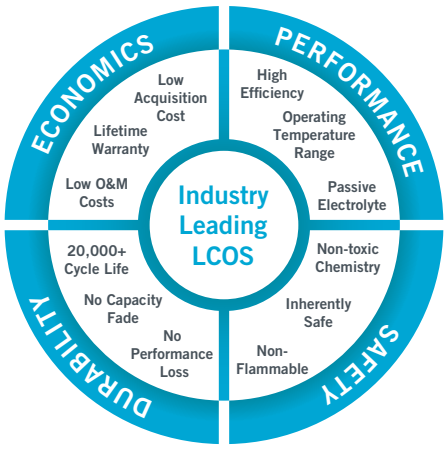
- Cost-effective, made of Earth's basic elements.
- Environmentally safe, non-toxic electrolyte – non-flammable – no corrosive acids – no hazardous materials – no noxious fumes.
- Long-duration storage (4+ hours) for renewable shifting and demand charge reduction.
- Provides flexibility for power and energy use cases.
- Long life, >20,000 cycles, low maintenance.
- Can be shipped in dry state and hydrated onsite.

ENERGY WAREHOUSE™

SPECIFICATIONS

FEATURE	DATA
Performance	
Peak Power:	100 kW (DC)
Maximum Energy:	400 kWh
Discharge time:	3 hr | 4.5 hr | 6 hr
Power:	100 kW | 75 kW | 50 kW
AC Roundtrip Efficiency:	75%
Voltage:	600-850
Response time:	Full power in <1 sec.
Cycle Life:	>20,000 cycles
Communications:	Remote Monitoring Proprietary interface; 3rd Party Data/control Modbus interface
Mechanical	
Footprint	320 ft² or 29.7 m²
Weight (Dry)	15,700 kg
Weight (Wet)	36,200 kg
Environmental	
Battery	Recyclable components
Electrolyte	$FeCl_2$, KCl, H_2O; non-flammable, non-corrosive
Ambient Temperature	-5°C to +50°C
Warranty	Comprehensive 20-Year; with continuous extended service agreement
Certification	NRTL, UL, Intertek Field Labeling, IP54, IE60529

LOWEST LEVELIZED COST OF STORAGE



Long-duration storage improves project economics, serving multiple energy and power use cases over project's long life span.

For more information, contact:

ESS INC

ESS, Inc.
26440 SW Parkway Ave.
Wilsonville, OR. 97070
Tel: (855) 423-9920
Email: info@essinc.com
www.essinc.com

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