

## THE MOST SUSTAINABLE LONG-DURATION STORAGE CAPACITY AT THE LOWEST LCOS

### ENERGY STORAGE FOR CRITICAL PROJECTS

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

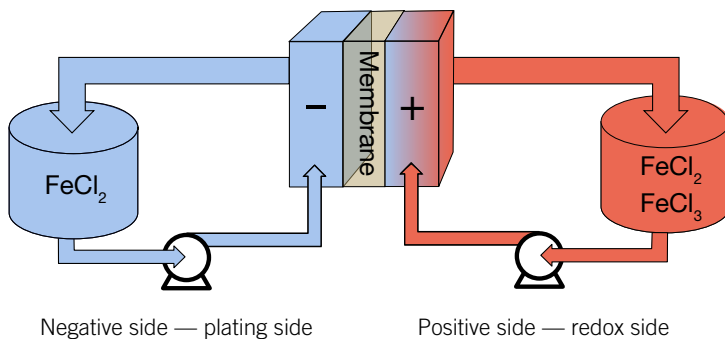
- time-shifting renewable energy on a daily basis,
- managing a facility's demand or TOU charges, and
- smoothing the intermittency of renewables on a constrained grid.

Over a lifespan exceeding 20,000 cycles and many cycles per day, maintenance requirements are low, and with an energy capacity of over 6 hours, the IFB matches well with the 25-year life span of solar and wind projects, supporting those applications' low levelized cost of energy (LCOE) requirements.

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

### TECHNOLOGY

All-iron redox (reduction-oxidation) flow battery technology by ESS is based on the elegant 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 IFB system installed within an advanced microgrid at Stone Edge Farm, Sonoma County, CA.

### ENERGY WAREHOUSE™



Each ESS Iron Flow Battery system is built in a 40' long by 8.5' high customized shipping container housing. Separate energy and power subsystems/containers can be stacked to conserve space

### FEATURES AND BENEFITS

- Cost-effective, made of Earth's basic elements
- Rugged construction, shipping container housing
- Environmentally safe, non-toxic electrolyte
  - Non-flammable
  - No corrosive acids
  - No hazardous materials
  - No noxious fumes
- Long-duration storage (over 6 hours) smoothes renewables output, reduces demand charges, and allows for the stacking of multiple uses/revenue streams
- Long life, >20,000 cycles, low maintenance
- Transports preassembled anywhere worldwide
  - The electrolyte can be hydrated onsite



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# 100kW/800kWh All-Iron Flow Battery Delivering 8+ hours of energy storage

## SPECIFICATIONS

FEATURE	DATA	Notes
<b>Electrical</b>		
Power	100 kW (AC)	150% rated power for 30 sec.
Energy Capacity	800 kWh	100% available
AC Interface	480 VAC, 3-phase	Container-mounted disconnect
Communications	Remote Monitoring 3rd Party Data	Proprietary Modbus
<b>Mechanical</b>		
Power Container		
Dimensions	40'L x 8'W x 8.5'H	Customized shipping container
Weight	16,000 kg	
Energy Container		
Dimension	40'L x 8'W x 8.5'H	
Weight (Dry)	5,000 kg	Shipped dry
Weight (Wet)	57,000 kg	
<b>Environmental</b>		
Battery	Recyclable components	
Electrolyte	FeCl <sub>2</sub> , KCl, H <sub>2</sub> O	Non-flammable, non-corrosive
Operating Temperature	-5°C to +50°C	Extended range with active temperature control
Warranty	Comprehensive 20-Year	with continuous Extended Service Contract
Certification	NRTL Field Certification UL	Meets AHJ requirements Pending
<b>Performance</b>		
Cycle Life	>20,000 cycles	To 100% DOD
AC/AC Roundtrip Efficiency	>70%	80% DOD cycles
Response Time	Full power in <1 sec.	From standby, inverter limited



Each Iron Flow Battery and its AC electronic components are housed in a shipping container for transportability and protection from the elements.

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