ESS INC

CATALYZING A CLEANER FUTURE

If you want to make your energy storage investment last longer…

If you need four or more hours of stored energy…

If you want to make your grid more flexible and resilient…

Then the ESS Energy Warehouse is the solution.

Today's choices for commercial battery technologies include highly competitive alternative chemistries, such as flow batteries. The limitations of lithium-ion batteries – cycle life, safety, disposability – will become more of an issue as the need for more flexible, longer-duration storage increases. With its safe, proven and earth-abundant all-iron flow battery, ESS is helping project developers, utilities, and EPCs make the transition to more flexible non-lithium-ion storage that is better suited for the grid in a variety of applications.

WHY LONG-DURATION STORAGE

1. **You want storage to address multiple needs.** Long-duration value is recognized by regulators, utilities, and industry experts for its flexibility in addressing multiple use cases with a single storage asset. It can be used to smooth renewable intermittencies, enable time shifting, manage a facility's demand charges and improve infrastructure resiliency.

2. **If you have solar, wind or microgrid projects that last 20 or 25 years, you want a battery that lasts just as long.** If you have to replace it multiple times, like you would for lithium-ion, you are impacting your levelized cost of storage.

3. **You need to shift four or more hours of energy capacity and cycle frequently each day.** With long-duration storage, you can store excess renewables production and shift that energy to when it has greater economic value. With ESS's patented flow battery, you can count on operating at high efficiency over an unlimited number of deep charge and discharge cycles with no degradation.

4. **You want to adapt to growth or add resiliency to your existing energy generation.** Long-duration storage can help defer T&D upgrades to avoid capital cost. It would also add resiliency by being there for peak demand conditions and supporting critical load during outages.

5. **You're looking to introduce more intermittent renewables and limit reliance on generators in remote locations.** Flexible long-duration storage can serve a constantly fluctuating load, with the generator only called upon to recharge the batteries. This allows the generator to operate at peak efficiency and substantially reduces refueling cost and logistics.

Ultimately, by tying multiple revenue streams to the cost of storage, you'll see economic benefits and improved customer satisfaction.

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LONG-DURATION COMMERCIAL & UTILITY SCALE ENERGY STORAGE APPLICATIONS

	ESS Iron Flow Batteries	Lead Acid Batteries	Li-ion Batteries	Trad, Flow Batteries	Flywheels
LCOS	●	○	○	●	◒
Energy Density	◒	○	●	◒	●
Energy Capacity	●	○	◒	◒	○
Installation	●	○	◒	◒	○
Cycle Life	●	○	○	●	●
Depth of Discharge	●	○	●	●	◒
O&M	◒	○	◒	◒	◒
Response	●	◒	◒	●	●
Environment	●	○	○	◒	●

● Good ◒ Medium ○ Poor

WHY ESS'S ENERGY WAREHOUSE (EW) IS THE RIGHT SOLUTION FOR YOU

ESS's safe, low-cost, and sustainable all-iron flow battery, EW™, is ideal for long-duration storage for renewables integration and microgrid applications in utility, industrial and commercial sectors.

Flow battery technology delivers lowest levelized cost of storage (LCOS)

1. No capacity degradation
2. Long operating life
3. Low capex and low O&M

The ESS flow battery is made of iron, salt and water, which provide environmental and cost advantages. Its non-corrosive, non-toxic chemistry enables use of off-the-shelf materials. Its non-flammable composition eliminates costly fire suppression systems. Combined with an innovative cell design, you'll benefit from increased power density and reduced O&M cost over its 20+ year life.

APPLICATIONS & USE CASES

ESS energy storage systems are suitable for many applications in the utility, commercial and industrial markets, both on- and off-grid.

- Renewable energy time shifting
- Demand charge management
- TOU tariff arbitrage
- Energy security
- Utility ancillary services
- Deeper penetration of renewables
- Demand response
- Capacity reserve
- Infrastructure support
- Run generators at peak efficiency
- Microgrid stabilization, energy shifting

ESS Energy Warehouse is operating as part of an advanced microgrid at University of San Diego, CA. The system was easily sited on the university campus with its small footprint and non-toxic, non-flammable chemistry.

ABOUT ESS INC.

Established in 2011, ESS Inc. manufactures low-cost, long-duration all-iron redox flow batteries for commercial and utility-scale energy storage applications requiring 4+ hours of flexible energy capacity. Its product, Energy Warehouse™, uses iron, salt, and water for the electrolyte, and delivers an environmentally safe, long-life energy storage solution for the world's renewable energy infrastructure.

Based in Wilsonville, Oregon, ESS Inc. was founded by a team with deep experience in fuel cells, electrochemistry, advanced material science and renewable energy. After five years of intensive innovation, engineering development and rigorous testing and validation, with the backing of ARPA-E and others, the company began shipping turnkey energy storage solutions in 2015.

In 2017, BASF, the world's leading chemical company, became a significant investor in ESS Inc., joining forces to deliver energy storage solutions for a sustainable future.

For more information, visit www.essinc.com or email at info@essinc.com.

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