ENDURIUM™

INVINITY ENDURIUM™ ENERGY STORAGE SYSTEM

Invinity's ENDURIUM™ is an evolution of our proven modular vanadium flow battery technology, engineered for greater energy density, simplified maintenance, and greater economic value. At its foundation is a String of four ENDURIUM Modules — a UL certified flow battery that stores 1.35 MWh of usable energy and can be fully discharged in 3 hours, or as long as 18 hours based on the application. Strings are connected together into Arrays sized to optimally pair with the inverter. ENDURIUM Arrays can be combined to create 100 MW+ solutions that deliver unmatched throughput and flexibility.

- **MORE THROUGHPUT** Non-degrading chemistry delivers throughput superior to most stationary storage today.
- **MORE FLEXIBILITY** Adaptability to a wide range of duty cycles, with no warranty limits on cycle count.
- **MORE LIFETIME** Suitable for 25+ years of constant cycling, matching the lifespan of solar & wind assets.
- **MORE SAFETY** Zero risk of thermal runway; exceptional personnel safety for crews & first responders.
- **MORE SUSTAINABILITY** 99% of components are recyclable; vanadium electrolyte reusable at battery EOL.
- **MORE INSIGHT** Unparalleled visibility to system performance to understand and optimize asset performance.

SCALABLE
3-100+
MW POWER

3-18
HOUR DISCHARGE

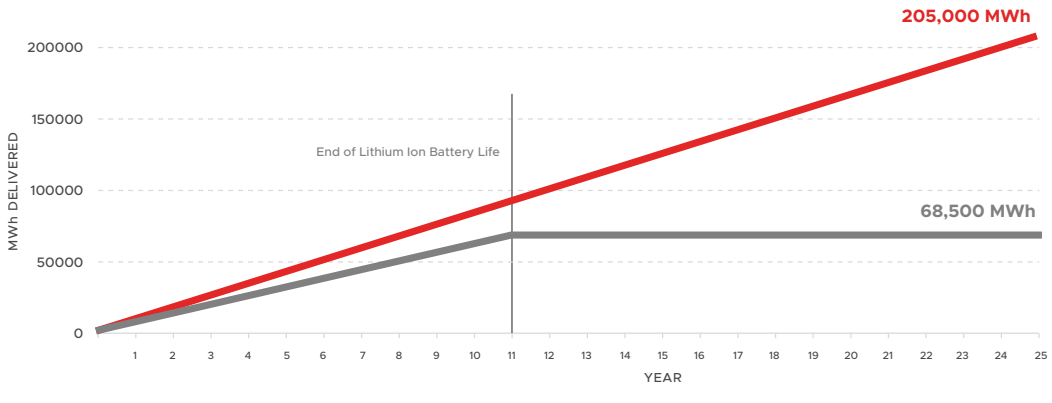
UNLIMITED CYCLES

UNLIMITED THROUGHPUT

NON FLAMMABLE

25+
YEAR LIFESPAN

CUMULATIVE ENERGY DELIVERED OVER TIME



Assumptions: 12 MWh capacity installed, 2 cycles per day, 100% DoD per cycle, 365 days a year.
Lithium out of warranty/EOL @ 60% capacity.
We charitably assume the lithium system can meet this duty cycle: its actual degradation is likely to occur much faster.

INVINITY ENERGY SYSTEMS

GET MORE BATTERY™

ENDURIUM™

PRODUCT DATA SHEET

STRING SPECIFICATION

COMPONENTS
4x Vanadium Flow Battery Modules, 1x String Control Unit, Inter-String cabling

PERFORMANCE[1]	2 Power Blocks	3 Power Blocks
Max DC Power	300 kW	375 kW
Max Usable Energy[2]	1310 kWh	1370 kWh
Discharge Durations at Constant Power	4h @300 kW 8h @160 kW 10h @130 kW 12h @110 kW	4h @310 kW 8h @170 kW 10h@ 140 kW 12h @120 kW
Max DC RTE Max Total RTE	74% 69%	75% 70%
DC Response Time	<15 ms from On; <1 min from Off	
Voltage Range	800–1280 VDC	
Max DC Current	406A	

OPERATING CAPABILITIES	
Duty Cycle	Continuous at Max Power. No rest period
Lifetime Cycles	Unlimited for 25 years
Depth of Discharge	0-100 %
Cooling System	Forced Air
Communications	Modbus TCP/IP
Annual Energy Degradation	<0.2%

REQUIRED UTILITIES	
Auxiliary Supply	3Φ, 380-480 VAC
Auxiliary Loads (Average/Max)[3]	7 kW / 45 kW

CERTIFICATIONS AND STANDARDS (Expected in 2025)[4]	
Certifications	CE, UL 1973,UL 9540A, Sub Assembly under UL 9540
Standards	NFPA, IEC 62933-5-2, IEC 62485, IEC 62932-2-2

ENVIRONMENTAL	
Ambient Operating Temperature	-10°C to 45°C / 14°F to 113°F
Relative Humidity	5-95%
Maximum Elevation	2000 m / 6600 ft
Protection Class	IP 54

FOOTPRINT	
String Footprint (inc/service access)	8.7m x 10.9m / 28 ft x 36 ft
Area	93.7 m^2 / 1008 ft^2
Energy Density	96 MWh/Acre

BATTERY MODULE DIMENSIONS (4 PER STRING)	
Dimensions	6.1 m x 2.4 m x 2.6 m 20 ft x 8 ft x 8.5 ft
Mass	27,500 kg / 61,000 lbs

NOTES: 1 Performance values are for operation with electrolyte at 35°C. DNV IE Study available under NDA. Contact Invinity for more information.
2 Usable DC capacity varies depending on discharge profile.
3 Aux load excludes cooling fans, which are temperature dependant.
4 Only the core list of codes and compliance is provided. Contact Invinity for the compliance status of codes not referenced.

CONFIGURABLE ARRAY

Example of a double-stacked, 10-String, 13.5-MWh DC Array, capable of delivering Max Power of 3 MW DC for 4 hours. Strings are connected in parallel to form Arrays sized to optimize the battery power with the inverter power.

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