



ENERGY VAULT®
Enabling a Renewable World



G-VAULT™

EVx™ gravity energy storage for bulk energy shifting

As renewable energy penetration grows, so does the need for energy storage to balance supply and demand over longer periods of time. Asset owners require design and operational flexibility to maintain reliability for a rapidly evolving energy landscape, along with innovative technologies to mitigate supply chain and fleet change risk.

The EVx™ Gravity Energy Storage System (GESS) is based on the principle of pumped hydro storage, the most widely deployed energy storage solution on the planet. The EVx™ decouples power and energy while maintaining a high round-trip efficiency, without the need for specific topography. The result is a flexible, low-cost, 35-year (or more) infrastructure asset designed for daily bulk energy shifting without any storage medium degradation.



LEVELIZED COST OF STORAGE (LCOS)

Minimize the lifetime LCOS with reliable low-cost infrastructure designed for minimum 35-year operation



HIGH ROUND-TRIP EFFICIENCY

Maximize the amount of usable energy with 80+% round-trip efficiency



FLEXIBLE DURATION

Adjust your energy-to-power ratio from 4 to 24-hour discharge at GW+ scale



NO DEGRADATION

Maintain a constant storage capacity over the life of the system regardless of annual throughput

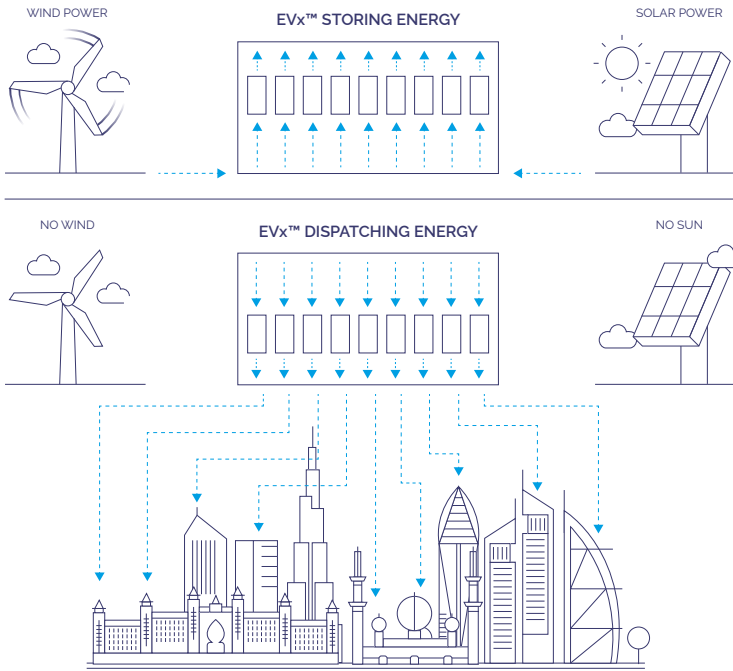


SAFETY

Rest easy, knowing there are no electrochemical reactions and zero need for fire protection

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Gravity Energy Storage | How It Works



When energy generation is higher than needed to supply grid demand, EVx™ uses surplus electricity to power an elevator system to lift heavy composite blocks from a lower-level floor to a higher-level floor of the structure.

Potential energy is stored as a factor of the elevation gain of the composite blocks when these mobile masses are raised, and then placed in a fixed position on the higher-level floor of the EVx™ structure, using a trolley system.

The EVx™ is fully charged when the maximum number of composite blocks are positioned on the higher floors of the structure.

When energy generation is needed to supply grid demand, the EVx™ releases the stored potential energy by engaging the elevator system to lower the composite blocks back down to a lower level of the structure under controlled resistance, spinning a generator to produce electricity.

Duration is increased at a fixed level of power, by expanding the width of the EVx™ structure and adding additional composite blocks.

PARAMETER	GRID FORMING	GRID FOLLOWING	
ELECTRICAL	Discharge Duration	4 - 24 hours	
	Incremental Power	1.0 MW-AC	6.25 MW-DC
	Output Voltage	690 V (AC), 3-phase delta	12kV (DC), Medium Voltage
	Grid Frequency	50, 60 Hz	
	Round Trip Efficiency	80% (LV side of MV Transformer)	84% (LV side of MV Transformer)
	Ramp Rate (0 to 100%)	3 sec (from Idle)	120 sec (from Idle)
	Usable Depth of Discharge	100%	
	Self-Discharge	0% / year	
	Storage Degradation	0% / year	
	MECHANICAL	Design Life	35 years minimum
Seismic Rating		International Building Code compliant to meet requirements in all seismic zones	
System Safety		No hazardous materials or electrochemical reactions that can lead to thermal runaway Safety Logic Controller following the ISO (EN) 13849 safety standards, Safety-related terminals on all individual subsystems, Out-of-Bound sensor alarm, AC and DC circuit breakers	
Energy Density		80 - 120 m ² / MWh (860 - 1,290 ft ² / MWh)	
Incremental Dimensions (L x D)		8 m x 86 m (26.25 ft x 282.2 ft) [4-hour discharge] 8 m x 246 m (26.25 ft x 807.1 ft) [12-hour discharge]	96 m x 86 m (315.0 ft x 282.2 ft) [4-hour discharge] 96 m x 246 m (315.0 ft x 807.1 ft) [12-hour discharge]
Height		145 m (475 ft)	
Ambient Temp Range		-15 to 45°C (5 to 113°F)	
Plant Controller	VaultOS™ Energy Management System for both local and cloud-based controller		
Protocols & Interfaces	Protocols: Modbus TCP, DNP3, OPC UA; Interfaces: RTU/RTAC		