ENERVENUE

Long Lasting Nickel-Hydrogen Batteries For Grid Flexibility

EPRI Workshop – Washington D.C. Nov 2023

Chad Spring
Associate Director, Business Development

+1 (720) 819-5711
chad.spring@enervenue.com

Augment Your Expectations, Not Your Battery

AGENDA

- HISTORY
- CONTRAST AND COMPARE
- ENERGY STORAGE VESSEL
- DEPLOYMENT AND USE CASES
- PROJECT EXECUTION TIMELINE
- TOTAL COST OF OWNERSHIP

Technology Timeline

Mature, proven technology used in outer space applications for 30+ years

NASA

Metal-Hydrogen deployed by NASA

- Mars Rover
- Space Station
- Hubble Telescope
- **30+ years**
- **200 million cycles**
- **100,000 charge and discharge cycles**

1980s

Stanford University

Stanford Professor Yi Cui refines NASA battery technology

- New materials
- Reduced costs
- New catalyst

2017

EnerVenue spun-out of Stanford's business accelerator

- 30,000 cycles
- 30 years
- 3 cycles per day
- No fire risk
- 100% recyclable

2020

Energy Storage Vessel™ production underway

- Commercialized solution
- Pilot line in Fremont, CA
- Gigafactory facility operational in 2025

MADE IN USA

2023

Coming Soon to Shelby County, Kentucky

- 1 Million square feet
- EnerVenue will achieve volume production in 2025 in Kentucky-based facility, with eventual expansion to 20 GWh
- Vessels meet the stringent requirements to be classified as Made in the USA
- Energy Storage Vessels should qualify for ITC/IRA domestic content incentives, but please consult with a qualified tax advisor to determine your project's eligibility

Traditional Energy Storage Challenges

Traditional energy storage technologies have a role to play in meeting the demands of the energy transition but are limited in their applicability by cost and safety concerns

- Fire and explosion risk
- High operating & maintenance expenses
- Incapable of longer duration & dispatch
- Limited cycle life
- Restrictions on over-charge and over-discharge
- Harsh climates: hot deserts & freezing winters
- Flammable liquids and toxic materials
- High chemistry, adoption and technology risks

Most Durable and Reliable Battery Technology

Ni-H2 batteries can operate in extreme temperatures for 30+ years, offering the longest cycle-life of any battery system

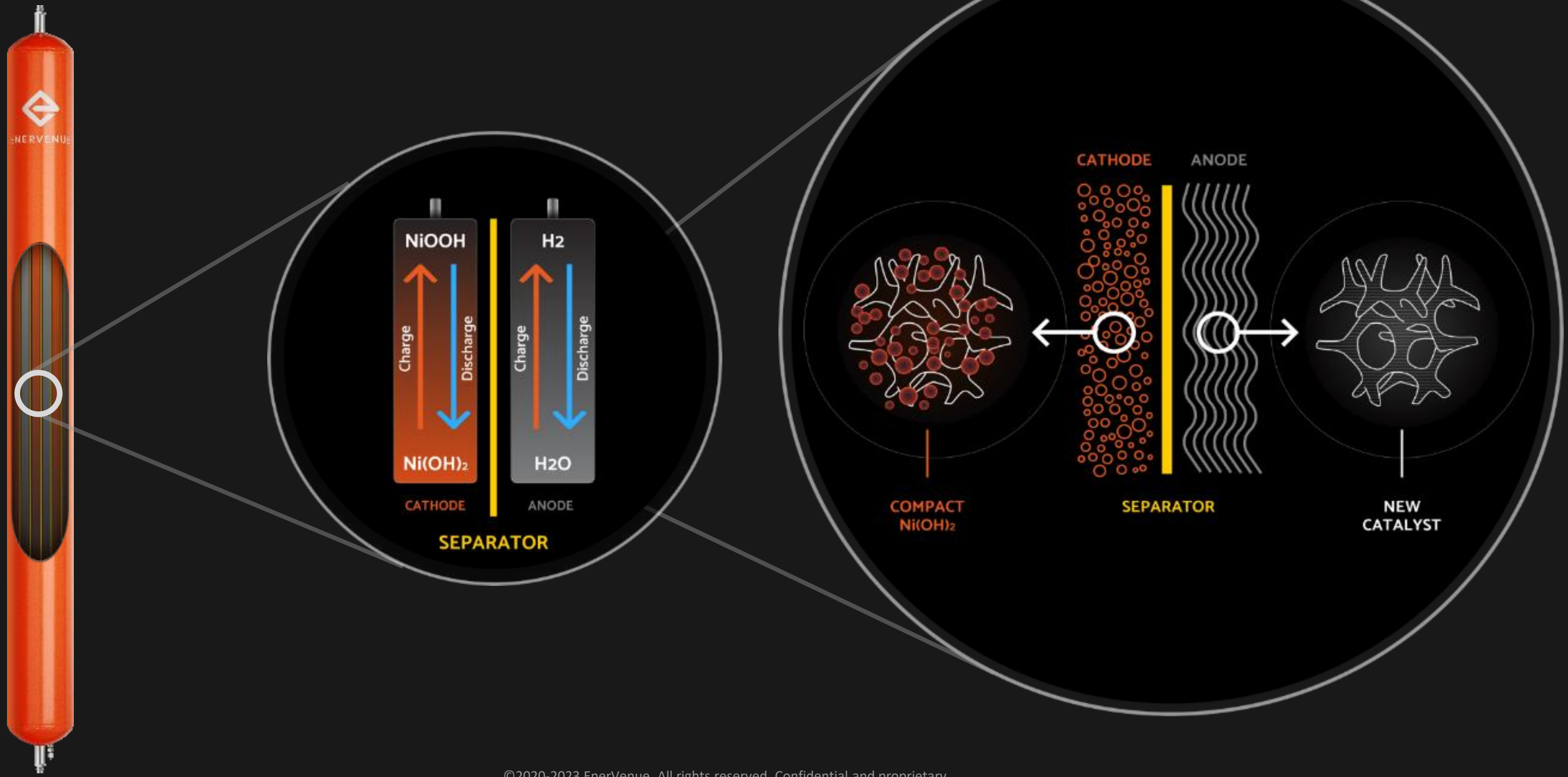
Li-ion challenge	EnerVenue advantage
Fire and explosion risk	No thermal runaway risk No need for fire suppression
High operating & maintenance expenses	No augmentation No routine maintenance
Incapable of longer duration & dispatch	Flexible charge/discharge range C/2 to C/12
Limited cycle life	30+ year lifespan ~30,000 cycles, 3 cycles/day
Restrictions on over-charge and over-discharge	Excellent overcharge, discharge and deep-cycle
Harsh climates: hot deserts & freezing winters	Technology capable of -40°C to 50°C ambient
Flammable liquids and toxic materials	Non-toxic, no lithium, easily sourced
High chemistry, adoption and technology risks	Proven in 30+ years of use in space applications

⚠ Li-ion = Challenge with Lithium-Ion technology

= Advantage with EnerVenue technology

EnerVenue Energy Storage Vessel

30+ years mature technology upgraded with new low-cost earth abundant durable catalyst and design improvements



Our Markets

Traditional energy storage technologies have a role to play in meeting the demands of the energy transition but are limited in their applicability by cost and safety concerns

Grid-scale

Commercial & Industrial

Residential

Product Portfolio Overview

Battery Cells

Energy Storage Vessel (ESV)

ESV-4.0
3.0 kWh

Energy Storage Vessel (ESV)

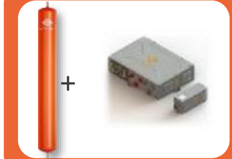
ESV-E
1.2 kWh

BMS

BMS for 1500 Vdc

BMS for 1000 Vdc

Energy Storage Solutions



Battery + BMS Package

- ESV + 1000 Vdc BMS only, customer integrated
- ESV + 1500 Vdc BMS only, customer integrated

Energy Rack™

- Fully assembled with batteries, BMS, and cabling
- Stackable, modular, ideal for buildings or enclosures

Energy Prism™

- Grid-scale modular 1500 Vdc complete DC block
- Single string, 1000 Vdc enclosure for C&I market

Energy Venue™

- Indoor warehouse-based solution utilizing stacked Energy Racks
- Highest possible energy density

Product Portfolio Overview

Battery Cells

Energy Storage Vessel (ESV)

ESV-4.0
3.0 kWh

Model: Energy Storage Vessel ESV-4.0 PRELIMINARY

TYPE	DESCRIPTION	SPECIFICATION
Mechanical	Dimensions (Diameter x Length)	168mm x 1800mm
	Format	Tubular
	Type	Large Format Battery
	Weight	62 Kg / 136 lbs
	Operating Temperature	-10C to 45C
	Storage Temperature	-15 to 60 C
	Cooling Type (Pending)	Convection, Forced Air
Electrical	Nominal Amp-hour Charge/Discharge	137 Ah
	Nominal Energy Capacity	3.0 kWh @ 25 °C
	Voltage Range	23-30 Vdc across full range of SOC (0-100%) @ 25 °C
	Nominal Power	1500 W
	C-Rates	C/2 - C/12
	Peak RTE	>90% @ 25 °C
	Expected Capacity Retention	86% after 30,000 cycles
	Chemistry	Ni-H_2
	Modes	Constant Current, Constant Power
	BMS	EnerVenue BMS 1000 V / 1500 V
Performance	Warranty	3-years standard, extendable to 20 years
Regulatory	Certifications Pending	UL1973* and applicable CE standards
	Tests Pending	UL 9540A
	Product Name	ESV-4

*UL 1973, Annex E

Product Portfolio Overview

Energy Storage Solutions

Model: Energy Rack

PRELIMINARY

TYPE	DESCRIPTION	SPECIFICATION
Mechanical	Dimensions	8' H x 3.5' W x 7' D
	Weight	7,500 lbs.
	Operating Temperature	-10 to 45 C
	Cooling Type	Forced Air
	Chemistry	Nickel Hydrogen (NiH2)
Electrical	1500 Vdc String Capacity	150 kWh
	1000 Vdc String Capacity	102 kWh
	1500 DC System Voltage	1150 - 1500 Vdc
	1000 DC System Voltage	782 – 1000 Vdc
	Max DC Current	67 A
	C-rates	C/2 to C/10
	Aux Load (Max)	1000 Watts
	Expected Capacity Retention	86% after 30,000 cycles
	BMS	Included, EnerVenue BMS 1000 V / 1500 V
Performance	Warranty	3-years standard, extendable to 20 years
Regulatory	Certification (Pending)	UL 1973, 9540, 9540A, UL 1998
Software	Communication Protocol	Modbus TCP/IP

Energy Rack™

- Fully assembled with batteries, BMS, and cabling
- Stackable, modular, ideal for buildings or enclosures

Grid-Scale

EnerVenue NiH_2 is changing the way electric utilities are thinking about battery energy storage systems

ENERVENUE DELIVERS MORE

- 30-year life, 3 cycle/day
- Multiple cycles per day with total flexibility
- Short and long duration operation
- No augmentation needed over entire life
- Minimal OPEX and LOW warranty costs
- Proven safe with zero fire risk

Product Portfolio Overview

Energy Storage Solutions

Model: Energy Prism 1500 Vdc PRELIMINARY

TYPE	DESCRIPTION	SPECIFICATION
Mechanical	Dimensions	10' H x 25' W x 7' D
	Operating Temperature	-10 to 45 C
	Cooling Type	Forced Air
	Chemistry	Nickel Hydrogen (NiH_2)
Electrical	Usable Capacity	900 KWh
	1500 DC System Voltage	1150 - 1500 Vdc
	C-rates	C/2 to C/10
	Expected Capacity Retention	86% after 30,000 cycles
	BMS	Included
Performance	Warranty	3-years standard, extendable to 20 years
Regulatory	Certification (Pending)	UL 1973, 9540, 9540A, UL 1998
Software	Communication protocol	Modbus TCP/IP

Energy Prism™

- Grid-scale modular 1500 Vdc complete DC block
- Single string, 1000 Vdc enclosure for C&I market

Grid-Scale

Energy Racks can be stacked in new-build or existing structures

Grid-Scale

Building or using existing warehousing allows for a customized design

Product Portfolio Overview

Energy Storage Solutions

Energy Venue™

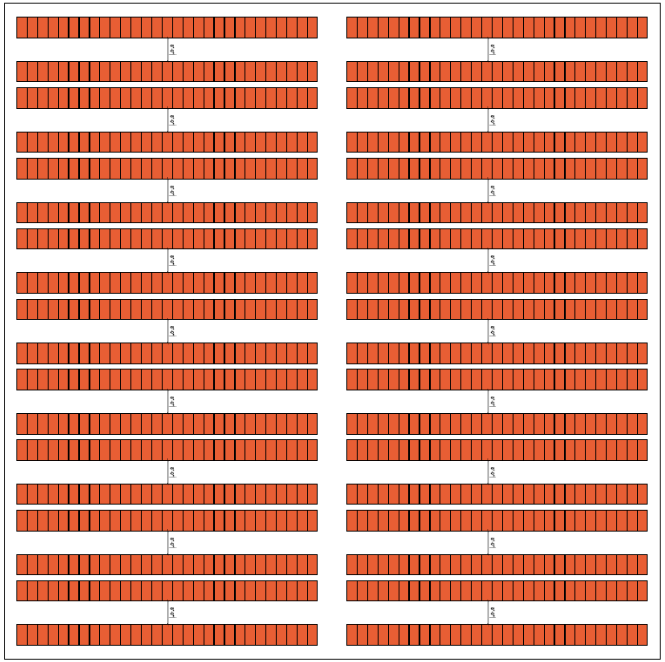
- Indoor warehouse-based solution utilizing stacked Energy Racks
- Highest possible energy density

<u>Structure Specifications</u>

- 50,000 ft² structure
- 150 kWh per 1500V rack
- 29 racks per row
- 1,044 racks per level
- 3,132 racks total
- 8’ recommended clearance between rows
- 1’ recommended clearance for back-to-back rows

<u>Total Capacity</u>

- 1-level total = 156.6 MWh
- 2-level total = 313.2 MWh
- 3-level total = 469.8 MWh



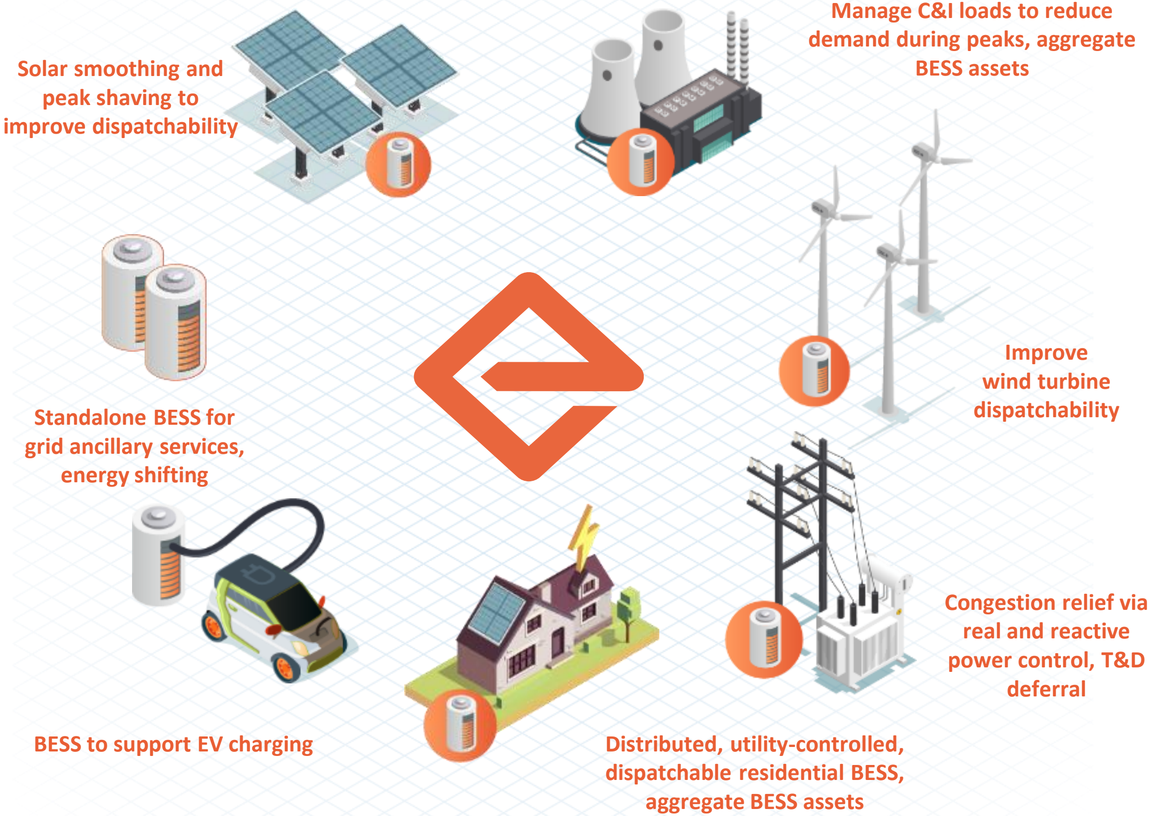
Excellent scalability with stacking up to three rows high

<u>Dimensions</u>

- 24’ H x 21’ W x 7’ D

Grid-Scale Applications

EnerVenue NiH_2 is changing the way electric utilities are thinking about battery energy storage systems



ENERVENUE CAN DO IT ALL…

DURABLE 30,000 cycles, 30 years, 3 cycles/day

FLEXIBLE Multiple use cases per day

SIMPLE Minimal OPEX with no augmentation

SAFE No fire or thermal runaway risk

PROVEN Refined by NASA and Stanford

	LITHIUM-ION	ENERVENUE
Daily Cycles	1 With Resting Period	1-3 Continual Cycling
OPEX (% CAPEX/yr)	3 %	0.5 %
Augmentation	Yes	No

The Value of Battery Energy Storage

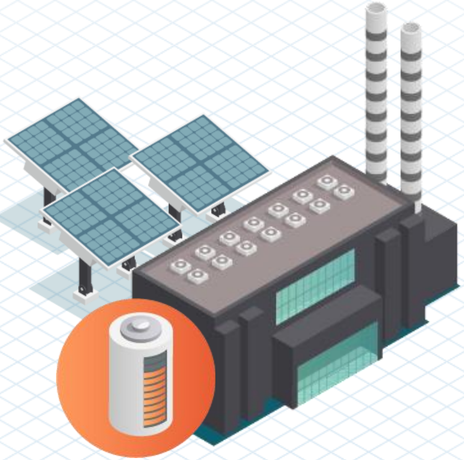
Commercial and Industrial (C&I) customers

REDUCE COSTS

- Shift electricity consumption from expensive to lower cost periods
- Generates power locally
- Reduces demand on the grid without disrupting business operations

IMPROVE SUSTAINABILITY

- Harness energy from renewable fuel sources
- Draws more electricity from autonomously generated solar power
- Slashes the amount of energy drawn from the grid



IMPROVE RESILIENCY

- Provides enough backup power to tackle any grid reliability issues
- Provides backup coverage by leveraging the solar energy stored
- Provides plenty of backup power to tackle any grid imbalances

EARN REVENUE

- Grants access to grid services, like Demand Response
- Minimizes the energy curtailment and generates additional revenue streams
- Generates revenue by selling energy surpluses into the energy market

Execution Partners

- Established relationships across industry verticals to drive EnerVenue market penetration

Execution Partners

Battery and BMS	PCS/Inverter	ESS Integrator	EMS	EPC	Developer / IPP
EnerVenue	epcpower	PowerSecure	Watt More (intelligent energy now)	CSI Energy Group (Pursuing Engineering Excellence)	Clearway
	Delta	Nicon Green Energy Renewable Services	PowerSecure	IEA	Vistra Energy
	Dynapower	Dynapower	Indie Energy	Burns McDonnell	AES
	SMA	amperehour	Fractal EMS	Blue Ridge Power	Calpine
		slb			Pinegate Renewables
		FlexGen			NextEra Energy
		Sonnell Power Solutions			Avantus
		NextEra Energy			

EnerVenue Deployments

Arvada, CO
365 kWh

Watkins, CO
365 kWh

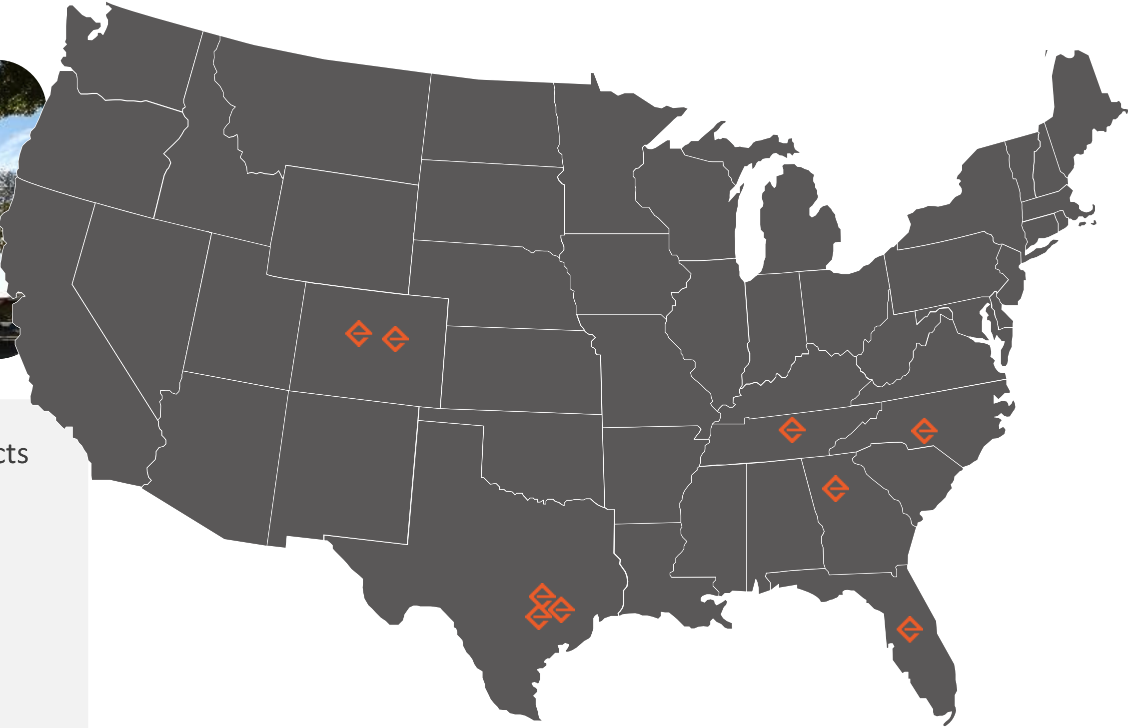
Sugar Land, TX
365 kWh

Charlotte, NC
365 kWh

India
365 kWh

Germany
365 kWh

Denmark
365 kWh



Additional projects coming soon:

- Tennessee
- Georgia
- Florida
- Puerto Rico
- China
- Saudi Arabia

1.4+ GWh in firm POs
7,000 MWh in MOUs signed

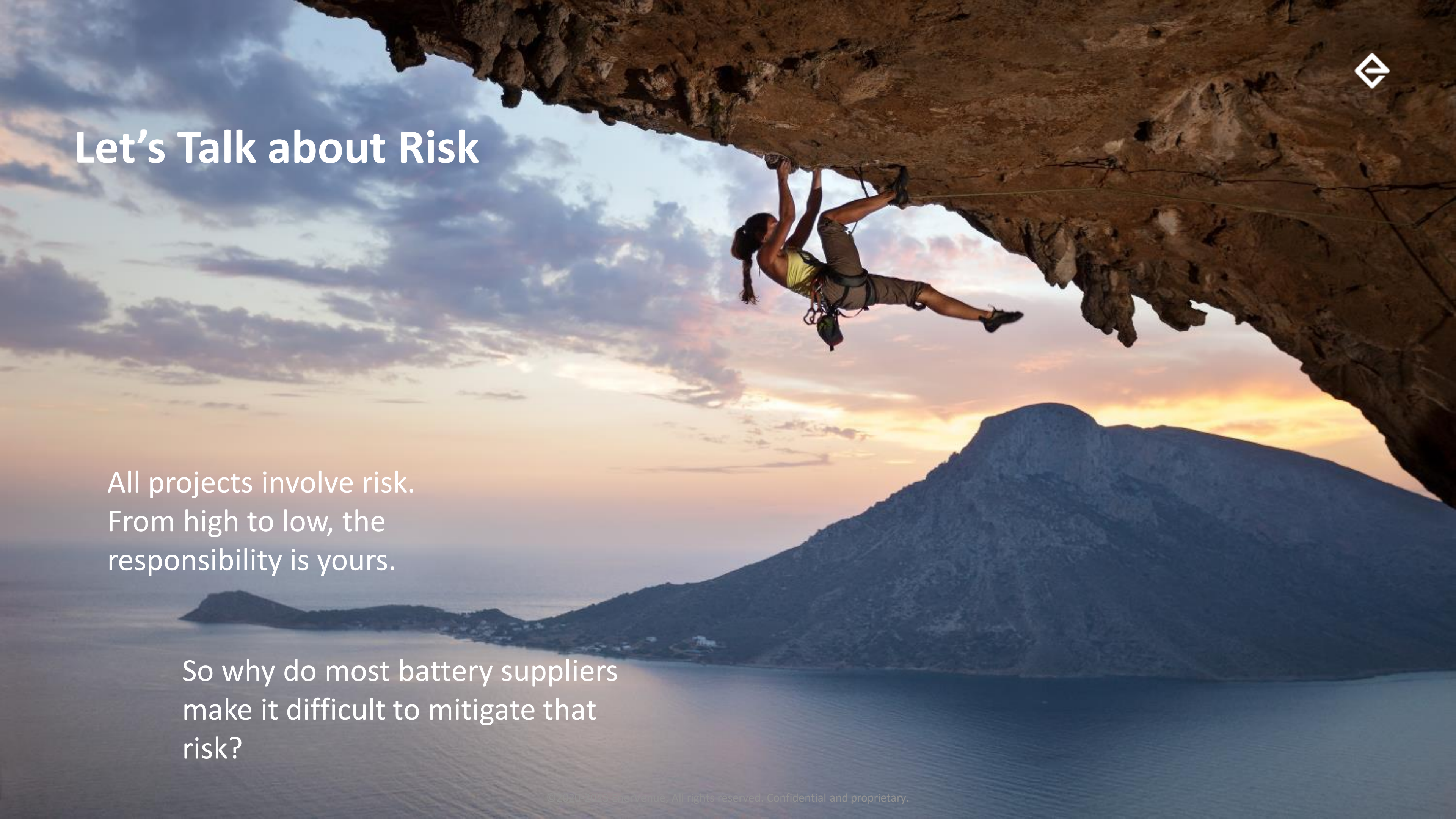
EXPANSION TIMELINE

ESV 4.0
2023
HIGH SPEED R&D LINE

100 MWh
Q4 2024
GLOBAL PRODUCTION VALIDATION SITE

1500 MWh
2025
1ST PHASE KENTUCKY GIGAFACTORY

5000+ MWh
2026
DOMESTIC & GLOBAL EXPANSION



Let’s Talk about Risk

All projects involve risk. From high to low, the responsibility is yours.

So why do most battery suppliers make it difficult to mitigate that risk?

Capacity Assurance™

The stationary battery storage industry's simplest and longest extended warranty

LI-ION

- 7 – 10 years or 7,000 – 10,000 cycles
- End of life with 60% capacity
- Complex operating terms
  - SOC limitations
  - Narrow C-rate requirements
  - <u>Strict</u> temperature requirement
  - Non-linear degradation
  - Requires augmentation strategy
- 10-year design life (1 cycle per day)
  - No safety margin

ENERVENUE ENERGY STORAGE VESSELS

- The stationary battery storage industry's simplest and longest extended warranty
- 20-year or 20,000 cycles
- Second life with 88% capacity
- Simple operating terms
- 90-year design life (1 cycle per day)
  - Ample safety margin

Validation from Distinguished Media Outlets

FORBES > INNOVATION > SUSTAINABILITY

Forget Musk! This News From EnerVenue Will Change The World

Erik Kobayashi-Solomon Contributor

Investor in climate change adaptation and mitigation businesses

Follow

0

May 26, 2023, 08:00am EDT

Listen to article 5 minutes

I believe these walls of EnerVenue Energy Storage Vessels represent the future of stationary battery installations around the world. [-] ENERVENUE.COM

CANARY MEDIA

This NASA tech might just spur a major grid battery breakthrough

EnerVenue's still got plenty to prove, but it already has a pipeline of orders and more than $100M in funding. A factory in Kentucky is on the way.

17 April 2023

The International Space Station pictured from the SpaceX Crew Dragon Endeavour in November 2021 (NASA)

Modified NASA space tech provides sustainable batteries that last 30 years

It "lasts more than three times as long" as lithium-ion, according to EnerVenue CEO Jorg Heinemann.

INTERESTING ENGINEERING

With the advent of space tourism for the world's wealthiest and a looming global recession, there has been a predictable increase

EnerVenue Has Garnered International Attention

Energy Storage

Metal-Hydrogen Battery Company EnerVenue Signs 250 MWh Supply Deal with Developer

pv magazine

EnerVenue to Supply 420 MWh of Metal-Hydrogen Batteries to Puerto Rico

Solar Industry

EnerVenue Signs Energy Storage Agreement with Pine Gate Renewables

Solar Power World

EnerVenue Offers 20-Year Extended Warranty for Its Nickel-Hydrogen Batteries

SOLAR BUILDER

EnerVenue has a metal-hydrogen battery tech that could de-throne large-scale lithium storage

Forbes

EnerVenue: The Batteries We Need For Grid-Scale Storage

CANARY MEDIA

This NASA tech might just spur a major grid battery breakthrough

POWER

Battery Technology Used in Outer Space Could Be a Gamechanger on Earth

Energy Storage

Metal-hydrogen battery company EnerVenue to open 1GWh battery factory in Kentucky, scaling up to 20GWh

Industry Leading Management Team

EnerVenue has brought together a team of premier scientists and renewable energy and battery executives experienced in commercializing breakthrough technologies

Jorg Heinemann
CEO

10+ years renewable energy executive leadership; 20 years global business transformation leadership at Accenture

- CCO/COO Primus Power
- EVP SunPower ($1.5B P&L)
- Accenture, Executive Partner

Yi Cui
Chairman & Chief Technology Advisor

Professor, Matertials Science & Engineering, Stanford

- Founder of Amprius, 4C Air, and EEnotech
- Fellow of Electrochemical Society (2018), Materials Research Society (2016) and Royal Society of Chemistry (2015)

Majid Keshavarz
CTO

20+ years renewable and energy storage technology leadership

- CTO of IMERGY
- VP R&D of Natron Energy
- Ph.D., Rensselaer Polytechnic Institute

Betsy Engle
CFO

10+ years Renewable Energy leadership 20+ years of Fortune 500 public company experience

- SVP CFO Iron Mountain Data Centers (4B IRM)
- SVP 8 Minute Energy Solar + Storage
- VP Graftech (1.5B GTI)
- VP General Electric Industrial (12B GE)

Randall Selesky
CRO

25+ years of leadership experience from start-ups as well as Fortune 500 companies.

- SVP Global Sales & Marketing for Greensmith Energy Management
- VP Power & Energy for Rockwell Automation

Kim Gupta
CSO

25+ years of supply chain and manufacturing expertise including start-ups and Fortune 100

- VP Strategic Sourcing for Bloom Energy
- Supply chain, materials and operations, Intel
- PH.D. Stanford

Industry Leading Sales Management Team

Randall Selesky
CRO

25+ years of leadership experience from start-ups as well as Fortune 500 companies

- SVP Global Sales & Marketing for Greensmith Energy Management
- VP Power & Energy for Rockwell Automation

Dave Shultz
VP of Sales, Americas

20 years in the technology and energy management space

- VP Sales at KORE Power and Greensmith/Wartsila
- Regional sales director at EnerNOC

Nabil Contreras
Director of Sales, Americas

17-year career in the energy industry

- Developed multiple micro-grids in the Caribbean
- Lead Cummins channel development

Chad Spring
Associate Director Business Development

15+ years of growing and managing accounts in fossil and renewable energy industries

- Siemens Energy TurboCare, EthosEnergy, and Toshiba America Energy Systems
- SMA America

Christine King
Associate Director, Inside Sales

20 years in sales, administration and operation management

- Managed sales operations for Iron Mountain
- Track record of driving demand, increasing speed to close

Veteran Product, Marketing, and Inside Support Team

Spencer Nervig
Senior Director, Product Management & Application Engineering

13-year career as a battery storage and power conversion expert

- 13-year career in the energy industry.
- 8 years at SMA focused on BESS
- Customer facing AE assisting clients with all aspects of design.

Tucker Meier
Senior Applications Engineer

Extensive experience guiding customers through complex power and storage project challenges

- 15-year career in renewable energy
- Senior applications engineer and technical training specialist, SMA Solar Technology

Brad Dore
Senior Director, Marketing

Creative and pragmatic thinker with more than 15 years of experience in renewable energy

- Outside sales and creative agency experience
- Director of Marketing, Americas region, SMA Solar Technology

Matt Marx
Product Marketing Manager

Marketing strategist and sales enablement specialist with 15 years experience in renewable energy

- Senior Marketing Manager, GoodWe
- Strategic Marketing Manager, SMA Solar Technology

PRICING

Aggressive Total Cost of Ownership

Storlytics Total Cost of Ownership Study

Use case 1: overbuild, high cycle count, deep discharge

Power Req. at POI	25 MW
Duration Req.	4 hours
EoL Dsch Energy Req. at POI	100 MWh
Project Life	20 Years
Cycle Count per Day	2.1 Cycles
Cycle Count per Asset Life	15,330 Cycles
Deployment Strategy	Overbuild
Applications	Energy Arbitrage PJM RegD , PV clipped Energy

	EnerVenue (ESV)	Lithium (LFP)
Simulation Amb. Temp	20 °C	24 °C
Required BoL Energy	112.36 MWh	219.17 MWh
Max SoC	100%	96%
Min SoC	3%	3%

	EnerVenue (ESV)	Li-Ion ($LiFePO_4$)
Project Life	20 years	20 years
Cost per unit energy ($/kWh)	350	285
Required BoL Energy Capacity (MWh)	112.36	219.17
DC Block Capital Cost($)	$ 39,326,000	$62,463,450
AC System Capital Cost($)	$ 2,400,000	$3,360,000
Total System Capital Cost($)	$ 41,726,000	$65,823,450
SoH Guarantee Cost per year ($)	$ 179,776	$317,797
NPV Cost of SOH Guarantee($)	$ 2,715,387	$4,800,087
Energy Loss Per Year (MWh)	9026.45	2,097.66
Cost of Energy Loss per Year($)	$ 992,910	$ 230,742
NPV Cost of Energy Loss ($)	$ 14,771,986	$ 3,432,859
NPV of Total Running Cost($)	$ 17,487,373	$ 8,232,946
Discount rate	3%	3%
Total Cost ($)	$ 59,213,373	$ 74,056,396
Required EoL Energy(MWh)	100	100
Effective Cost per Required EoL Energy($/kWh)	**$ 592**	**$ 741**

ESV-4.0 drives lower cost, comparison underway

Technical Scores

Scores are based on Enervenue battery performance of specified use-case in section 3

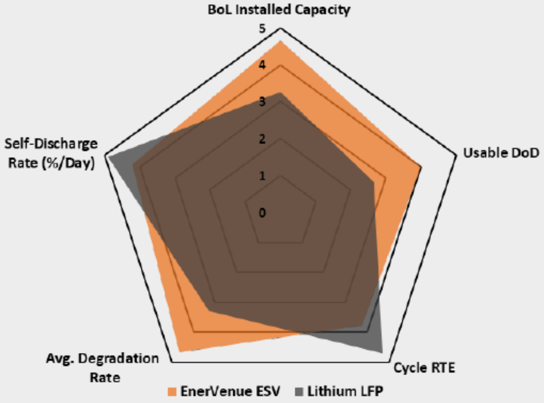


Figure 1. Radar chart for technical comparison

Table I. Technical Scoring

	EnerVenue ESV	Lithium LFP
BoL Instl. Capacity	4.7	3.3
Usable DoD	4	2.7
Cycle RTE	3.8	4.7
Avg. Deg. Rate	4.7	3.3
Self-Dsch Rate (%/Day)	4.2	4.9

Storlytics Total Cost of Ownership Study

Use case 2: augmentation, medium cycle count, deep discharge

Power Req. at POI	25 MW
Duration Req.	4 hours
EoL Dsch Energy Req. at POI	100 MWh
Project Life	20 Years
Cycle Count per Day	1.75 Cycles
Cycle Count per Asset Life	12,775 Cycles
Deployment Strategy	EnV: Overbuild; Li-Ion:Augmentation
Applications	Energy Arbitrage PV clipped Energy

ESV-E

	EnerVenue (ESV)	Lithium (LFP)
Simulation Amb. Temp	20 °C	24 °C
Required BoL Energy	112.36 MWh	127.48 MWh
Required Augmentation	None	Y5 – 30 MWh Y12 – 115 MWh Y15 – 30 MWh
Max SoC	100%	96%
Min SoC	3%	3%

	EnerVenue (ESV)	Li-Ion ($LiFePO_4$)
Project Life	20 years	20 years
Cost per unit energy ($/kWh)	350	285
Required BoL Energy Capacity (MWh)	112.36	127.47
DC Block Capital Cost($) - Year 0	$ 39,326,000	$36,328,950
DC Block Capital Cost($)- Augmentation	$0	$30,935,381
DC Block Capital Cost($) - Total	$39,326,000	$67,264,331
AC System Capital Cost($)	$ 2,400,000	$2,160,000
Mobilization/Demobilization		$215,756
Total System Capital Cost($)	$ 41,726,000	$ 69,640,086
SoH Guarantee Cost per year ($)	$ 179,776	$184,832
NPV Cost of SOH Guarantee($)	$ 2,715,387	$2,791,747
Energy Loss Per Year (MWh)	7186.49	2,742.25
Cost of Energy Loss per Year($)	$ 790,513	$ 301,647
NPV Cost of Energy Loss ($)	$ 11,760,842	$ 4,487,745
NPV of Total Running Cost($)	$ 14,476,229	$ 7,279,492
Discount rate	3%	3%
Total Cost ($)	$ 56,202,229	$ 76,919,578
Required EoL Energy(MWh)	100	100
Effective Cost per Required EoL Energy($/kWh)	**$ 562**	**$ 769**

ESV-4.0 drives lower cost, comparison underway

Technical Scores

Scores are based on EnerVenue battery performance of specified use-case in section 3

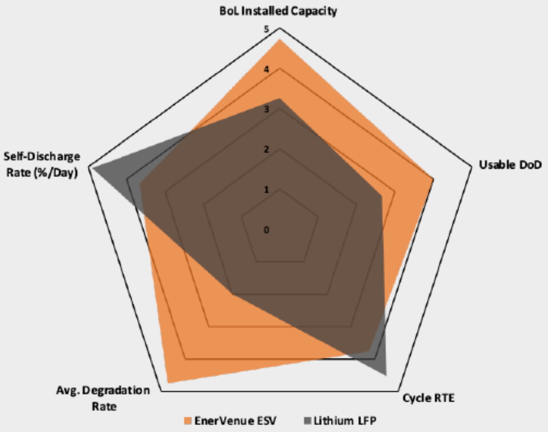


Figure 1. Radar chart for technical comparison

Table I. Technical Scoring

	EnerVenue ESV	Lithium LFP
BoL Instl. Capacity	4.7	3.3
Usable DoD	4.0	2.7
Cycle RTE	3.8	4.5
Avg. Deg. Rate	4.7	2.0
Self-Dsch Rate (%/Day)	3.7	4.9

Disclaimer: This work should not be viewed as an endorsement by EPRI and should be considered an unbiased, independent analysis

DER-VET EnerVenue Modeling Results

Miles Evans | EPRI

Overview

This study compares the financial outcomes from owning and operating an EnerVenue energy storage system with a typical Lithium-ion energy storage system using EPRI's Distributed Energy Resources Value Estimation Tool (DER-VET). Each system in 2, 4, 6, and 8 hour configurations is simulated in the CAISO and ERCOT energy and ancillary services markets with degradation modeling to determine expected lifetimes and compared on a net present value basis.

Data Sources

- Energy and ancillary services prices in 2022
  - CAISO (PGAE DLAP)
  - ERCOT (HOUSTON HUB)
- Technical specifications and performance information
  - EnerVenue's data sheet and supplementary information from EnerVenue
  - Lithium-ion generic data and EPRI's cost tool

Inputs and Assumptions

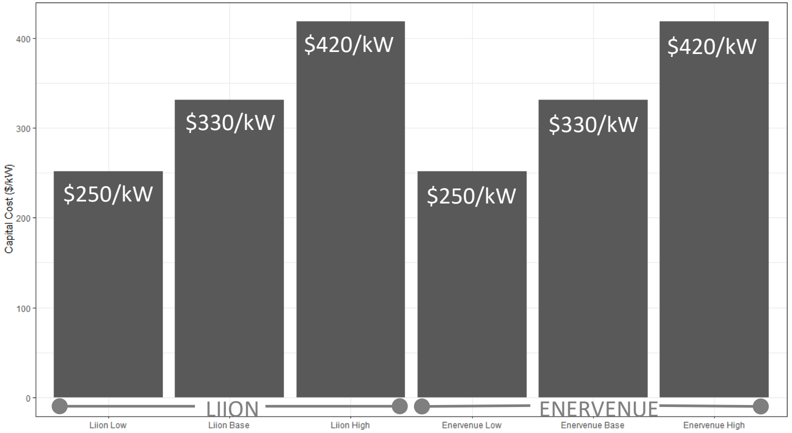
Capital Costs Sensitivity Analysis

AC CAPITAL COST SENSITIVITY INPUTS

- EnerVenue and Liion assumed to be the same
  - $250/kW (low)
  - $330/kW (base)
  - $420/kW (high)

Includes

- *PCS*
- *Controls/SCADA*
- *AC BOP and Installation*
- *Site Work*
- *Engineering*
- *Management*
- *Contingency*
- *Profit*

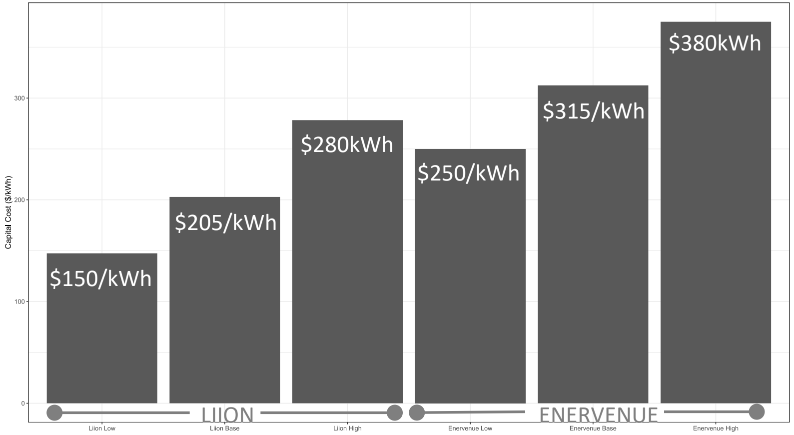


DC CAPITAL COST SENSITIVITY INPUTS

- Liion
  - $150/kWh (low)
  - $205/kWh (base)
  - $280/kWh (high)
- EnerVenue
  - $250/kWh (low)
  - $315kWh (base)
  - $380/kWh (high)

Includes

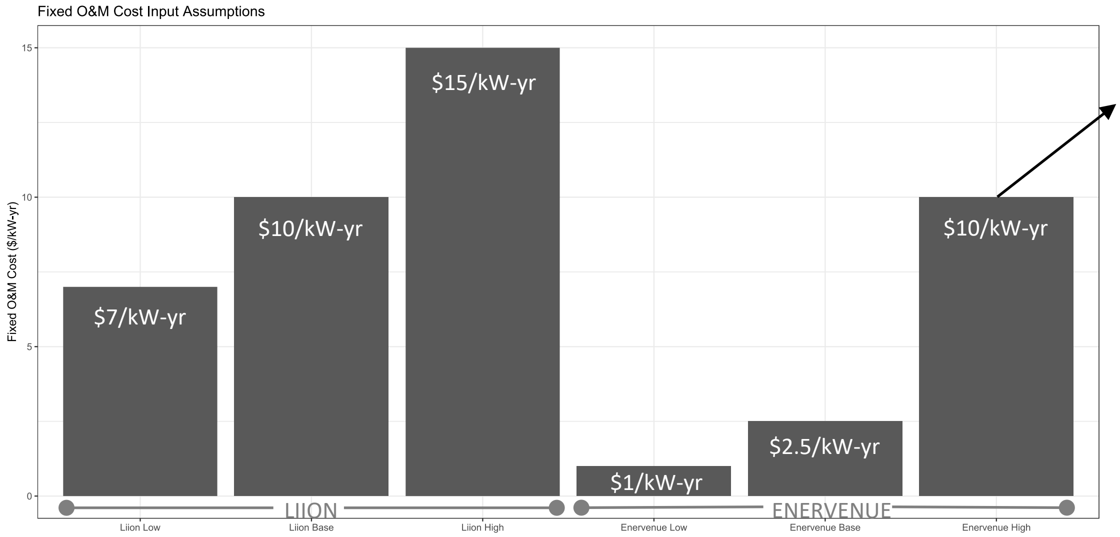
- *Batteries*
- *DC BOP (enclosure, aux systems, etc)*
- *BESS Installation*



Fixed O&M Costs Sensitivity Analysis

FIXED O&M COST SENSITIVITY INPUTS

- Liion
  - $7/kW-yr (low)
  - $10/kW-yr (base)
  - $15/kW-yr (high)
- EnerVenue assumed to be the same
  - $1/kW-yr (low)
  - $2.5/kW-yr (base)
  - $10/kW-yr (high)

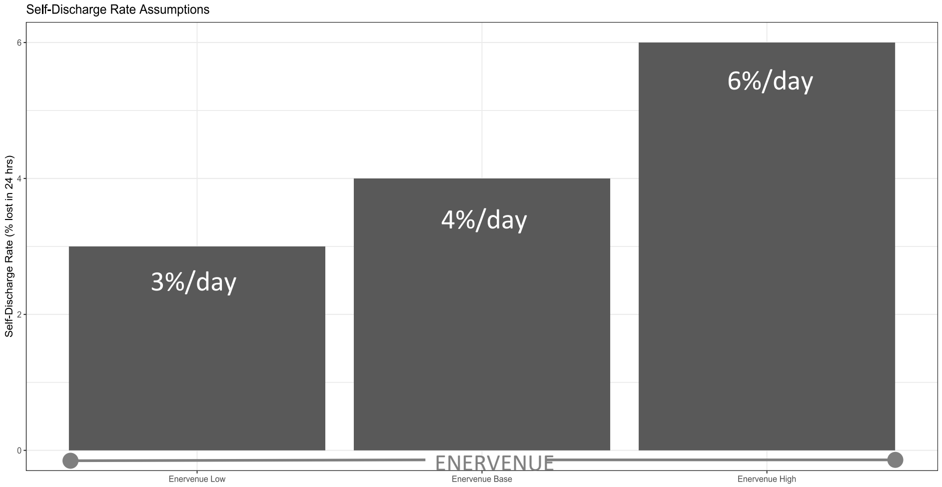


NOTE: The EnerVenue high fixed cost scenario is selected to match the Liion base scenario for comparison's sake. This is not an expectation of high fixed costs for the EnerVenue system.

Self-Discharge Rate Sensitivity Analysis

SELF-DISCHARGE SENSITIVITY INPUTS

- Liion
  - 0%/day
- EnerVenue assumed to be the same
  - 3%/day (low)
  - 4%/day (base)
  - 6%/day (high)



Degradation and RTE Inputs

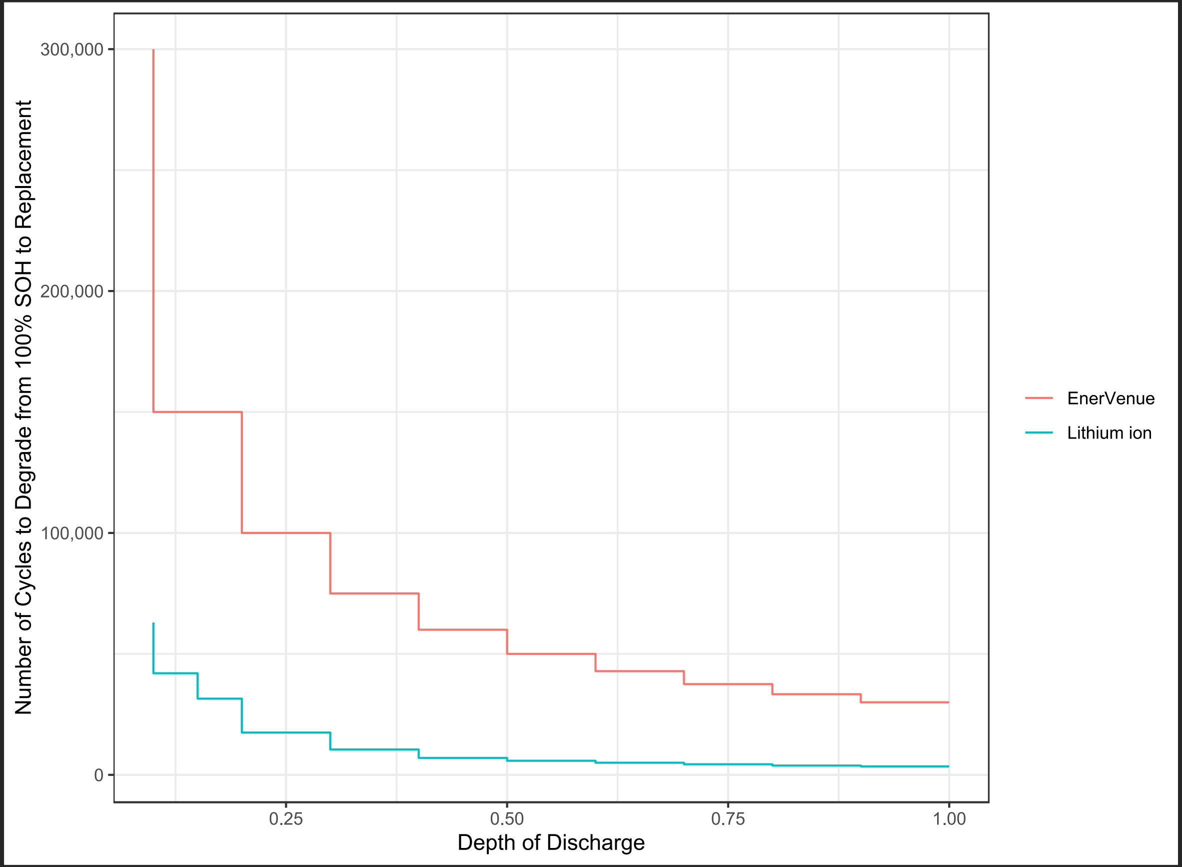
DEGRADATION INPUTS

- The EnerVenue system is given a very conservative flat cycle life curve, meaning a partial cycle is counted as a full cycle in the DER-VET model
- A generic cycle life curve is used for the Lithium system based on a generic LFP chemistry

RTE INPUTS

- Lithium-ion: **85%**
- EnerVenue: **83%** (86% DC-DC RTE plus inverter losses)

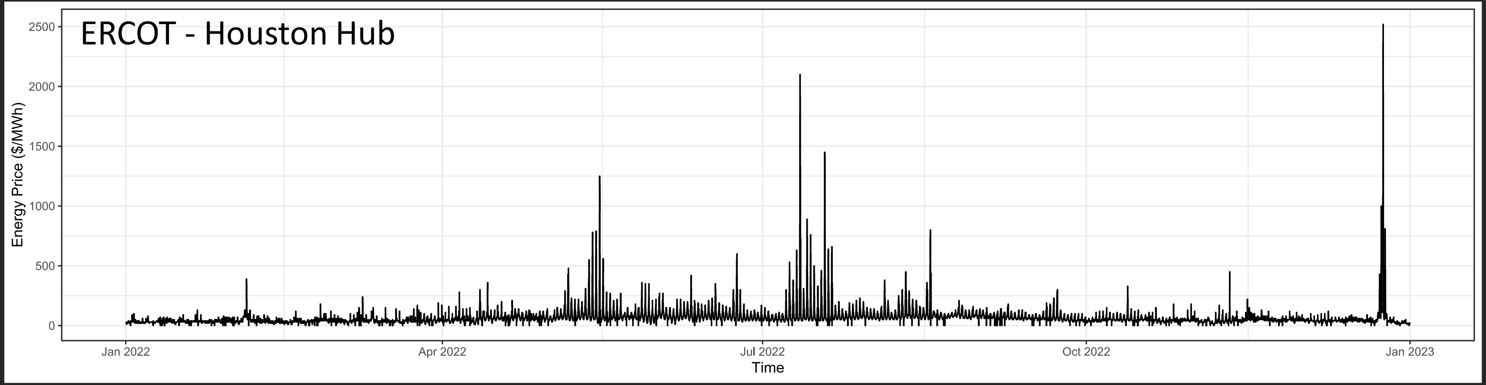
RTE = AC energy discharged/AC energy charged

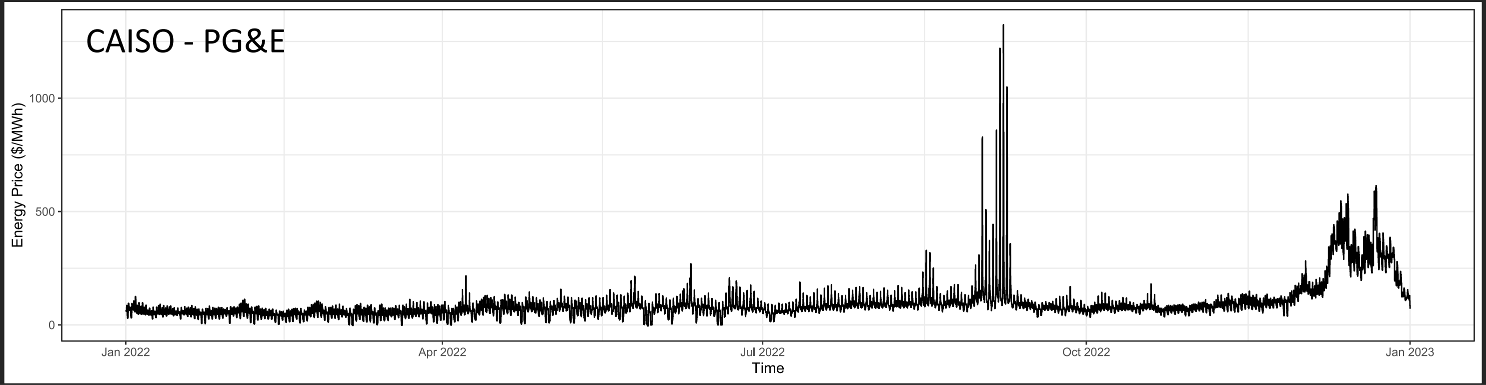


Market Participation Comparison

Energy Prices

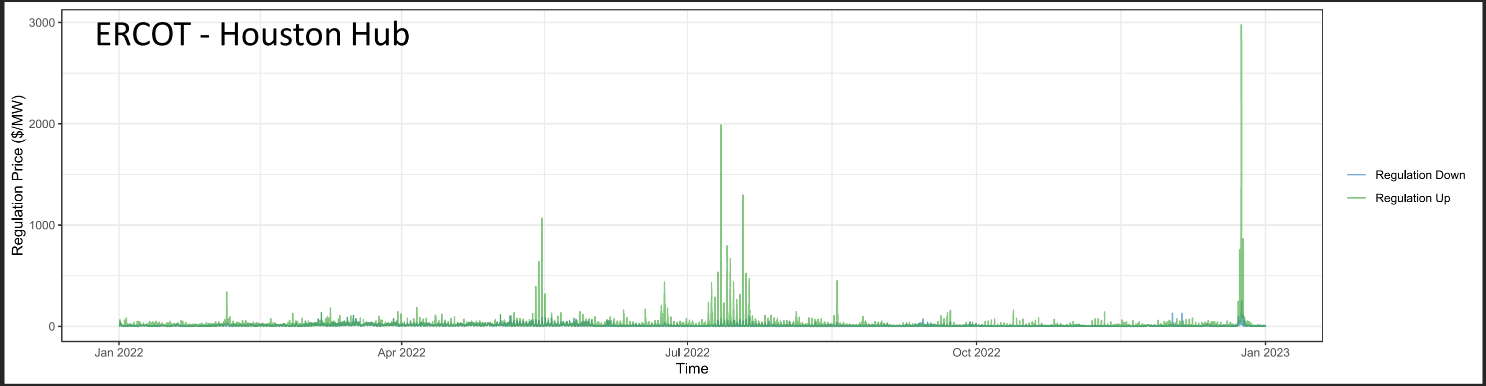
- Historical ENERGY market pricing data for calendar year 2022
- Used as DER-VET baseline for EnerVenue and Liion NPV comparison

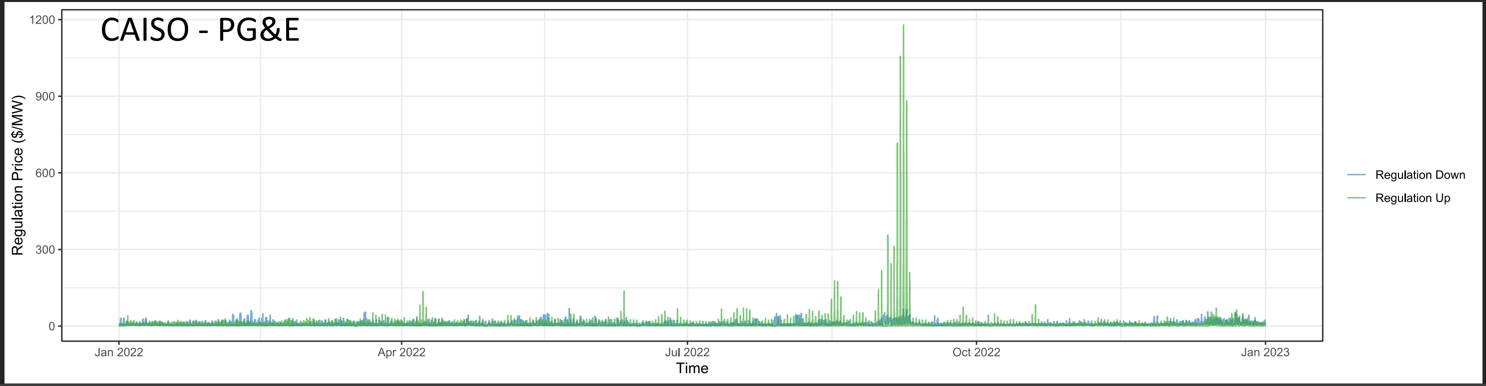




Regulation Prices

- Historical FREQUENCY REGULATION market pricing data for calendar year 2022
- Used as DER-VET baseline for EnerVenue and Liion NPV comparison

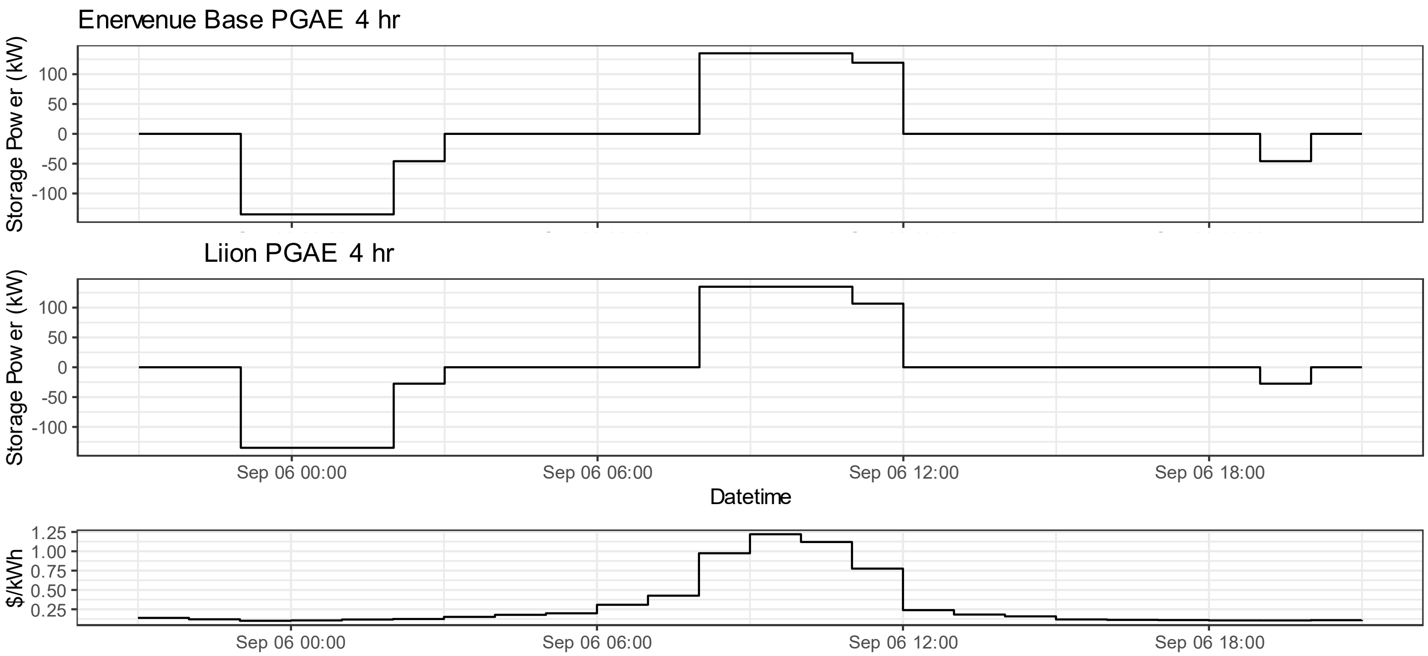




Energy Market Comparison – 24hr Snapshot CAISO PG&E

Visual depiction of DER-VET model analysis.

In both cases, the systems charge from the cheapest available electricity and discharge when the price is highest.



NOTE: Only minimal differences in operation due to roundtrip efficiency differences, etc.

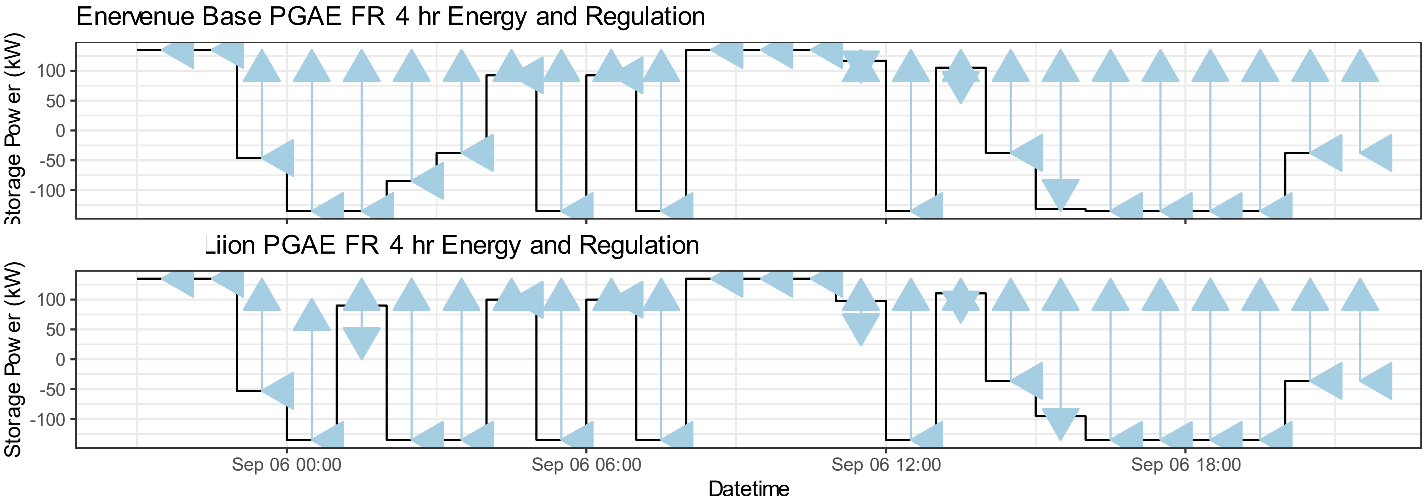
Energy & Regulation Market Comparison – 24hr Snapshot CAISO PG&E

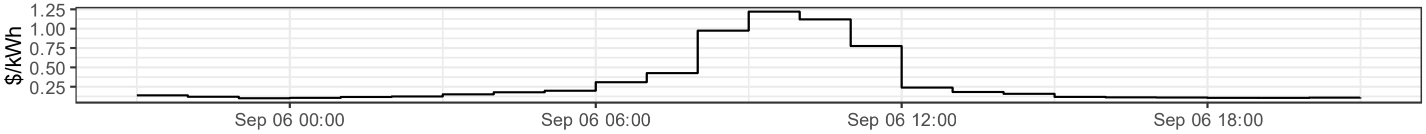
Visual depiction of DER-VET model analysis.

Blue arrows represent regulation participation.

Both systems maximize total (energy and regulation) benefit with similar overall operation.

Both systems discharge fully during the price spike while recharging and providing regulation at other times

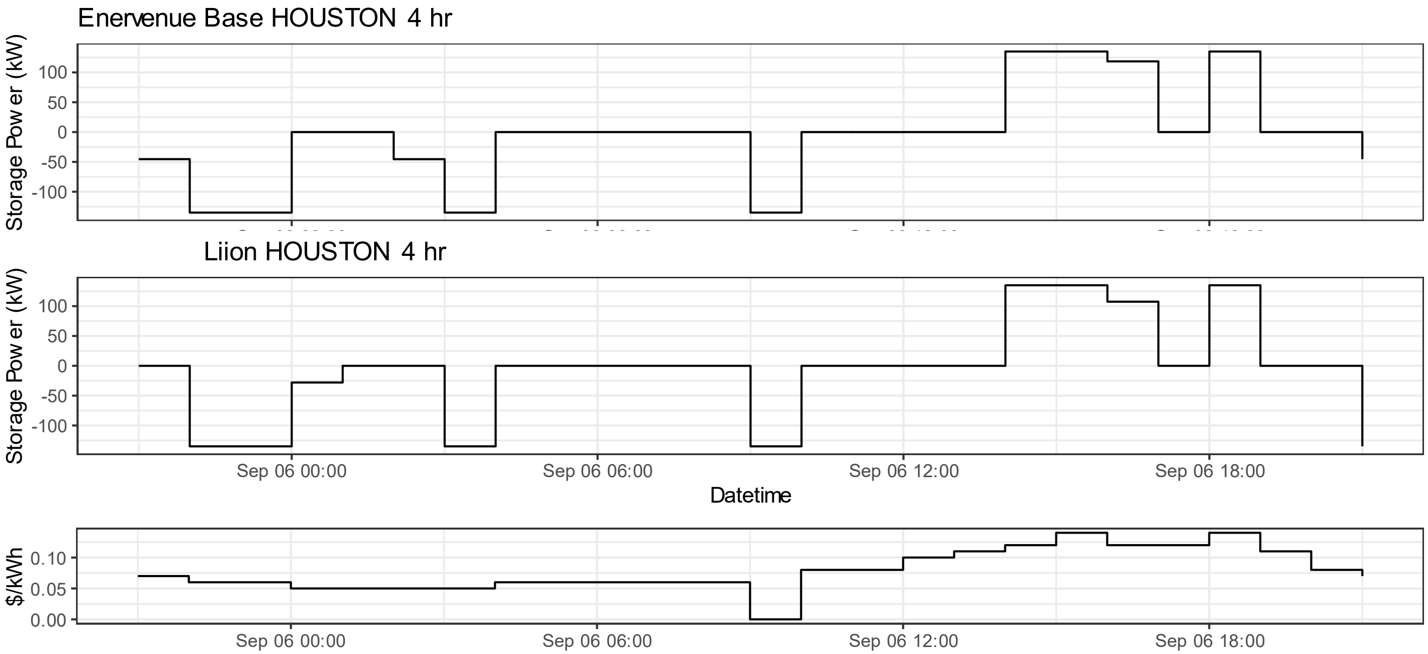




Energy Market Comparison – 24hr Snapshot ERCOT Houston

Visual depiction of DER-VET model analysis.

In both cases, the systems charge from the cheapest available electricity and discharge when the price is highest.



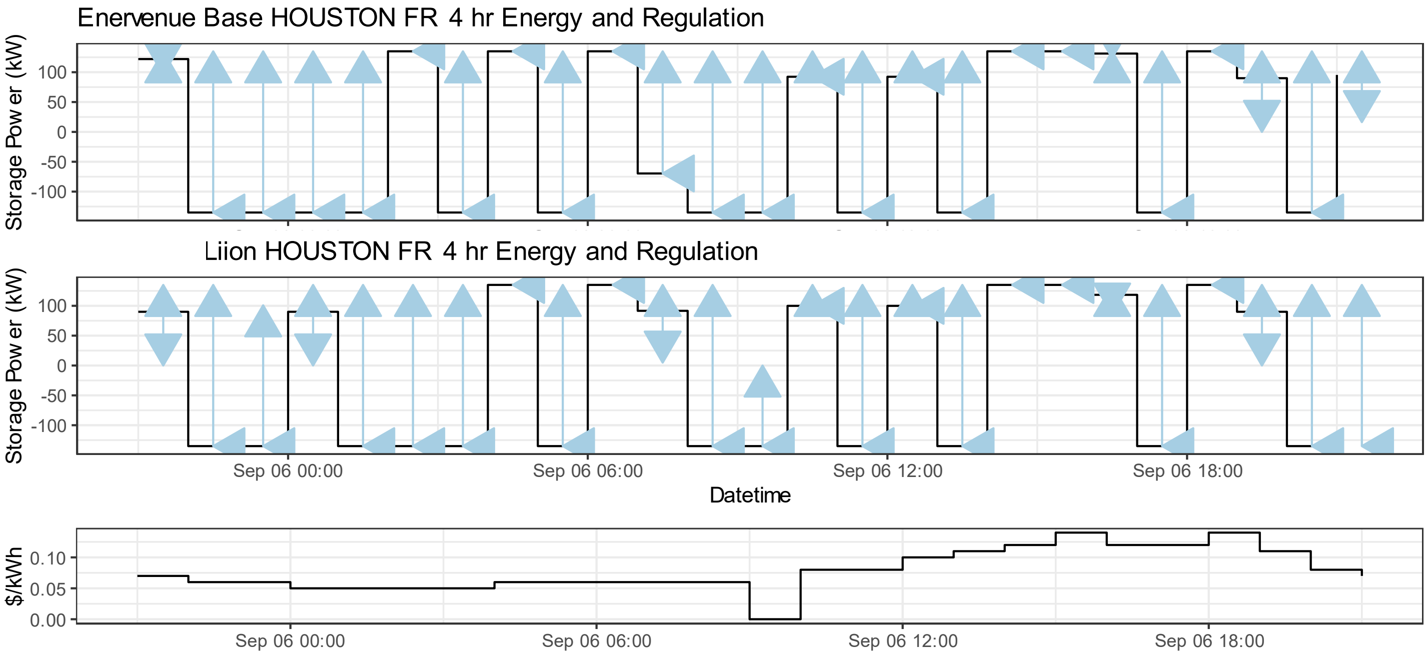
NOTE: Only minimal differences in operation due to roundtrip efficiency differences, etc.

Energy & Regulation Market Comparison – 24hr Snapshot ERCOT Houston

Visual depiction of DER-VET model analysis.

Blue arrows represent regulation participation.

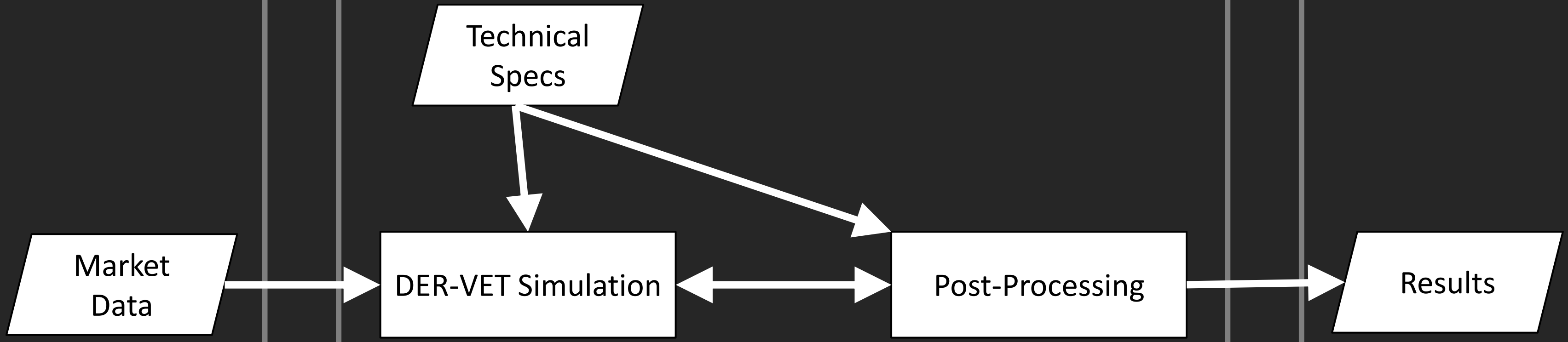
Both systems spend most of the day providing regulation and managing SOC, and discharging with no regulation during the afternoon.



EPRI

Methods

Methods



1 year of hourly energy and regulation prices in ERCOT and CAISO in 2022

24-hr optimization window mimics day-ahead market, but prevents energy shifting between days

Returns best possible financial outcomes given the market conditions and technical limitations of each system

RTE, self-discharge, and degradation are modeled with more fidelity than can be in optimization

7% discount rate applied for both technologies

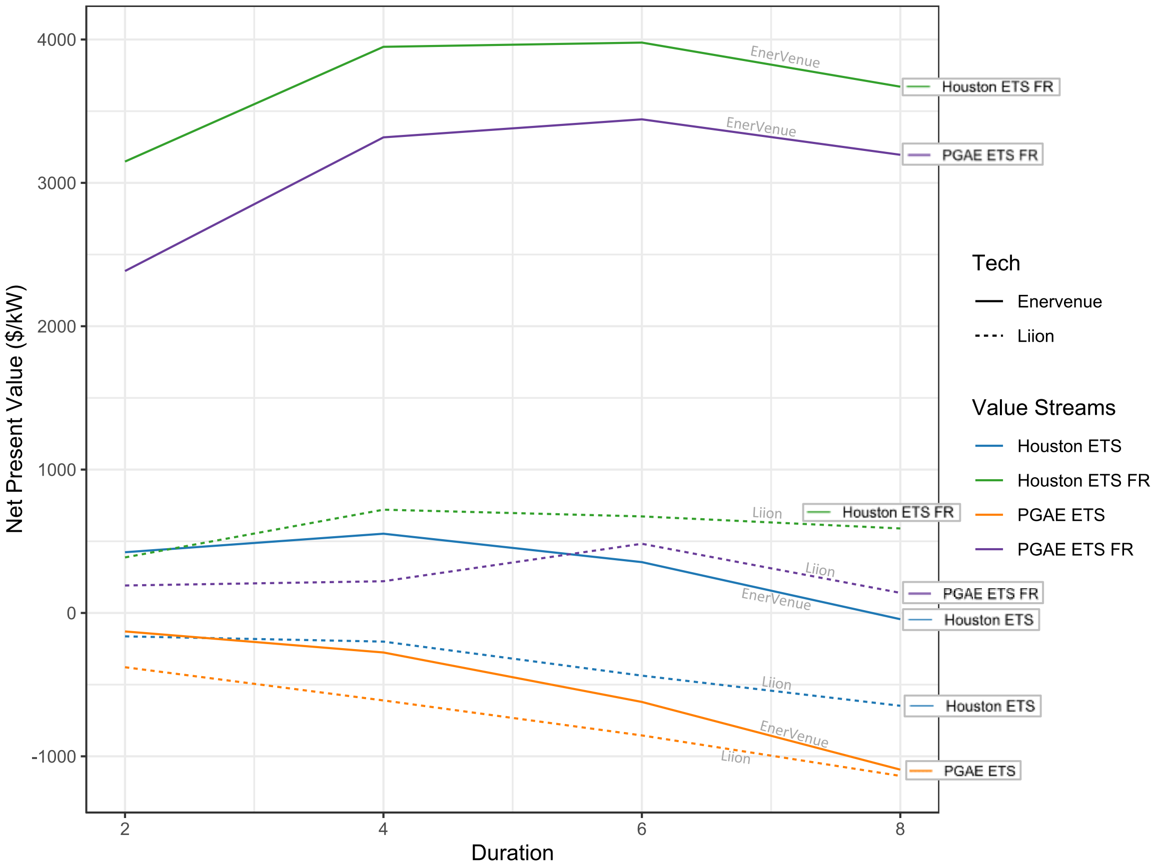
NPV financial outcome comparison of technologies

Results

Net Present Value – Base Case

CONCLUSIONS

- NPV of EnerVenue is greater than Liion in all use cases and durations



Key
ETS = 'Energy Time Shifting'
FR = 'Frequency Regulation'

Net Present Value - Capital Cost Sensitivity

CONCLUSIONS

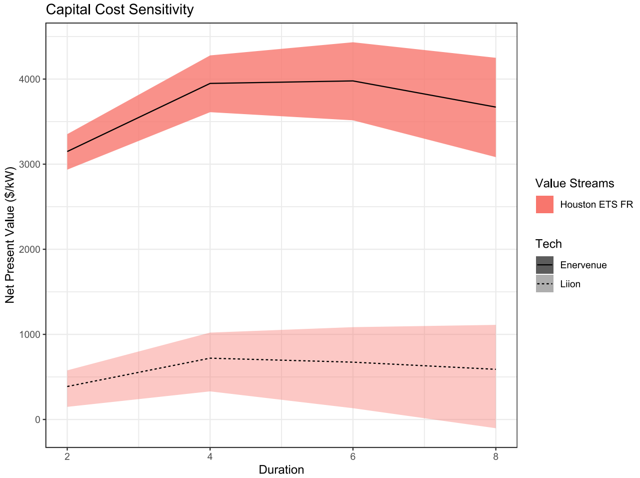
The colored ribbons represent the range between low and high capital costs and the line represents the base assumption.

Key
ETS = 'Energy Time Shifting'
FR – 'Frequency Regulation'

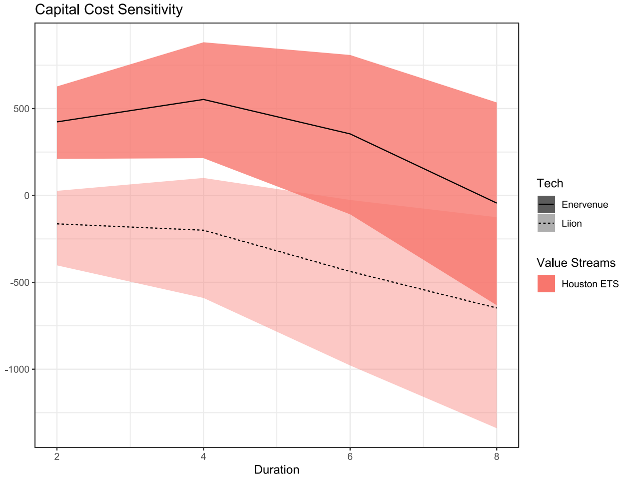
- For ETS+FR case in Houston ERCOT, EnerVenue's **high cost** assumption yields significantly better NPV than Liion **low cost** assumption across all durations.

- For ETS case in Houston ERCOT, EnerVenue's **high cost** assumption yields better NPV than Liion **low cost** assumption in 2 and 4 hour durations while still being competitive in 6 and 8 hour durations.

ETS + FR
Houston ERCOT



ETS
Houston ERCOT



Net Present Value - Capital Cost Sensitivity

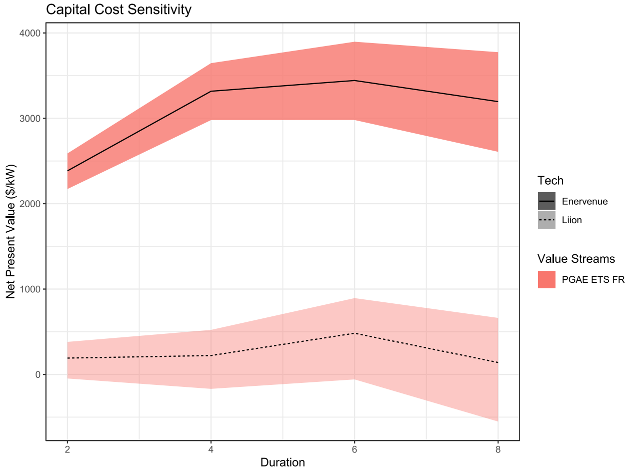
CONCLUSIONS

- For ETS+FR case in PG&E CAISO, EnerVenue's **high cost** assumption yields significantly better NPV than Liion **low cost** assumption across all durations.
- For ETS case in PG&E CAISO, EnerVenue's NPV is generally more favorable over Liion.

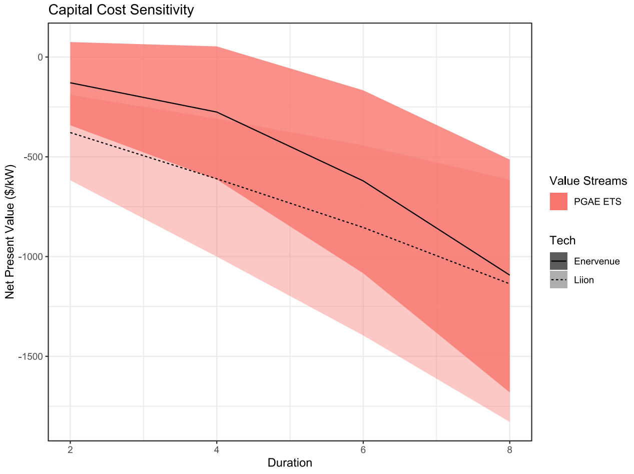
The colored ribbons represent the range between low and high capital costs and the line represents the base assumption.

Key
ETS = 'Energy Time Shifting'
FR – 'Frequency Regulation'

ETS + FR
PG&E CAISO



ETS
PG&E CAISO



Conclusions

Conclusions

- There are three main factors that distinguish the EnerVenue system from a generic Lithium-ion reference point:
  - Cost
  - Life
  - Performance
- Capital cost is slightly higher for the EnerVenue system in 2025
- Life is much longer for the EnerVenue system, overcoming the cost gap.

The EnerVenue system results in higher NPV in nearly all cases

Contacts

Randy Selesky
Chief Revenue Officer

+1 (847) 420-7994
randy.selesky@enervenue.com

Dave Shultz
VP of Sales, Americas

+1 (617) 872-1982
dave.shultz@enervenue.com

Chad Spring
Associate Director, Business Development

+1 (720) 819-5711
chad.spring@enervenue.com

Nabil Contreras
Director of Sales, Americas

+1 (754) 236-9926
nabil.contreras@enervenue.com

Spencer Nervig
Senior Director, Product Management and Application Engineering

+1 (916) 261-9744
spencer.nervig@enervenue.com

Brad Dore
Senior Director, Marketing

+1 (916) 207-7355
brad.dore@enervenue.com

Thank You!