Game Changer for Energy Storage

VIB ESS

STANDARD
ENERGY

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STANDARD ENERGY

Company Profile

Battery company founded by
Ph. D. from MIT & KAIST since 2013

11 Years

Experts in Material, Battery, System,
Facility, Quality, Strategy, Sourcing

160 Members

Total fundraised amount
No.1 battery startup in South Korea

100 Million USD

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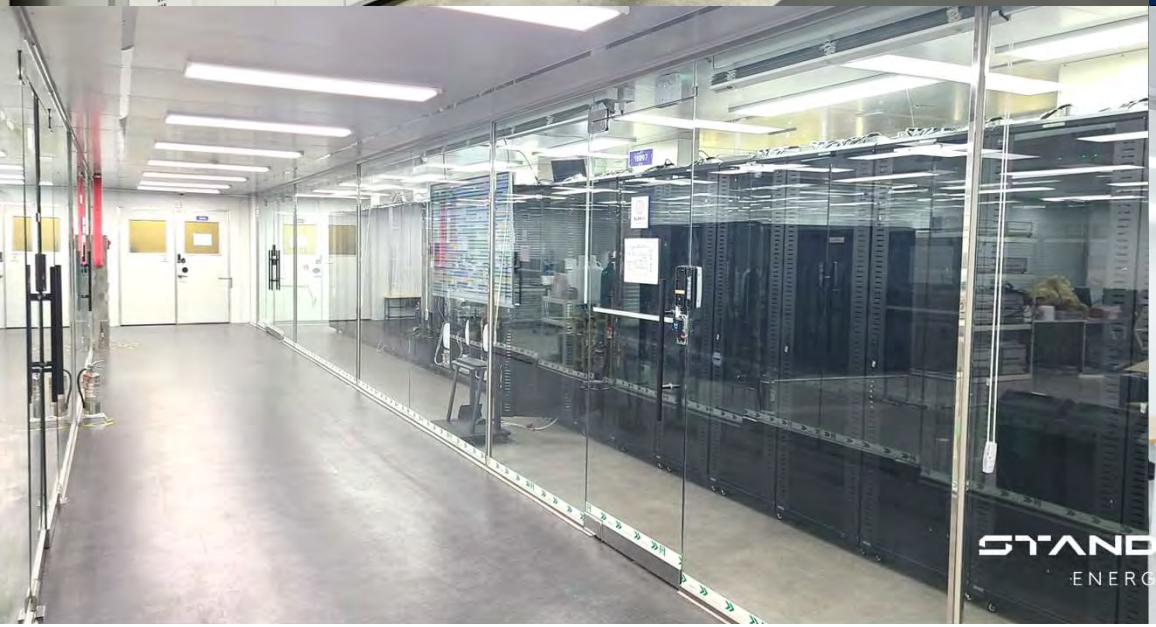
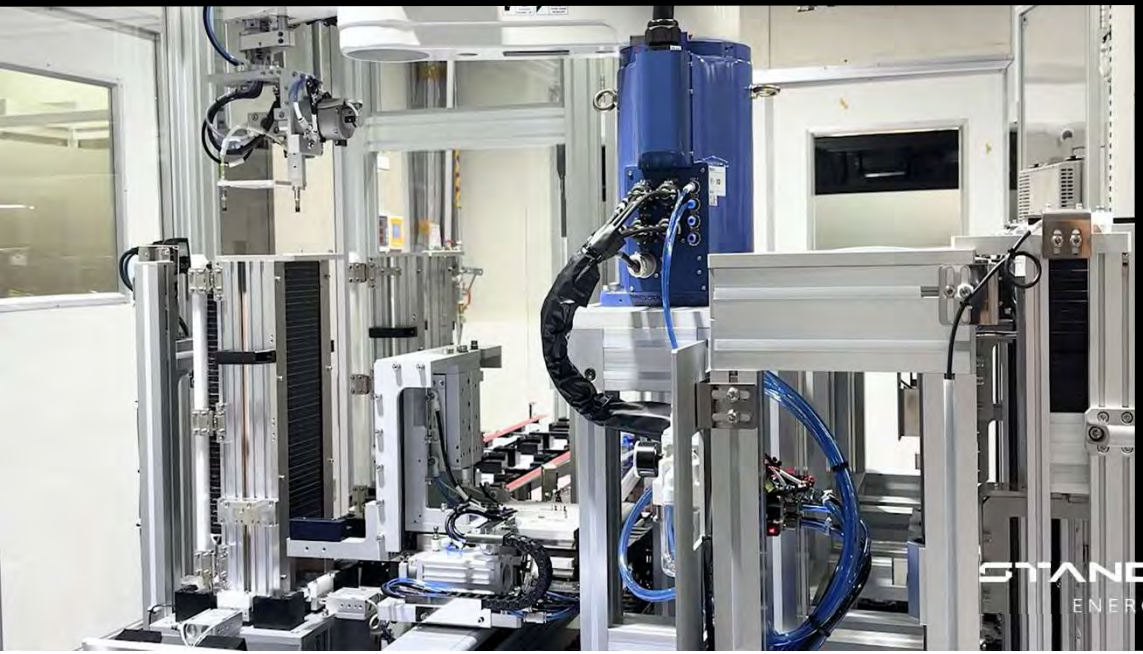
From Fundamental R&D



To Material, Cell, System



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Energy Market

Energy Market: Supply & Demand

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Traditional Plants → Renewables

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Unstable: Daily & Local

Figure 7 - uploaded by Wander S Wadman

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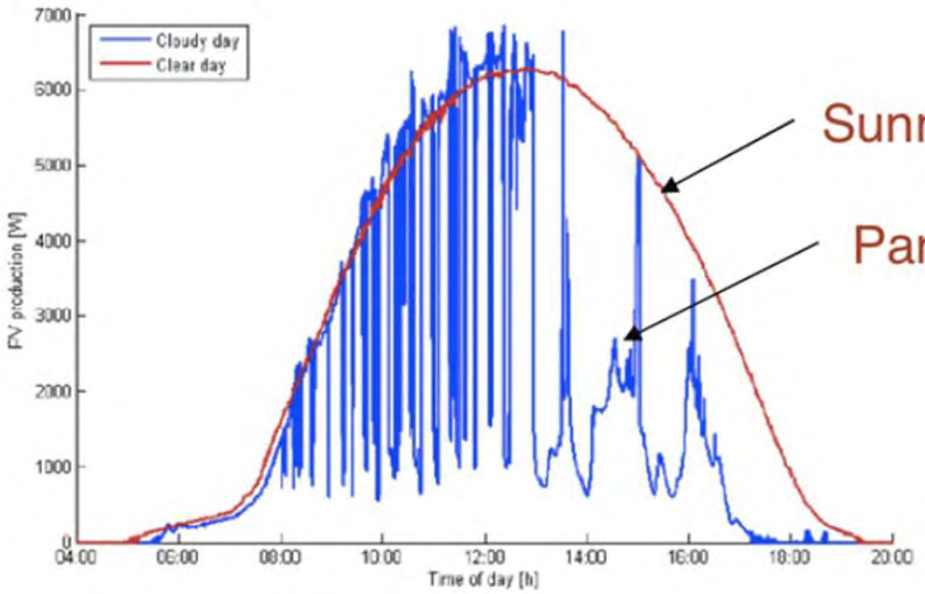

Typical daily power production profile from solar panels [1].

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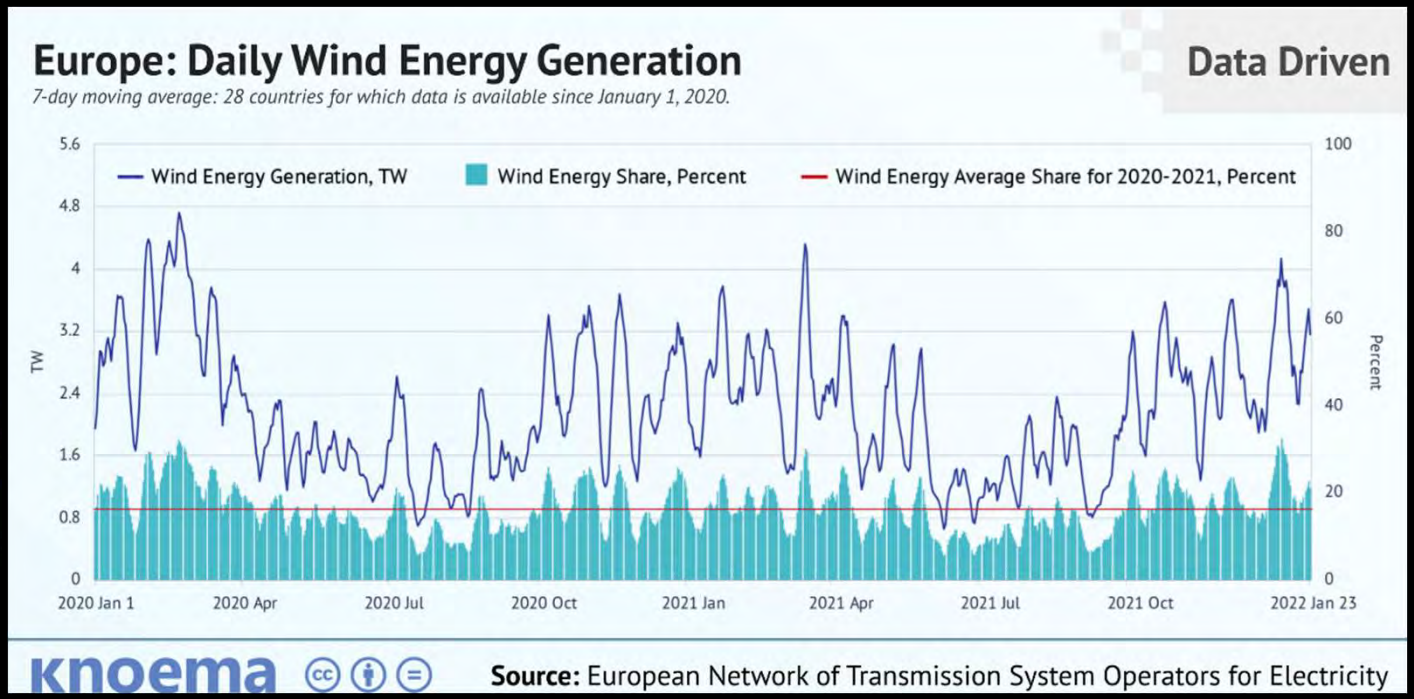
Unstable: Yearly & Global



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Stop Renewables

朝鮮日報

제주도, '신재생 과속'으로 정전 위험... 3년 뒤부턴 전국이 겪을 수도

입력 2023.11.21. 오전 6:02 · 수정 2023.11.21. 오전 9:35

지난 14일 서울 종로구 감사원에서 최재혁 산업금융감사국장이 신재생에너지 사업 추진 실태 감사 결과를 발표하고 있다. /연합뉴스

감사원이 제주도가 신재생에너지 과잉 발전(發電)으로 인한 송·배전 설비 과부하와 대규모 정전 위험성에 노출돼 있다며, 2026년부터는 이런 문제가 제주도를 넘어서서 전국적으로 나타날 수 있다고 경고한 것으로 드러났다. 신재생 발전 비중을 너무 빠르게 높이다보니 전력망이 이를 감당하지 못하게 된다는 것이다.

Supply is limited & unstable

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Demand skyrockets : EV

1~2 kW per house

350 kW per EV

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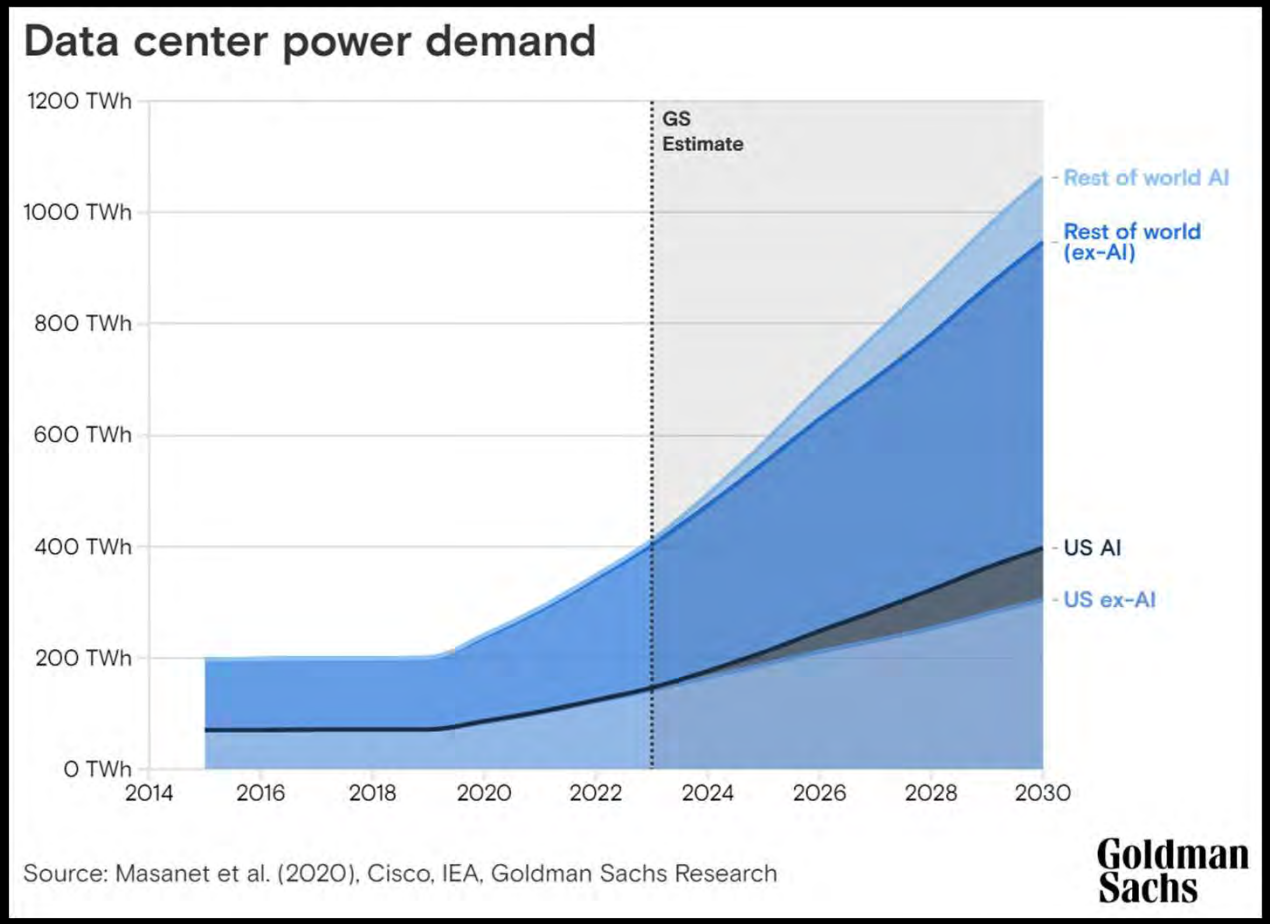
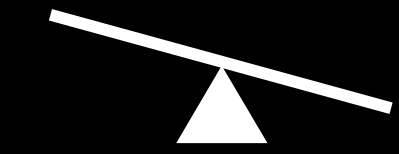
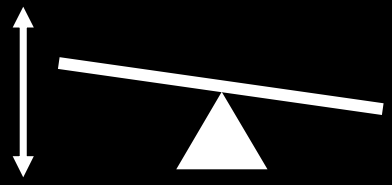
Demand skyrockets : IT & AI



Imbalance & Fluctuation





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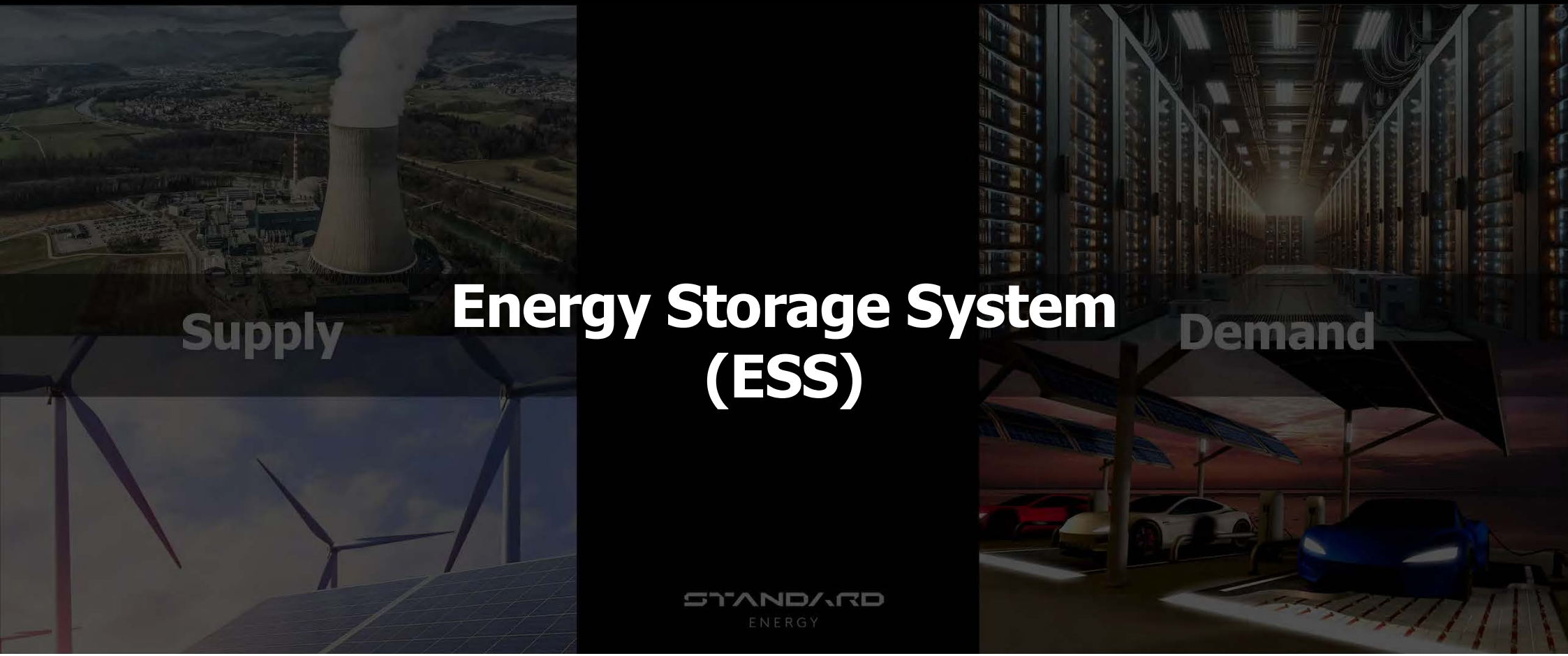
Final Piece for Balance

Final Piece for Balance : ESS



Final Piece for Balance : ESS

1,194 GWh

Global ESS installation capacity, 2030

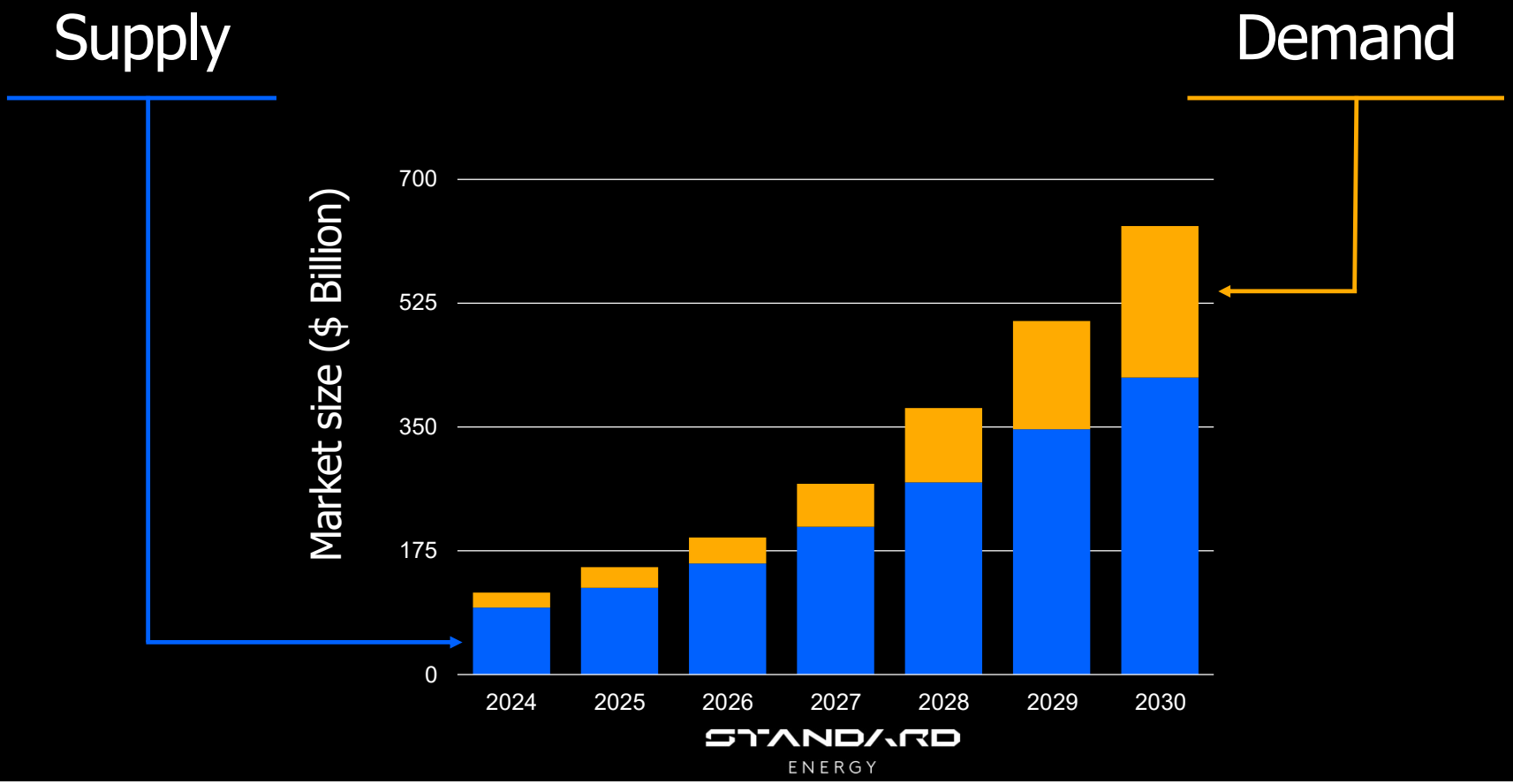
Bloomberg NEF

Final Piece for Balance : ESS

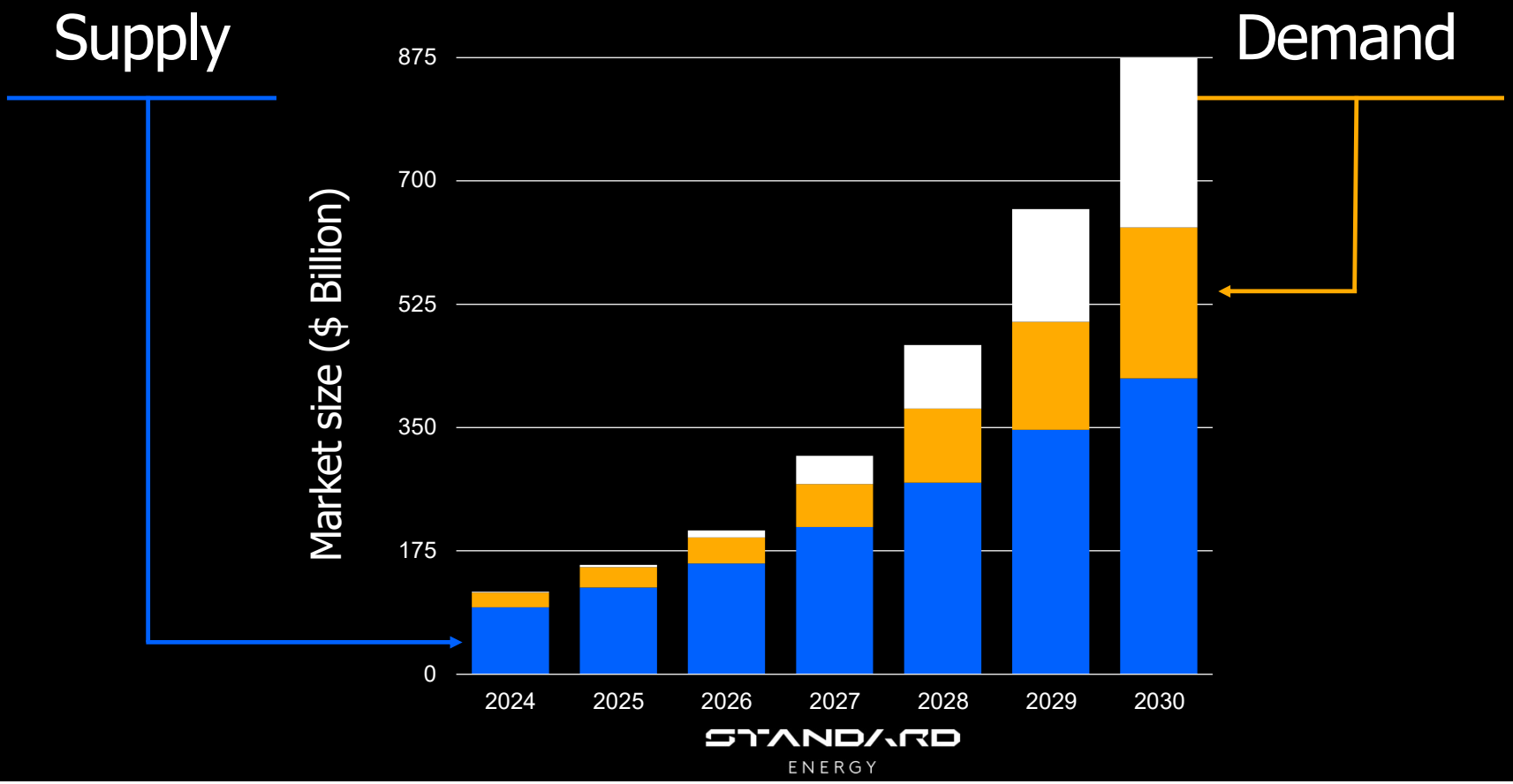
$ 634 Billion

Global ESS market size, 2030

Both Supply & Demand needs ESS



AI needs ESS


Supply
Demand
Market size ($ Billion)
875
700
525
350
175
0
2024
2025
2026
2027
2028
2029
2030
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ESS Status

Supply

Category	Technology
High power (Short duration)	?
Medium power (Medium duration)	Lithium Ion Battery
Low power (Long duration)	Lithium Ion Battery Flow Battery

Demand

Category	Technology
AI, Datacenter (Large scale)	?
Building, Factory, Infra (Indoor medium scale)	?
Home (Small scale)	Lithium Ion Battery Lead Acid Battery

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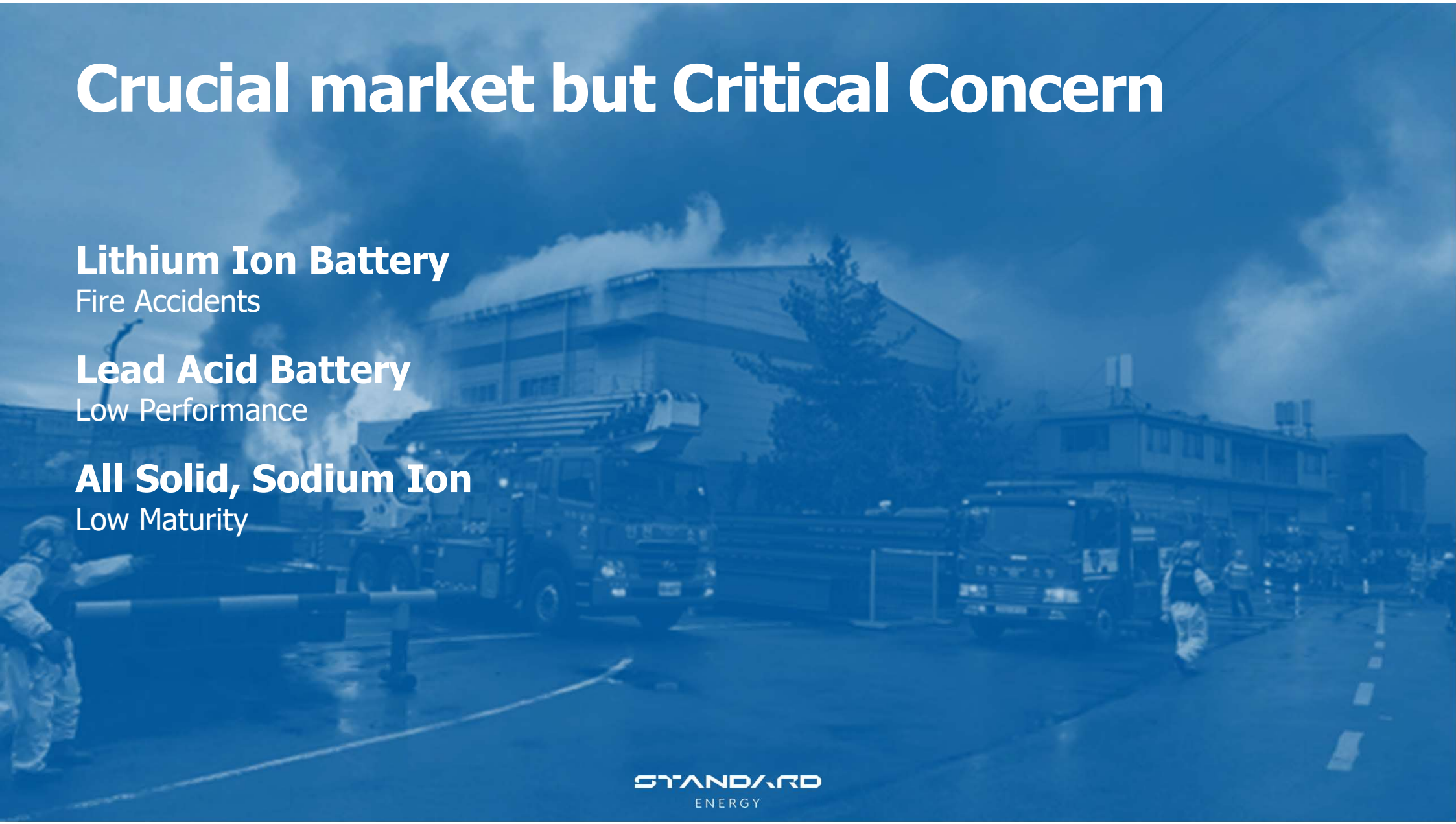
Crucial market but Critical Concern

Crucial market but Critical Concern



Lithium Ion Battery
Fire Accidents

Lead Acid Battery
Low Performance

All Solid, Sodium Ion
Low Maturity

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Technology that Market is Waiting for

Absolute Safety
No ignition & No leakage

Consistently High Performance
Efficiency, Power, Cycle life

Technological Maturity
Technical Readiness Level (TRL) > 7

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Why We Created a New Battery

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Vanadium Ion Battery

" Technology born from the market needs "

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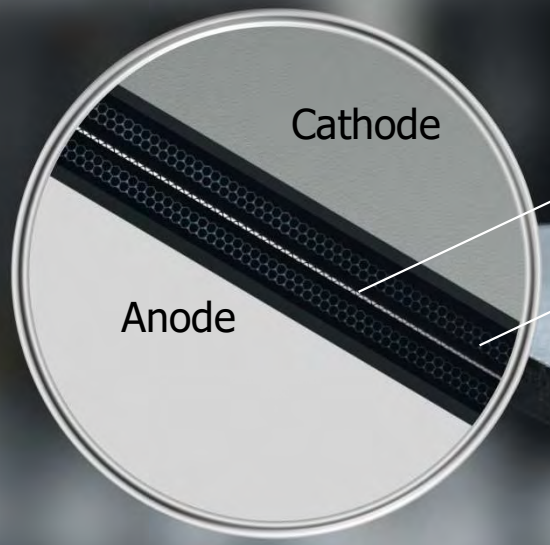
Vanadium Ion Battery

Single sealed battery with Vanadium electrode & self-balancing mechanism



Separator

- Highly selective asymmetric proton exchange membrane

Electrode : liquid & solid 2-phase electrode

- Liquid electrode : post-treated aqueous Vanadium electrode
- Solid electrode : highly reversible dual-layer graphite electrode

Frame structure

- Cathode / Anode self-balancing mechanism

We hold 236 patents & 103 trademarks

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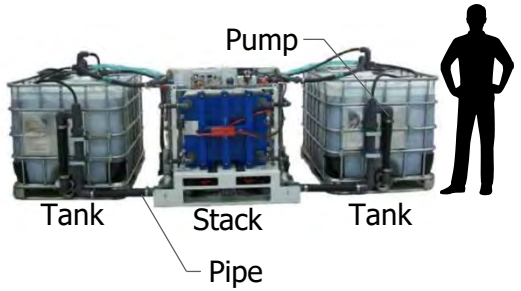
Technologies for Energy Storage System

	Vanadium Ion Battery (VIB)	Lithium Ion Battery (LIB)	Vanadium Flow Battery (VFB)
Active material	Vanadium	Lithium	Vanadium
Operation mechanism	Static	Static	Flow by mechanical pumps
Structure	Single sealed cell	Single sealed cell	Stacks, pumps, pipes, electrolyte tanks
Scalability	Multiple cells	Multiple cells	Size of electrolyte tanks
Image			

Technologies for Energy Storage System

	Vanadium Ion Battery	Lithium Ion Battery	Vanadium Flow Battery
Safety (no ignition)	**O**	**X**	**O**
Safety (no chemical leakage)	**O**	**O**	**X**
Energy efficiency	**97.5%**	**95%~98%**	**70%~75%**
Maximum power	**High**	Medium	Low
Cycle life (Charge / Discharge repeatability)	**100,000**	4,000	10,000
Recyclability	**High**	Low	Medium
Power / Energy density	Medium	**High**	Low
Standard / Certification	O	O	O

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Stationary

Energy Storage System

Mobile

EV, Phone, Laptop

	Vanadium Ion Battery	Lithium Ion Battery	Vanadium Flow Battery
Safety (no ignition)	**O**	**X**	O
Safety (no chemical leakage)	**O**	**O**	X
Energy efficiency	**97.5%**	**95%~98%**	70%~75%
Maximum power	**High**	Medium	Low (0.2C)
Cycle life (Charge / Discharge repeatability)	**100,000**	4,000	10,000
Recyclability	**High**	Low	Medium
Power / Energy density	Medium	**High**	Low
Standard / Certification	O	O	O

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Ultimate Safety Tests

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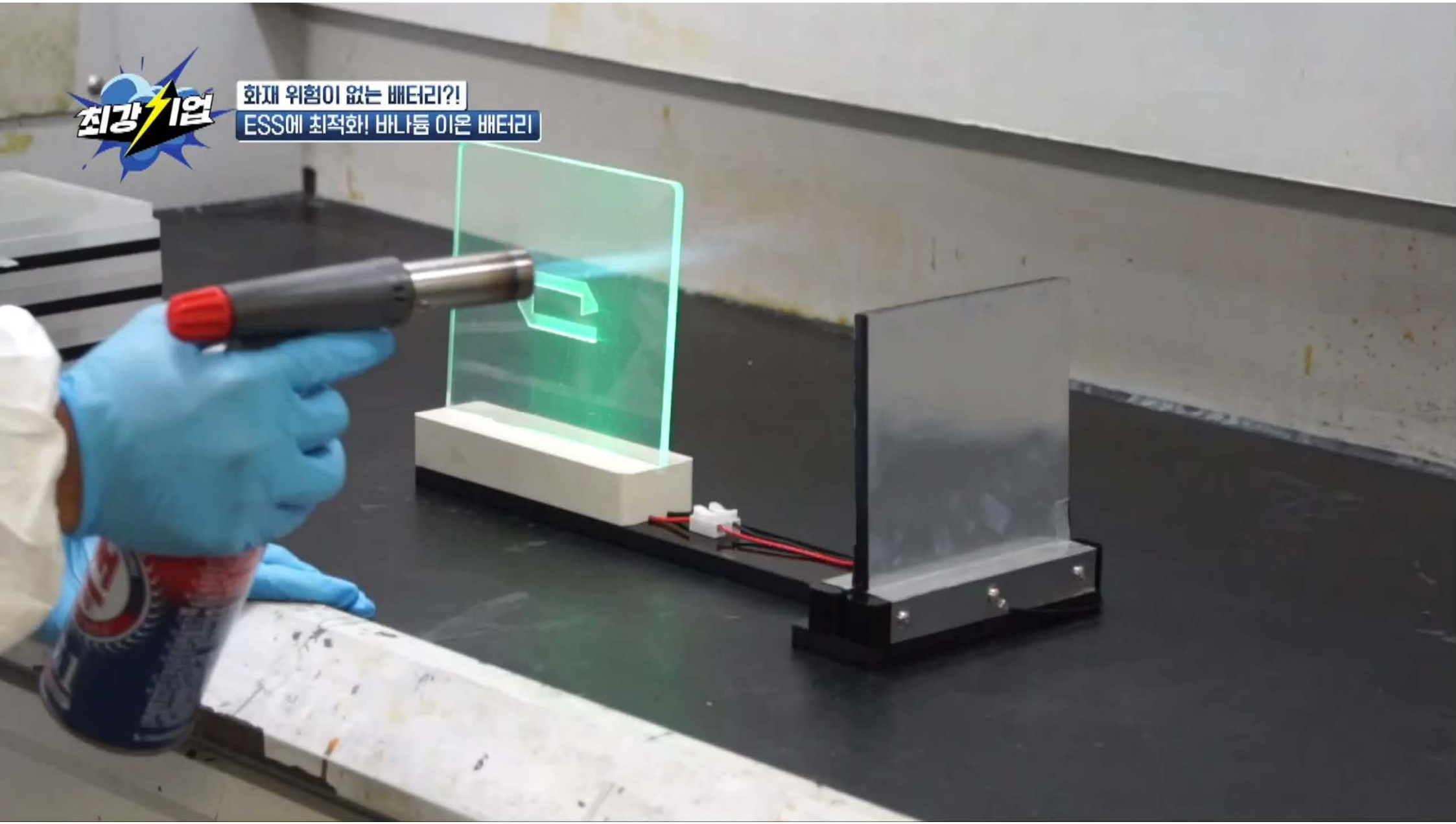
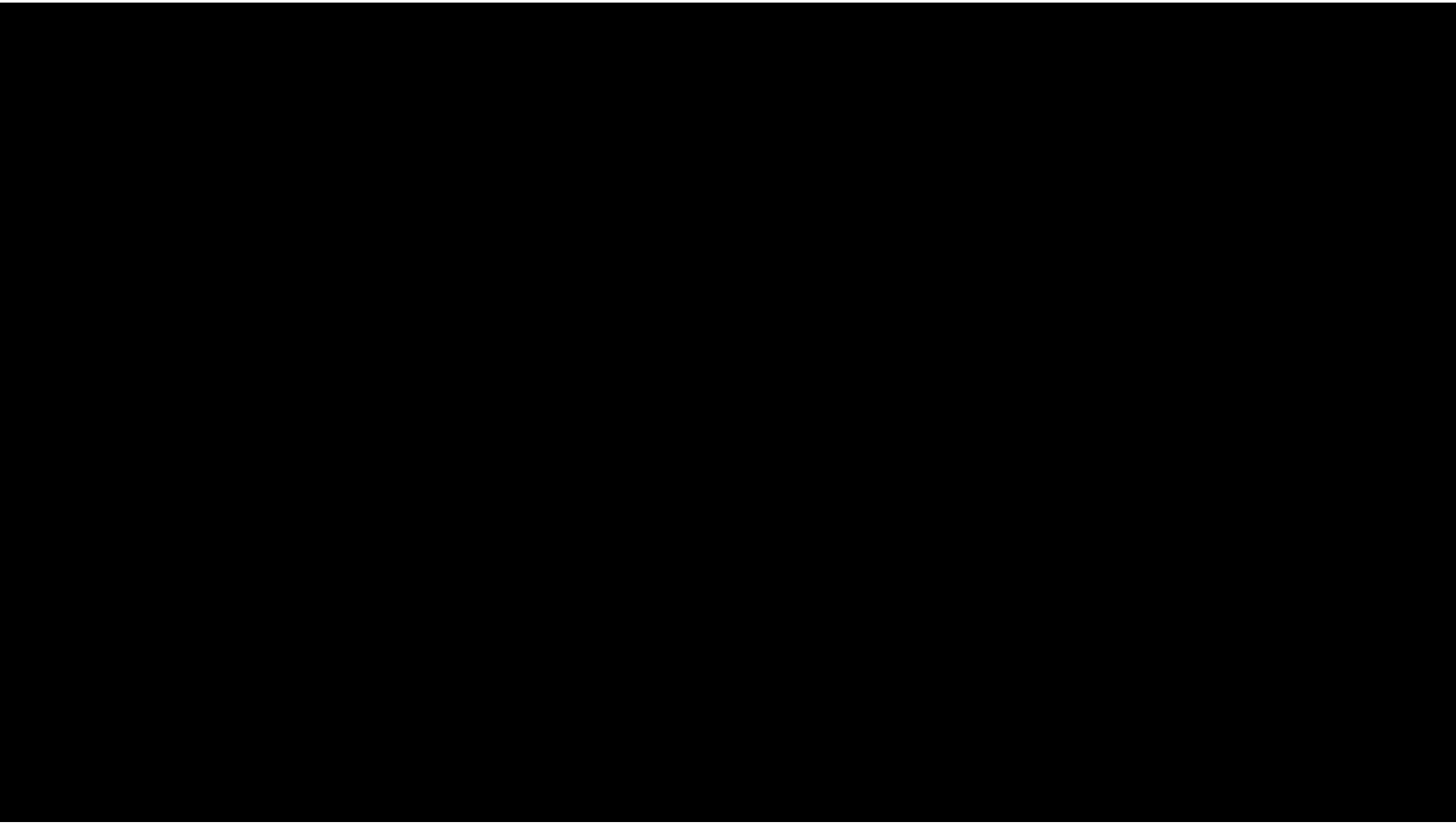

최강기업
화재 위험이 없는 배터리?!
ESS에 최적화! 바나듐 이온 배터리



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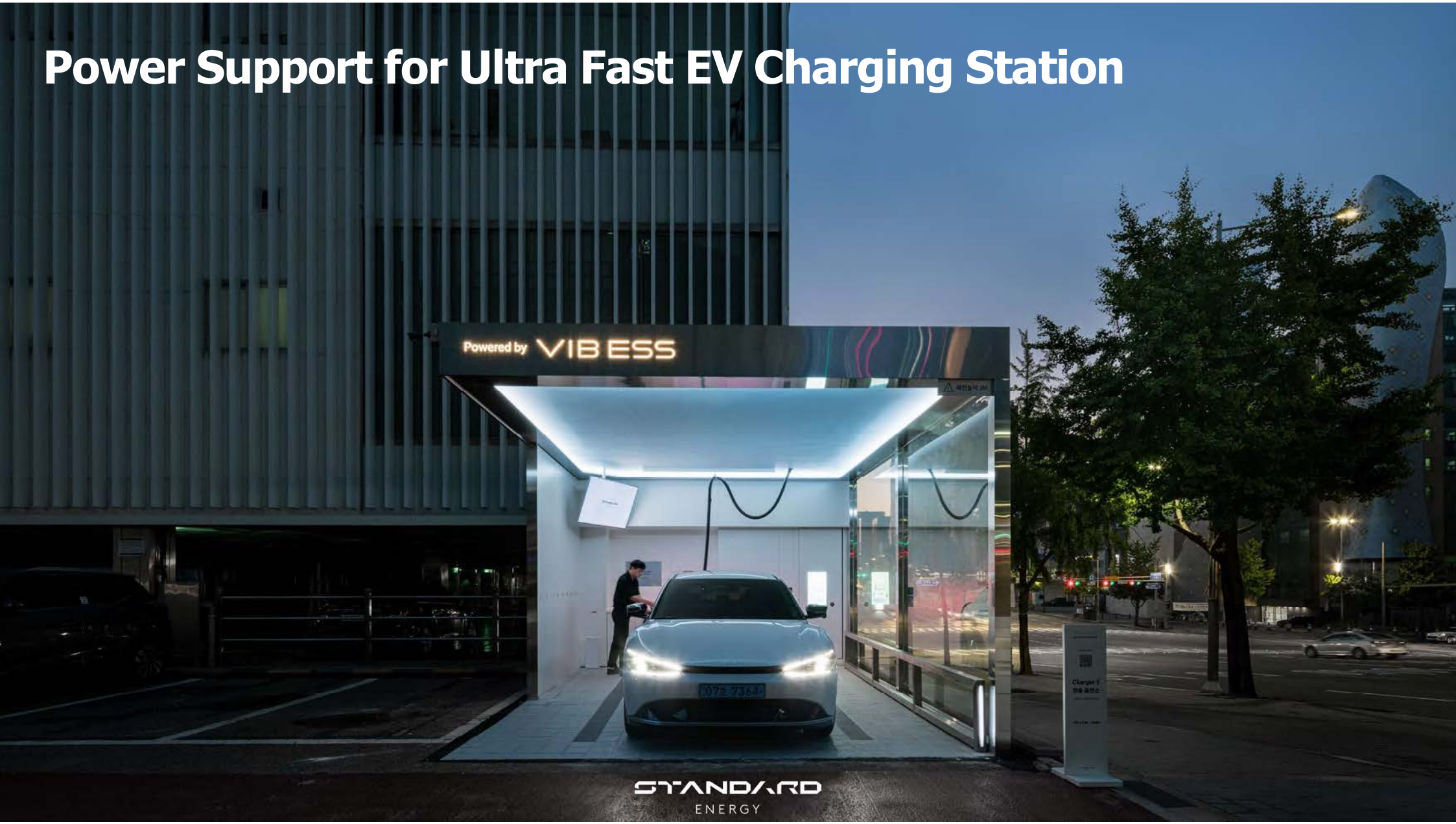
Factory Energy Management System (EMS)

Power Support for Ultra Fast EV Charging Station



Uninterruptable Power Supply (UPS)

Emergency Power for Electrified Vessel

Home ESS

World's first & only

Certification of product & production capability

Factory ESS

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Before VIB ESS

Supply

Category	Technology
High power (Short duration)	?
Medium power (Medium duration)	Lithium Ion Battery
Low power (Long duration)	Lithium Ion Battery

Demand

Category	Technology
AI, Datacenter (Large scale)	?
Building, Factory, Infra (Indoor medium scale)	?
Home (Small scale)	Lithium Ion Battery

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Before VIB ESS

Supply

Category	Technology
High power (Short duration)	**High power & longevity required**
Medium power (Medium duration)	Lithium Ion Battery
Low power (Long duration)	Lithium Ion Battery

Demand

Category	Technology
AI, Datacenter (Large scale)	**High power & safety required**
Building, Factory, Infra (Indoor medium scale)	**High power & safety required**
Home (Small scale)	Lithium Ion Battery

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With VIB ESS

Supply

Category	Technology
High power (Short duration)	**Vanadium Ion Battery**
Medium power (Medium duration)	Lithium Ion Battery
Low power (Long duration)	Lithium Ion Battery

Demand

Category	Technology
AI, Datacenter (Large scale)	**Vanadium Ion Battery**
Building, Factory, Infra (Indoor medium scale)	**Vanadium Ion Battery**
Home (Small scale)	Lithium Ion Battery

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Different Market

Monopoly market (size : $214 billion, 2030)

Category	Technology
AI, Datacenter (Large scale)	**Vanadium Ion Battery**
Building, Factory, Infra (Indoor medium scale)	**Vanadium Ion Battery**
Home (Small scale)	Lithium Ion Battery

Competitive market (size : $420 billion, 2030)

Category	Technology
High power (Short duration)	**Vanadium Ion Battery**
Medium power (Medium duration)	Lithium Ion Battery
Low power (Long duration)	Lithium Ion Battery

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Partners

Fabless with core mother facility

Category	Short term (2024-2025)	Long term (2025-)	Partnership	Region
Development	●	●	In-house Co-development	Headquarters
Pilot production	●	●		
Mass production	-	Partnership	Licensing M&A JV	Asia (2024-) North America (2025-) Europe (2026-) Middle East (2026-)
Certification	●	Partnership		
Sales	●	Partnership		
Maintenance	●	Partnership		

Partners

Supply Chain

Chemical Company

Facility Company

Heavy Industry Company

Transportation Company

Construction Company

Certification Company

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Demand Chain

ESS Integrator

Home ESS Distributor

Gas Station Company

Datacenter Operator

AI Center Operator

Utility Company

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Thank you for your support
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