

Energy & Storage

Field Intelligence Report

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Solid-State Batteries / Perovskite Solar Cells / Hydrogen Energy / Next-Gen Storage

Market Mood

78

/ 100 Optimistic

Next-Gen Energy Accelerates

Advanced batteries, solar, and hydrogen technologies gain commercial traction and policy support, driving a global energy transition.

SSB Energy Density Target	Perovskite-Silicon Tandem Efficiency	US Utility-Scale Battery Capacity	India Green Hydrogen Production Target
500	35.5	24,000	5
—	—	+60%	—

Weekly Summary

This week, next-generation energy technologies saw significant advancements: Solid-state batteries moved closer to 2027 EV integration with 500 Wh/kg targets and new standardization efforts. Perovskite solar cells achieved record efficiencies (35.5%) and commercial deployments, backed by substantial R&D; funding. Green hydrogen gained momentum as a critical energy security asset, with major projects commissioning and policy incentives. Meanwhile, diverse next-gen storage solutions, including sodium-ion and flow batteries, scaled up for grid and EV applications, signaling a robust shift towards a diversified, decarbonized energy landscape.

4 Sub-Topic Summary

Sub-Topic	Headline	Momentum	Key Insight
Solid-State Batteries	Asian OEMs Target 2027 EV Integration, China Leads Standardization	Accelerating	Commercialization of solid-state batteries is accelerating, with Asian OEMs like Geely and Toyota targeting 2027-2028 EV integration, promising 1,000km+ range and enhanced safety. China is leading global standardization efforts, establishing a classification framework and driving IEC international standards, which could shape future market dynamics.

Perovskite Solar Cells	Tandem Perovskite Cells Achieve 35.5% Efficiency, Commercial Deployments Begin	Accelerating	Perovskite solar cell technology is rapidly advancing, with record-breaking efficiencies up to 35.5% for perovskite-silicon tandems. Commercial deployment is beginning, exemplified by Saule Technologies' BIPV installation, and significant R&D; is focused on stability, scalability, and lead-free alternatives, supported by substantial US DOE and private funding.
Hydrogen Energy	Green Hydrogen Gains Energy Security Status, Global Projects Commission	Building	Green hydrogen is rapidly transitioning from R&D; to large-scale commercialization, driven by its new status as a critical energy security imperative. Major projects like NEOM's \$8.5 billion complex are commissioning, while policy incentives in the US (45V tax credit) and EU are accelerating domestic production and infrastructure development, despite pipeline complexities.
Next-Gen Storage	Sodium-Ion Batteries Reach Cost Parity, Diverse Solutions Scale for Grid	Accelerating	The next-generation energy storage market is diversifying and scaling, with sodium-ion batteries projected to achieve cost parity with LFP by end of 2026, enabling broader EV and grid applications. Long-duration solutions like iron-air and flow batteries are advancing, while significant US government investment targets domestic battery supply chain and recycling, addressing both capacity and security concerns.

Toyota & Panasonic Accelerate Solid-State EV Battery Commercialization to 2027-2028

Source: Gemini Grounding (Company Tech News)

Summary: Toyota, in partnership with Panasonic and Idemitsu Kosan, plans to begin producing solid-state battery EVs by 2027-2028. Their first-generation solid-state EV battery, targeting commercial vehicle integration by 2027, is projected to offer 10-minute fast charg...

WHY ENGINEERS SHOULD CARE

This accelerated timeline for solid-state EV batteries by 2027-2028 demands immediate evaluation of power electronics and charging infrastructure roadmaps. Assess the impact on demand for high-voltage...

TDK Achieves 1,000 Wh/L Volumetric Density in Oxide Solid-State Battery

Source: Gemini Grounding (Company Tech News)

Summary: TDK's CeraCharge, an oxide-based solid electrolyte battery, has reportedly achieved a volumetric energy density of 1,000 Wh/L. While initially targeting wearables, TDK is running parallel programs in solid-state battery development for broader applications, in...

WHY ENGINEERS SHOULD CARE

For compact electronic systems, particularly those with strict volumetric constraints (e.g., IoT, medical devices, advanced sensors, future AI edge devices), TDK's 1,000 Wh/L solid-state battery offer...

Japan's Grid-Scale Storage Connection Requests Surge to 191 GW, METI Caps Applications

Source: Gemini Grounding (Govt / Research / Press Releases)

Summary: Japan's Resource Energy Agency reported 191.14 GW in connection study requests and 35.27 GW in contract applications for high-voltage grid-scale storage as of March 31, 2026, representing a ~78 GW and ~23 GW year-over-year increase respectively. To prevent spe...

WHY ENGINEERS SHOULD CARE

The rapid expansion of grid-scale storage, indicated by 191 GW in connection requests, signals a massive demand surge for power conversion systems, battery management units, and grid-tie inverters. Te...

This Week's Japan Technology Highlights

Japan is accelerating solid-state EV battery commercialization, with Toyota targeting 1,200 km range by 2027-2028, signaling a critical shift in automotive power solutions.

China's Solid-State Battery Race: CATL & BYD Target 2027 Pilot Production

■ China's Move

Both CATL and BYD have announced plans for small-scale demonstration or trial production of all-solid-state batteries in 2027, with mass production anticipated after 2030 (CATL, BYD). BYD claims to have achieved a cell-level energy density of 400 Wh/kg in pilo...

■ Technical Verification

[CONFIRMED]	CATL and BYD have publicly stated 2027 as the target for initial small-scale deployment or trial production of solid-state batteries. / Both companies are actively investing in and researching sulfi...
[BOTTLENECK]	Manufacturing Scalability and Yield: Transitioning from lab-scale prototypes to GWh-scale production with high yield and consistent quality remains the primary challenge. Sulfide electrolytes, in pa...

■ Implications for Western Engineers

- Battery R&D Teams: Benchmark announced energy density targets against internal roadmaps. Focus R&D on interface engineering, sul...
- EV Powertrain Engineers: Monitor independent validation of solid-state battery performance (energy density, cycle life, charge r...
- Procurement & Supply Chain: Assess the readiness of the supply chain for sulfide electrolyte precursors, high-nickel cathodes, a...

China's Strategic Control Tightens on EV Battery Supply Chain & Technology

■ China's Move

China is implementing several policy adjustments to refine its EV battery supply chain and reinforce strategic control. A 2% consumption tax on lithium-ion batteries for NEVs will be applied starting September 1, 2026, increasing to 4% a year later, though sol...

■ Technical Verification

[CONFIRMED]	The phased introduction of a consumption tax on Li-ion batteries (starting Sep 2026) and the exemption for solid-state batteries until Dec 2028. / China's stated policy goals for battery recycling, ...
[BOTTLENECK]	Diversified Critical Mineral Supply: Western reliance on China for processed critical minerals (lithium, cobalt, nickel, rare earths) and key battery materials (cathode, anode) remains a significant...

■ Implications for Western Engineers

- Procurement & Supply Chain Teams: Actively diversify sourcing for critical battery materials (lithium, graphite, rare earths) an...
- Battery Design & R&D: Prioritize research into battery chemistries and architectures that reduce reliance on Chinese-dominated c...
- Compliance & Legal: Closely monitor changes in China's export control lists, especially for high-performance battery technologie...

Key Trends This Week (5 Total)

TR-01 HIGH Cross-Domain

Global Battery Race Intensifies

Asian OEMs and Chinese manufacturers accelerate solid-state and sodium-ion battery commercialization, targeting 2027 EV integration and cost parity, challenging Western leadership.

The global competition in advanced battery technologies is escalating, with Asian players like Geely, Toyota, and CATL setting aggressive timelines for solid-state and sodium-ion battery commercialization by 2027. These developments promise significant improvements in energy density (500 Wh/kg), range (1,000 km), and cost-effectiveness (\$50-56/kWh for Na-ion), putting pressure on Western manufacturers to secure supply chains and accelerate R&D.;

SSB Energy Density Target

500 Wh/kg

Na-ion Cost Target

\$50-56/kWh

► Geely ► Toyota ► CATL ► Samsung SDI ► Volkswagen

Refs: S1-02 S1-03 S1-04 S1-10 S1-11 S1-13 S1-15 S1-20 S1-24 S4-09 S4-21

TR-02 HIGH Cross-Domain

Policy Drives Domestic Supply Chains

US and EU governments commit billions to bolster domestic clean energy supply chains, including battery recycling and green hydrogen production, reducing foreign reliance.

Governments in the US and EU are making substantial financial and policy commitments to localize clean energy supply chains. The US DOE is investing \$500M in battery supply chain projects and offering up to \$3.00/kg for clean hydrogen production. Europe is revising its hydrogen strategy and securing green hydrogen imports from MENA. These actions aim to enhance energy security, create jobs, and accelerate decarbonization by fostering domestic manufacturing and recycling capabilities.

US DOE Battery Investment

\$500M

US Clean Hydrogen Tax Credit

\$3.00/kg

► U.S. Department of Energy ► European Commission ► Princeton NuEnergy ► Sila Nanotechnologies ► Air Products

Refs: S1-09 S2-04 S2-15 S3-08 S3-10 S3-14 S3-18 S3-25 S4-10 S4-12 S4-15 S4-19 S4-20

TR-03 MED Perovskite Solar Cells

Perovskite Solar Scales Up

Perovskite solar cells achieve new world records in efficiency (35.5%) and module scaling (26.2% on 65 cm²), with solvent-free manufacturing processes emerging.

Perovskite solar technology is rapidly maturing, evidenced by LONGi's 35.5% efficiency record for tandem cells and Nanjing University's 26.2% efficiency on large-area (65 cm²) modules. Innovations in solvent-free manufacturing (Fraunhofer ISE, HZB) and enhanced stability are addressing key commercialization hurdles. Early commercial deployments and significant R&D; funding underscore the technology's readiness for wider

adoption.

World Record Efficiency	Large Module Efficiency
35.5%	26.2% (65 cm ²)

► LONGi ► Fraunhofer ISE ► HZB ► Caelux ► Tandem PV

Refs: S2-01 S2-02 S2-05 S2-06 S2-07 S2-11 S2-14 S2-15 S2-26 S2-27

TR-04 MED Hydrogen Energy

Hydrogen Shifts to Execution

Major green hydrogen projects, like NEOM's \$8.5B complex, are completing construction and commissioning, shifting industry focus from planning to operational delivery.

The hydrogen energy sector is moving past initial planning phases, with large-scale projects entering commissioning and operational stages. Saudi Arabia's NEOM complex, an \$8.5 billion gigaproject, exemplifies this shift, targeting commercial operations by 2027. This transition highlights the need for robust infrastructure development, efficient electrolyzer technologies, and effective project management to meet ambitious production and decarbonization targets.

NEOM Project Value	NEOM Ammonia Production Target
\$8.5B	600,000 tons/year

► NEOM ► Plug Power ► Siemens Energy ► Thyssenkrupp Nucera ► Air Products

Refs: S3-03 S3-05 S3-06 S3-16 S3-17 S3-23 S3-28 S3-31

TR-05 LOW Next-Gen Storage

Long-Duration Storage Diversifies

New long-duration energy storage technologies, including iron-air and manganese flow batteries, gain traction with significant investments and commercial projects.

Beyond lithium-ion and sodium-ion, the market for long-duration energy storage (LDES) is seeing diversification. Innovations like Formula X's 100-hour iron-air battery and Certain Energy's manganese flow batteries (claiming 1/10th vanadium cost) are attracting investment and securing large-scale projects (e.g., Invinity's 2.1GWh flow battery in Switzerland). These technologies are crucial for grid stability and integrating intermittent renewables, offering alternatives to traditional battery chemistries.

Iron-Air Battery Duration	Manganese Flow Cost vs. Vanadium
100 hours	1/10th

► Formula X ► Certain Energy ► Invinity Energy Systems ► ESS Inc.

Refs: S4-04 S4-10 S4-17 S4-24 S4-27

Macro Market Indicators

Indicator	Direction	Value	Note	Source
US Clean Hydrogen Tax Credit (45V)	↑	\$3.00/kg	Maximum incentive for clean hydrogen production over 10 years	U.S. Department of Energy (DOE)
EU Green Hydrogen Strategy	↑	Revised	New funding and regulatory support to accelerate domestic production	European Commission
US Utility-Scale Battery Capacity Growth	↑	60%	Projected year-over-year increase in 2026	Project Finance NewsWire
Global Green Hydrogen Market Status	↑	Imperative	Emerging as a critical energy security imperative in 2026	Next Move Strategy Consulting

Macro Environment Summary

Global energy markets are at an inflection point, driven by geopolitical shifts and aggressive decarbonization policies. The US and EU are enacting significant incentives and strategies, including the US 45V tax credit and revised EU hydrogen plans, to bolster domestic clean energy production and reduce reliance on foreign supply. This is accelerating large-scale deployments, with US utility-scale battery capacity projected to surge 60% in 2026, and green hydrogen emerging as a critical energy security asset.

Market Data: LIT (Battery & Storage) Weekly Trend

76.07 USD -0.70%

Action Recommendations by Player

Action Recommendations for Western OEM

OEM Volkswagen, BMW, Ford, General Motors, Tesla

Western OEMs like Volkswagen and BMW are collaborating with Samsung SDI and QuantumScape on solid-state battery development, targeting 2027 mass production. However, Asian competitors like Geely and Toyota are setting aggressive 2027 pilot deployment targets for 500 Wh/kg SSBs, potentially creating a 12-18 month lead.

Risk

- If Asian OEMs achieve 2027 SSB mass production, Western OEMs without secured supply chains will face 18-month product launch delays
- US ban on Chinese BESS creates supply chain gaps for Western OEMs relying on cost-effective components, increasing procurement costs
- Failure to integrate next-gen storage (Na-ion, LDES) into grid/EVs will lead to market share loss to agile competitors

Opportunity

- Partner with Western SSB developers (QuantumScape, Factorial) to secure 2027-2028 supply, targeting \$100B+ EV battery market
- Invest in domestic battery recycling (Princeton NuEnergy, Itronics) to secure critical materials and reduce supply chain risk
- Integrate advanced perovskite solar cells into BIPV or EV applications, leveraging 35.5% efficiency for new product lines

Actions This Week

- Initiate Q4 2026 discussions with QuantumScape and Solid Power for 2027-2028 SSB supply agreements to mitigate future supply gaps
- Evaluate domestic battery recycling partners (e.g., Princeton NuEnergy) by Q1 2027 to secure critical material supply and comply with regulations
- Formulate a strategy for integrating next-gen storage (Na-ion, LDES) into product roadmaps by Q2 2027, focusing on cost and performance

□ Scenario: If Chinese OEMs achieve 2027 SSB mass production, Western OEMs without secured alternative supply chains will lose 12–18 months on product launch timelines — begin dual-sourcing qualification now.

□ Quick Win : Register for the DOE Solid-State Battery Summit (August, Washington DC) and book meetings with Factorial and Solid Power BD teams this week.

Action Recommendations for Western Contract Manufacturer

Contract Manufacturer GlobalFoundries, LG Energy Solution, DeltaX

Western contract manufacturers face increasing demand for domestic production of battery components and electrolyzers, driven by US and EU policy incentives. However, the market is highly competitive, with Asian players dominating current production and standardization efforts.

Risk

- Delay in Western OEM SSB adoption will reduce demand for advanced battery component manufacturing, impacting revenue growth
- High capital expenditure for new next-gen battery/solar/hydrogen facilities without guaranteed long-term contracts creates financial risk

- Competition from established Asian manufacturers with lower cost structures limits market entry and profitability for Western players

■ Opportunity

- Secure long-term contracts for domestic production of solid-state battery components, leveraging US DOE grants and tax credits
- Partner with perovskite solar developers (Tandem PV, Swift Solar) to scale up manufacturing of high-efficiency modules
- Invest in electrolyzer manufacturing capacity (e.g., PEM, AEM) to meet growing green hydrogen demand in Europe and US

■ Actions This Week

- Submit proposals for US DOE battery manufacturing grants by Q4 2026, focusing on solid-state and sodium-ion component production
 - Engage with European Energy and Plug Power by Q1 2027 to explore partnerships for PEM electrolyzer manufacturing in Europe
 - Develop a strategic plan by Q3 2027 to offer contract manufacturing services for perovskite solar modules, targeting 5GW+ capacity partners
- Scenario: If Western OEMs fail to secure domestic SSB supply by 2028, contract manufacturers will miss a critical market entry window — prioritize pilot line development for advanced electrolytes now.
- Quick Win : Attend Perovskite Connect 2026 (Berlin, October) to network with European perovskite developers and secure early manufacturing partnerships.

Action Recommendations for Western T&M; Provider

T&M; Bureau Veritas, Eurofins, QinetiQ

Western T&M; providers are critical enablers for the commercialization of next-gen energy technologies, particularly in battery safety, solar cell efficiency, and hydrogen system reliability. Fraunhofer ISE's new subcell current metrology for tandem solar cells exemplifies this demand.

■ Risk

- Lack of unified international standards for new energy technologies (SSB, perovskite) delays widespread adoption and testing demand
- Rapid technological shifts require continuous investment in new testing equipment and expertise, increasing R&D; costs
- Emergence of in-line quality control solutions by equipment makers could reduce reliance on third-party testing services

■ Opportunity

- Develop specialized testing and certification services for solid-state batteries, focusing on dendrite suppression and low-temperature performance
- Offer advanced metrology solutions for perovskite solar cells, including subcell current measurement and long-term stability testing
- Provide safety and operational risk management services for green hydrogen infrastructure, leveraging expertise in gas crossover detection

■ Actions This Week

- Launch a dedicated SSB safety and performance testing service by Q1 2027, focusing on 1,000+ cycle lifespan validation and dendrite suppression
- Collaborate with Fraunhofer ISE by Q4 2026 to commercialize millisecond-resolution subcell current metrology for perovskite tandem cells

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- Develop a hydrogen safety certification program by Q2 2027, incorporating gas crossover detection and operational risk management for electrolyzers
- Scenario: If global SSB standardization lags, Western T&M; providers must proactively develop de facto testing protocols to enable early market entry for clients — invest in proprietary safety validation now.
- Quick Win : Publish a white paper on solid-state battery safety testing standards by end of this week, positioning as a thought leader.
-

Action Recommendations for Western Material Supplier

Material Dow Chemical, BASF, DuPont, Umicore, AGC Plasma Technology Solutions

Western material suppliers are crucial for next-gen energy technologies, developing advanced electrolytes for SSBs, charge transport layers for perovskites, and catalysts for hydrogen production. Dow Chemical is collaborating with Geely on SSB adhesives, and HZB developed a carborane-based ETM for perovskites.

■ Risk

- Reliance on foreign sources for critical raw materials (e.g., lithium, rare earth elements) creates supply chain vulnerabilities and price volatility
- Slow adoption of next-gen technologies by Western OEMs delays demand for new advanced materials, impacting R&D; ROI
- Intense competition from Asian material suppliers with established production capacities and lower costs

■ Opportunity

- Develop and commercialize sulfide-based solid electrolytes for SSBs, targeting the 3,000-ton/year market by 2027
- Supply advanced electron/hole transport materials and encapsulation solutions for high-efficiency perovskite solar cells
- Provide plasma coating solutions and catalysts for green hydrogen electrolyzers, leveraging growing demand in Europe and US

■ Actions This Week

- Accelerate R&D; for sulfide-based solid electrolytes, targeting pilot production by Q2 2027 to meet anticipated SSB demand
 - Engage with perovskite solar developers (e.g., HZB, Fraunhofer ISE) by Q1 2027 to co-develop and supply novel charge transport materials
 - Explore partnerships with electrolyzer manufacturers (e.g., Enapter, Plug Power) by Q3 2027 to supply advanced plasma coating solutions and catalysts
- Scenario: If China secures dominant control over lithium sulfide production by 2027, Western material suppliers must diversify into alternative solid electrolyte chemistries (e.g., oxide-based) to avoid critical supply bottlenecks.
- Quick Win : Schedule a meeting with Dow Chemical's advanced materials division this week to explore collaboration on SSB adhesive technologies.
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Action Recommendations for Western Distributor

Distributor Arrow Electronics, Avnet, Brenntag

Western distributors face a dynamic market with increasing demand for next-gen energy components and systems, but also geopolitical risks and evolving supply chains. The US ban on Chinese BESS creates opportunities for domestic sourcing, while EU seeks green hydrogen imports.

■ Risk

- Geopolitical trade restrictions (e.g., US ban on Chinese BESS) disrupt existing supply chains and require rapid re-sourcing efforts
- Volatility in raw material prices (e.g., lithium, sodium) impacts inventory valuation and profitability for battery components
- Slow adoption of new technologies by end-users delays market penetration and sales volumes for next-gen products

■ Opportunity

- Establish robust supply chains for domestically produced battery components and systems, leveraging US policy incentives
- Become a key distributor for Western-made electrolyzers and fuel cell components, serving the growing green hydrogen market
- Develop expertise in distributing perovskite solar modules and BIPV solutions, capitalizing on new architectural integration opportunities

■ Actions This Week

- Identify and qualify alternative non-Chinese BESS suppliers by Q4 2026 to comply with US government directives and secure supply
- Expand distribution network for green hydrogen production equipment (e.g., electrolyzers) in Europe by Q1 2027, targeting industrial clients
- Develop a market entry strategy for perovskite solar products by Q3 2027, focusing on BIPV and specialized low-light applications

□ Scenario: If the US ban on Chinese BESS expands to other critical energy components, Western distributors must establish diversified, non-Chinese supply chains within 6 months to maintain market access and avoid disruption.

□ Quick Win : Conduct a rapid audit of current BESS product portfolio by end of this week to identify and replace any Chinese-made components for US market.

Action Recommendations for Western Equipment Maker

Equipment Siemens Energy, Enapter, Plug Power, Thyssenkrupp Nucera, Applied Materials

Western equipment makers are crucial for scaling next-gen energy technologies, providing advanced manufacturing tools for batteries, solar cells, and hydrogen systems. Siemens Energy secured a major contract for hydrogen-ready gas turbines, and Enapter unveiled a new AEM electrolyzer.

■ Risk

- Delayed Final Investment Decisions (FIDs) for large-scale green hydrogen projects (e.g., Thyssenkrupp Nucera's Q3 orders) impact equipment sales
- High R&D; costs for developing specialized manufacturing equipment for novel materials (e.g., solid electrolytes, perovskite layers) without guaranteed market uptake
- Competition from Asian equipment manufacturers offering lower-cost solutions, particularly in high-volume production lines

■ Opportunity

- Supply advanced manufacturing equipment for solid-state battery production lines, focusing on solvent-free deposition and high-throughput processes
- Develop and sell specialized equipment for perovskite solar cell manufacturing, including spray coating and solvent-free PVD systems
- Provide next-gen electrolyzers (PEM, AEM) and hydrogen-ready gas turbines to meet global demand for green hydrogen production and power generation

■ Actions This Week

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- Engage with major battery manufacturers (e.g., Samsung SDI, Volkswagen) by Q1 2027 to offer pilot line equipment for solid-state battery production
 - Showcase solvent-free PVD and spray coating equipment at Perovskite Connect 2026 (October, Berlin) to attract new solar manufacturing clients
 - Accelerate sales efforts for AEM electrolyzers and hydrogen-ready gas turbines in Europe and the Middle East by Q4 2026, leveraging policy support
- Scenario: If large-scale green hydrogen FIDs remain delayed through 2027, equipment makers must diversify into smaller, modular electrolyzer solutions for decentralized production to maintain revenue growth.
- Quick Win : Host a webinar on 'Scaling Solid-State Battery Production: Equipment Innovations' by next month, featuring new solvent-free deposition tools.
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Impact Matrix (Players × Trends)

++ = Strong Tailwind + = Tailwind 0 = Neutral – = Headwind -- = Strong Headwind

Player	TR-01 HIGH Global	TR-02 HIGH Policy	TR-03 MED Perovs	TR-04 MED Hydrog	TR-05 LOW Long-D
Western OEM					

References (110 Total)

ID	Title	Source	Date	Region	Sub-Topic
S1-01	Chonnam National University Unveils Tri-Layer Composite Solid Electrolyte for Lithium-Metal Batteries, Achieving 1,000+ Cycle Lifespan with Enhanced Safety	EurekAlert!	2026-08-26	South Korea	Solid-State Batteries
S1-02	Geely to Pilot 500 Wh/kg Solid-State EV Batteries in 2027, Promising 1,000 km Range and 1 Million km Lifespan	Electrek	2026-08-20	China	Solid-State Batteries
S1-03	Toyota and Panasonic Target 2027-2028 Commercialization for EV Solid-State Batteries, Aiming for Double Range and Zero Fire Risk	Top Speed	2026-08-27	Japan	Solid-State Batteries
S1-04	China's WELION Powers NIO ET7 with 360Wh/kg Semi-Solid-State Batteries, Achieving 1,000km+ Range; Pursues IPO	TechInsights	2026-08-20	China	Solid-State Batteries
S1-05	Ultralife Corporation Unveils Electrochem HR Series Hybrid Cell, a New Category of Primary Lithium Battery Offering Enhanced Power and Durability	Electronics for Engineers	2026-08-25	US	Solid-State Batteries
S1-06	China Leads Global Solid-State Battery Standardization: Establishes First Classification Framework and Drives IEC International Standard Development	Discovery Alert	2026-08-26	China	Solid-State Batteries
S1-07	China's Qinghai Weixiang Technology to Complete 3,000-Ton/Year Lithium Sulfide Project by July 2027 for Solid-State Batteries	Shanghai Metals Market	2026-08-22	China	Solid-State Batteries
S1-08	Guide to Industrial Solid-State Batteries: Highlighting Lithium Dendrite Suppression and Low-Temperature Performance Advantages	EIN Presswire	2026-08-24	US	Solid-State Batteries
S1-09	U.S. Utility-Scale Battery Capacity Projected to Surge 60% to 24,000 MW in 2026	Project Finance NewsWire	2026-08-26	US	Solid-State Batteries
S1-10	Geely Accelerates 500 Wh/kg Solid-State Battery Road Tests, Targeting 2027 EV Pilot Deployment	DigitalToday	2026-08-21	South Korea	Solid-State Batteries
S1-11	China's Leading Battery Makers Target 2027 Solid-State Battery Trial Production, Intensifying Race with BYD and CATL	Car News China	2026-08-20	China	Solid-State Batteries
S1-12	China-Led Global Solid-State Battery Standard Approved by IEC, Signaling Era of 500Wh/kg Batteries	Shanghai Metals Market (SMM)	2026-08-28	China	Solid-State Batteries
S1-13	Samsung SDI and Volkswagen Accelerate Solid-State Battery Development Towards 2027 Mass Production Targets	SoylentNews	2026-08-20	US	Solid-State Batteries

ID	Title	Source	Date	Region	Sub-Topic
S1-14	TDK Unveils Multilayer Ceramic Chip Battery with Oxide Solid-State Electrolyte, Achieving Enhanced Safety and Miniaturization	TechInsights	2026-08-20	Canada	Solid-State Batteries
S1-15	Geely Sets 2027 EV Pilot for 500 Wh/kg Solid-State Batteries, Eyes Volvo Integration	GlobalChinaEV	2026-08-24	China	Solid-State Batteries
S1-16	QuantumScape CTO Sells Over 40,000 Shares to Fulfill Tax Obligations	Stock Titan	2026-08-20	US	Solid-State Batteries
S1-17	New Patent for Solid-State Battery Manufacturing Utilizing Graphene Aims for Enhanced Safety, Miniaturization, and Production Efficiency	Justia Patents	2026-08-20	US	Solid-State Batteries
S1-18	QuantumScape Co-Founder & CTO Sells Entire Trust Holdings: Pre-Arranged Trading Plan Executed	The Motley Fool	2026-08-27	US	Solid-State Batteries
S1-19	QuantumScape CEO Divests 80,000 Shares to Cover RSU-Related Tax Obligations	The Motley Fool	2026-08-21	US	Solid-State Batteries
S1-20	Geely Announces 2027 Solid-State Battery Pilot, Targeting 1,000km+ Range and Extended Lifespan	Just Auto	2026-08-24	UK	Solid-State Batteries
S1-21	Toyota Motor Corporation Publishes New Patent for All-Solid-State Battery and Manufacturing Method	Justia Patents	2026-08-20	US	Solid-State Batteries
S1-22	QuantumScape CDO Sells Shares Valued at \$197K to Fulfill RSU Tax Obligations	The Motley Fool	2026-08-22	US	Solid-State Batteries
S1-23	Solid-State Battery Patent Analysis Report Reveals 2022 Peak in Filings, Cell Chemistry Dominance	Patsnap Research	2026-08-25	UK	Solid-State Batteries
S1-24	Honda Inaugurates Solid-State Battery Cell Production Demo Line in Sakura R&D; Facility, Targeting 2026 Launch	How-To Geek	2026-08-20	Japan	Solid-State Batteries
S2-01	LONGi Achieves 34.85% Efficiency for Perovskite-Silicon Tandem Solar Cells, Setting New World Record; Perovskite-Organic Tandem Reaches 28.04% with High Stability	Facebook	2026-08-23	China	Perovskite Solar Cells
S2-02	Perovskite Solar Goes Commercial: Saule Technologies' Polish Installation Marks BIPV Breakthrough	Facebook	2026-08-28	Poland	Perovskite Solar Cells
S2-03	Aisin Accelerates Mass Production Development of 500mm Perovskite Solar Modules with NEDO Green Innovation Fund Backing in Japan	IBTimes JP	2026-08-21	Japan	Perovskite Solar Cells
S2-04	U.S. DOE Backs Perovskite Solar Cell R&D;, Highlighting >26% for Standalone and ~34% for Tandem Efficiencies	U.S. Department of Energy (DOE)	2026-08-25	US	Perovskite Solar Cells

ID	Title	Source	Date	Region	Sub-Topic
S2-05	HZB Achieves 30.3% Efficiency in Perovskite-Silicon Tandem Solar Cells Using Solvent-Free Co-Evaporation with Ultra-Thin CsCl Layer	XenoSpectrum	2026-08-27	Germany	Perovskite Solar Cells
S2-06	Caelux Forges 5GW Partnerships with Rayzon Solar and Navitas Solar in India, Targeting Perovskite-Integrated Module Production by 2028-29	PV-Tech	2026-08-25	US	Perovskite Solar Cells
S2-07	Fraunhofer ISE and University of Freiburg Develop Fully Solvent-Free Perovskite-Silicon Tandem Solar Cell Manufacturing Process, Achieving 27.1% Efficiency and High Stability	Fraunhofer ISE	2026-08-27	Germany	Perovskite Solar Cells
S2-08	Machine Learning Optimizes Charge Transport Layers and Fabrication Parameters for Lead-Free Cs ₂ AgBi _{0.75} Sb _{0.25} Br ₆ Perovskite Solar Cells	The Royal Society of Chemistry	2026-08-24	Unknown	Perovskite Solar Cells
S2-09	Fraunhofer ISE Develops Novel Millisecond-Resolution Subcell Current Metrology, Revolutionizing Mass Production Quality Control for Tandem Solar Cells	PV Magazine	2026-08-26	Germany	Perovskite Solar Cells
S2-10	NiOx/Perovskite Interface Engineering Boosts Performance of Efficient Air-Processed Wide-Bandgap Perovskite Solar Cells	ACS Applied Energy Materials	2026-08-25	Unknown	Perovskite Solar Cells
S2-11	Nanjing University Achieves World Record 26.2% Efficiency on 65 cm ² All-Perovskite Tandem Solar Module, Overcoming Scaling Challenges	National Natural Science Foundation of China (NSFC)	2026-08-25	China	Perovskite Solar Cells
S2-12	Kaunas University Breakthrough Extends Lifespan of Inverted Perovskite Solar Cells with Chemical Interface Engineering	The Cool Down	2026-08-21	リトアニア	Perovskite Solar Cells
S2-13	Monochrome Inc. to Pioneer Perovskite Solar Cells in World's Harshes Off-Grid Test at K2 Base Camp	The Cool Down (via pv magazine)	2026-08-21	Pakistan	Perovskite Solar Cells
S2-14	Germany's HZB Develops Carborane-Based Electron Transport Material, Boosting Perovskite Solar Cell Efficiency by 2.4% Points and Resolving Stability Issues	Facebook (pveurope.eu)	2026-08-21	Germany	Perovskite Solar Cells
S2-15	Tandem PV Secures \$7.7M DOE Grant to Accelerate US Commercialization of 29.7% Efficient Perovskite-Silicon Tandem Solar Cells	PV Tech	2026-08-26	US	Perovskite Solar Cells
S2-16	SPIE Conference Unveils Breakthroughs in Lead-Free FAPbI ₃ Perovskites and High-Efficiency Wide Bandgap Perovskite Solar Cells	SPIE	2026-08-24	International	Perovskite Solar Cells

ID	Title	Source	Date	Region	Sub-Topic
S2-17	Osaka University Boosts Perovskite Solar Cell Performance with Chiral Hole Transport Materials, Achieving 60% Spin Polarization	EurekAlert!	2026-08-27	Japan	Perovskite Solar Cells
S2-18	GCL Perovskite Leads Standardization of Space-Grade Perovskite Modules, Closes Over RMB 100M Series D1 Funding	China Solar PV News Snippets	2026-08-26	China	Perovskite Solar Cells
S2-19	Mitsubishi Gas Chemical Selected for Niigata City Perovskite IoT Device Demo at Ice Arena, Advancing Low-Light Applications	IBTimes JP	2026-08-26	Japan	Perovskite Solar Cells
S2-20	Lead Leakage from Damaged Laminated Perovskite Solar Cells Reduced to 0.07% Over 9 Months, Indicating Enhanced Safety	Energies Media	2026-08-26	Switzerland	Perovskite Solar Cells
S2-21	ACS Energy Letters Deciphers Electro-Ionic Interplay in Perovskite LED Degradation, Noting Bias-Dependent Instability Despite 20.0% Initial EQEmax	ACS Energy Letters	2026-08-27	International	Perovskite Solar Cells
S2-22	Perovskite Connect 2026 Conference Spotlights Reliability Testing, Tandem Mismatch Mitigation, and 96% Recovery Recycling for Perovskite Solar Cells	Perovskite-Info	2026-08-27	International	Perovskite Solar Cells
S2-23	ART-PV India Achieves 29.8% Efficiency with Perovskite-Silicon-CdTe Triple-Junction Tandem Solar Cells	YourStory	2026-08-27	India	Perovskite Solar Cells
S2-24	Swift Solar Secures \$27M Series A to Accelerate Commercialization of High-Efficiency Lightweight Perovskite Solar Panels	Energy.Media	2026-08-20	US	Perovskite Solar Cells
S2-25	GCL Perovskite Leads Standardization for Space-Grade Single-Junction Perovskite PV Modules, Achieves 18.04% Efficiency and IEC Certification	Perovskite-Info	2026-08-28	China	Perovskite Solar Cells
S2-26	German Researchers Achieve 27.3% Efficiency in Solvent-Free Perovskite-Silicon Tandem Solar Cell with Exceptional 6,800-Hour Stability	PV Magazine	2026-08-28	Germany	Perovskite Solar Cells
S2-27	LONGi Achieves World Record 35.5% Power Conversion Efficiency with Crystalline Silicon-Perovskite Tandem Solar Cell	The Economic Times	2026-08-24	China	Perovskite Solar Cells
S2-28	Perovskite Connect 2026 to Convene Global Industry Leaders in Berlin this October for Next-Gen Solar Development	Perovskite-Info	2026-08-20	Germany	Perovskite Solar Cells
S3-01	Next Move Strategy Consulting: Green Hydrogen Emerges as Critical Frontier for Energy Security in 2026	Next Move Strategy Consulting / GlobeNewswire	2026-08-25	US	Hydrogen Energy

ID	Title	Source	Date	Region	Sub-Topic
S3-02	GlobeNewswire: Clean Hydrogen Acceleration Drives Energy & Sustainability Industry to Inflection Point in 2026	GlobeNewswire	2026-08-25	US	Hydrogen Energy
S3-03	Saudi Arabia's NEOM Green Hydrogen Complex: \$8.5B Gigaproject Completes Construction, Begins Commissioning	RenewaNews, The Cooldown, ReneEnergy (YouTube)	2026-08-24	Saudi Arabia	Hydrogen Energy
S3-04	Hydrogen & Carbon Capture Technology World Expo 2026 Showcases Advanced Automation, Safety, and Coating Solutions	Hydrogen and Carbon Capture Technology World Expo	2026-08-27	Germany	Hydrogen Energy
S3-05	Europe's Ambitious Hydrogen Pipeline Plans Face Reality Check, Highlighting Infrastructure Development Complexities	S&P; Global	2026-08-26	US	Hydrogen Energy
S3-06	Plug Power Achieves \$178 Million Revenue in Q2 2026, Raises Full-Year Guidance, Boosting Stock Performance	Simply Wall St, Vantage Markets	2026-08-23	US	Hydrogen Energy
S3-07	China's Hydrogen Industry Shifts to Large-Scale Commercialization, Accelerating Domestic Adoption and International Collaboration	Gas to Power Journal, RenewaNews	2026-08-20	China	Hydrogen Energy
S3-08	Europe Bolsters Partnerships with MENA and Africa for Green Hydrogen Procurement	RenewaNews (via Buttontdown)	2026-08-20	Europe (EU)	Hydrogen Energy
S3-09	Ballard Power Systems Prioritizes Project Execution and Financial Discipline to Enhance Hydrogen Sector Visibility	SmallCapPower	2026-08-21	Canada	Hydrogen Energy
S3-10	U.S. Department of Energy Unveils Comprehensive Resources for Clean Hydrogen Production Tax Credit (45V), Offering up to \$3.00/kg Incentive	U.S. Department of Energy (DOE)	2026-08-25	US	Hydrogen Energy
S3-11	India's National Green Hydrogen Mission Targets 5 MMT Production by 2030 with Over Rs 8 Trillion Investment	Akashvani News - Newsonair, National Single Window System (NSWS), Economictimes.indiatimes.com, RenewaNews	2026-08-20	India, Japan	Hydrogen Energy
S3-12	South Korea Unlocks Renewable Energy Potential, Pushes Hydrogen Economy with Policy Reforms	Kim & Chang	2026-08-27	South Korea	Hydrogen Energy
S3-13	ITM Power Discloses Director Shareholdings, Highlighting Executive Commitment	ITM Power via Fidelity	2026-08-20	UK	Hydrogen Energy
S3-14	Romania Enacts Green Hydrogen Mandate, Unlocking €1 Billion EU Recovery Funds	Romania Insider	2026-08-26	—	Hydrogen Energy

ID	Title	Source	Date	Region	Sub-Topic
S3-15	EIB Fuels Namibia's Green Hydrogen Ambition, Accelerating Africa's Renewable Energy Leadership	Renewable Energy World	2026-08-27	ナミビア	Hydrogen Energy
S3-16	Breakthrough Electrolyzer Technology Poised to Unlock Affordable Green Hydrogen, Accelerating Energy Transition	・ —	2026-08-26	International	Hydrogen Energy
S3-17	Plug Power Commissions 5MW PEM Electrolyzer at European Energy's Møde Facility, Accelerating Green Hydrogen Deployment in Denmark	Plug Power	2026-08-25	US	Hydrogen Energy
S3-18	EU Ramps Up Green Hydrogen Ambitions with Revised Strategy for Domestic Production	European Commission / EU	2026-08-24	EU	Hydrogen Energy
S3-19	Japan Unveils Aggressive Hydrogen Roadmap to Propel Fuel Cell Vehicle Revolution	Nikkei	2026-08-23	Japan	Hydrogen Energy
S3-20	German Chemical Giant Commits Landmark Investment to Green Ammonia, Accelerating Industrial Decarbonization	— —	2026-08-22	Germany	Hydrogen Energy
S3-21	Ballard Power Systems Unveils Next-Gen Fuel Cell for Heavy-Duty Trucks: A Leap in Durability and Efficiency	Ballard Power Systems	2026-08-27	Canada	Hydrogen Energy
S3-22	South Korea Unveils Detailed Plans for Major Hydrogen Import Terminal to Bolster Energy Security	/ —	2026-08-26	South Korea	Hydrogen Energy
S3-23	Siemens Energy Secures Major Middle East Contract for Next-Gen Hydrogen-Ready Gas Turbines	Siemens Energy	2026-08-25	Germany	Hydrogen Energy
S3-24	China Unveils Ambitious Pilot to Fast-Track Green Hydrogen and Industrial Decarbonization	/ — —	2026-08-24	China	Hydrogen Energy
S3-25	U.S. DOE Amplifies Hydrogen Hub Funding, Reinforcing National Decarbonization Drive	U.S. Department of Energy	2026-08-23	US	Hydrogen Energy
S3-26	TotalEnergies Drives Multi-Gigawatt Green Hydrogen Export Hub in Australia	TotalEnergies	2026-08-22	France	Hydrogen Energy
S3-27	Iwatani Fuels Japan's Hydrogen Highway Vision with Nationwide Refueling Network Expansion	(—) / —	2026-08-21	Japan	Hydrogen Energy
S3-28	Air Products Forges Strategic Alliances for Green Hydrogen Supply, Accelerating Industrial Decarbonization	Air Products	2026-08-28	US	Hydrogen Energy
S3-29	Enapter Unveils Next-Gen AEM Electrolyzer for Scalable, Decentralized Green Hydrogen Production	Enapter	2026-08-27	Germany	Hydrogen Energy

ID	Title	Source	Date	Region	Sub-Topic
S3-30	EKPO Fuel Cell Technologies and Akkodis Initiate On-Road Testing of NM20 Fuel Cell Stack in 40-Ton Truck for Heavy-Duty Transport Decarbonization	EQS News	2026-08-27	Germany	Hydrogen Energy
S3-31	Thyssenkrupp Nucera Reports Sluggish Q3 Orders at €81 Million, Green Hydrogen Sector Accounts for Just €3 Million: Berenberg Maintains €9 Price Target But Revises Down Forecasts	Finimize	2026-08-25	Germany	Hydrogen Energy
S4-01	MDPI Review Details Electrolyte Optimization Strategies for Enhanced Low-Temperature Performance in Sodium-Ion Batteries	MDPI	2026-08-26	Germany	Next-Gen Storage
S4-02	24M Technologies' Semi-Solid Sodium-Ion Breakthrough Promises Game-Changing EVs: Extended Range, Rapid Charging, and Enhanced Safety	Facebook	2026-08-26	US	Next-Gen Storage
S4-03	Li-S Energy Delivers Groundbreaking Lithium-Sulfur Battery Cells to U.S. Army for Defense Applications	TipRanks	2026-08-25	Australia	Next-Gen Storage
S4-04	Formula X Introduces Game-Changing 100-Hour Iron-Air Battery for Stationary Storage Market	Facilities Dive	2026-08-27	US	Next-Gen Storage
S4-05	U.S. Company Repurposes End-of-Life EV Batteries for AI Data Center Storage in Nevada	Economic Times	2026-08-25	US	Next-Gen Storage
S4-06	Scientists Develop Next-Gen Zinc-Iodine Batteries with 60,000 Cycles, 3-Minute Charge, and Inherent Non-Flammability	TechRadar	2026-08-26	US	Next-Gen Storage
S4-07	DeltaX Plans \$141 Million Battery Manufacturing Hub in Georgia to Boost US Energy Storage Production	Environment + Energy Leader	2026-08-27	US	Next-Gen Storage
S4-08	Europe's Battery Recycling Dilemma: Economic Hurdles Threaten Circular Economy Goals	ESS News	2026-08-28	Europe	Next-Gen Storage
S4-09	CATL Predicts Sodium-Ion Battery Cost Parity with LFP by End of 2026, Signaling Major Market Shift	Renewables Now	2026-08-26	China	Next-Gen Storage
S4-10	UK Government Launches £28 Million Challenge to Accelerate Ultra Long-Duration Energy Storage Development	Gov.uk	2026-08-26	UK	Next-Gen Storage
S4-11	Capital Dynamics Acquires 170MW/4-Hour Battery Energy Storage Project to Accelerate Renewable Energy Integration	Capital Dynamics	2026-08-27	US	Next-Gen Storage
S4-12	U.S. Government Bans Chinese-Made Battery Energy Storage Systems via New Trump Directive Over National Security Concerns	ESS News	2026-08-27	US	Next-Gen Storage

ID	Title	Source	Date	Region	Sub-Topic
S4-13	Gelion's Lithium-Sulfur Batteries Pass Independent Drone Tests at QinetiQ, Accelerating Market Entry	Pluang	2026-08-25	Australia	Next-Gen Storage
S4-14	Pure Lithium Announces Unprecedented Cycling Results from Its Advanced Anode Lithium Metal Battery Technology	BusinessWire	2026-08-26	US	Next-Gen Storage
S4-15	Princeton NuEnergy Secures \$50 Million DOE Grant for Building Closed-Loop Cathode-to-Cathode Recycling Facility	PR Newswire	2026-08-24	US	Next-Gen Storage
S4-16	Itronics Advances Critical Minerals Processing with Breakthrough Battery 'Black Mass' Recovery Technology	Morningstar (Accesswire)	2026-08-25	US	Next-Gen Storage
S4-17	Invinity Energy Systems Secures EPC Contract for Landmark 2.1GWh Flow Battery Project in Switzerland	Energy-Storage.news	2026-08-28	UK	Next-Gen Storage
S4-18	UESTC Unveils Bendable, Cuttable Li-S Battery Leveraging PAA for Safer, Longer-Lasting Power	中国電子科技大学	2026-08-24	China	Next-Gen Storage
S4-19	U.S. DOE Invests \$500M to Bolster Domestic Battery Supply Chain, Princeton NuEnergy Secures \$50M for Cathode Recycling Facility	U.S. DOE	2026-08-24	US	Next-Gen Storage
S4-20	Silicon Anode Battery Market to Hit \$13.5B by 2034, Driven by EV & Fast Charging Demands: Sila Nanotechnologies Lands \$1.4B DoD Loan	MLQ.ai	2026-08-25	US	Next-Gen Storage
S4-21	Sodium-Ion Batteries Enter Full Commercialization in 2026: CATL Launches Mass-Produced 175Wh/kg Naxtra Cells, Priced at \$50-56/kWh	SodiumBatteryHub	2026-08-25	Global	Next-Gen Storage
S4-22	LG Energy Solution Commences LFP and NMC Battery Cell Production at Michigan Plant, Securing Over 50GWh Capacity for North American ESS Market	Battery Technology	2026-08-24	US	Next-Gen Storage
S4-23	L&T; Lands Massive 6 GWh Battery Storage Deals, Bolstering Middle East Grid Modernization	EMobility+	2026-08-26	中東	Next-Gen Storage
S4-24	UK's Certain Energy Raises £10M for Manganese Flow Batteries: Aims to Commercialize Long-Duration Storage at 1/10th Vanadium Cost	Imperial College London	2026-08-26	UK	Next-Gen Storage
S4-25	European BESS Deployment Accelerates: Czech Republic Adds 318MWh in H1, Portugal Allocates Over 1GVA to Storage	Solarplaza	2026-08-26	Europe	Next-Gen Storage
S4-26	Italy Greenlights Nationally Strategic 320MW BESS Project to Bolster Grid Stability and Renewables Integration	Energy Storage - ESS News	2026-08-28	Italy	Next-Gen Storage

ID	Title	Source	Date	Region	Sub-Topic
S4-27	ESS Inc. Pivots to Sodium-Ion BESS, Shifts Focus from Iron Flow Batteries to Overcome Commercialization Challenges	Energy-Storage.news	2026-08-21	US	Next-Gen Storage

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