

Energy & Storage

Field Intelligence Report

Vol. 49 | 2026.07.13 — 07.19 | Articles: 127

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

Market Mood

78

/ 100 Optimistic

Accelerating Green Energy Transition

Breakthroughs in batteries, solar, and hydrogen drive commercialization amidst policy shifts and infrastructure challenges.

Solid-State Battery Energy Density Target	Perovskite-Silicon Tandem Efficiency Record	Green Hydrogen Production Cost	Grid-Scale Battery Storage Capacity
900	35.5	1.75	19
—	+0.65%	—	—

Weekly Summary

This week's energy sector analysis reveals significant advancements across solid-state batteries, perovskite solar cells, hydrogen energy, and next-gen storage. Key developments include new efficiency records for perovskite-silicon tandem cells (35.5%), critical breakthroughs in solid-state battery dendrite suppression, and the commercialization push for sodium-ion batteries for grid storage. Policy shifts in the EU and US are shaping hydrogen project viability, while AI-driven data center demand is accelerating BESS adoption. Western players must navigate Asian manufacturing dominance and leverage R&D; to secure strategic positions in this rapidly evolving landscape.

4 Sub-Topic Summary

Sub-Topic	Headline	Momentum	Key Insight
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Solid-State Batteries	Solid-State Batteries Advance to Pilot Production, Address Dendrite Challenges	Accelerating	Research breakthroughs in dendrite suppression (Max Planck, MIT, Honda) and interfacial stability (Argonne, ACS) are accelerating solid-state battery commercialization. Asian players like Toyota (3,511 patents), Samsung SDI (900 Wh/L by 2027), and Chinese firms (CATL 500 Wh/kg by 2027, Dongfeng 50,000 EVs by 2027) lead in patents and mass production targets, while Western OEMs like BMW and Honda partner with US firms (Solid Power, QuantumScape) for testing and development.
Perovskite Solar Cells	Perovskite Solar Cells Break 35% Efficiency, Gain Commercial Certifications	Accelerating	Perovskite-silicon tandem solar cells achieved a new world record of 35.5% efficiency (LONGi), with other teams reaching 28.04% for perovskite-organic (CAS) and 27.3% for 3-junction (HZB). Qcells secured industry-first UL/IEC certifications for its tandem technology, paving the way for commercialization. Stability improvements through novel additives (TDB, TM-DHP) and interface engineering (MeXT) are addressing key durability challenges.
Hydrogen Energy	Hydrogen Energy Faces Policy Shifts, Achieves Cost Breakthroughs	Watch	The EU is loosening green hydrogen production standards and cutting auction budgets (€500M), while the US adjusts tax credits for inflation, impacting project viability. Despite \$17B in US project delays (Plug Power), an Icelandic pilot achieved \$1.75/kg green hydrogen. India launched 10 mobility corridors and a nuclear-assisted production facility. UK secures legislative power for hydrogen business models, signaling continued strategic support.

Next-Gen Storage	Next-Gen Storage Solutions Scale Up, Address AI Data Center Demand	Building	Sodium-ion batteries are rapidly commercializing, with CATL planning 1 GWh rollout by year-end and 5 GWh in Europe by 2027 (Alfen), and US firms (Peak Energy, ESS Tech) building 4 GWh/year manufacturing. Long-duration solutions like Form Energy's 100-hour iron-air battery and Energy Dome's 10-hour CO2 battery are gaining traction. AI data centers are shifting from diesel to BESS for grid stability, with Google building a 2.9 GWh storage project.
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Toyota Targets 1,000km EV Range with Solid-State Batteries by 2027

Source: Gemini Grounding (Toyota)

Summary: Toyota aims to commercialize solid-state batteries for Battery Electric Vehicles (BEVs) by 2027-2028, with small-scale production commencing in Japan in 2026. These next-generation batteries are projected to deliver a driving range of up to 1,000 km (621 miles...

WHY ENGINEERS SHOULD CARE

EV powertrain designers and battery procurement teams should closely monitor Toyota's 2026 small-scale production ramp-up and 2027-2028 commercialization timeline for solid-state cells. Achieving 450-...

TDK Achieves 1,000 Wh/L Solid-State Battery Material for Wearables

Source: Gemini Grounding (TDK)

Summary: TDK has developed a new material for next-generation solid-state batteries, achieving a volumetric energy density of 1,000 Wh/L. This represents approximately a 100-fold increase compared to TDK's conventional CeraCharge solid-state batteries. The immediate fo...

WHY ENGINEERS SHOULD CARE

Design engineers for compact electronics, IoT devices, and medical wearables should evaluate TDK's 1,000 Wh/L solid-state battery material for significant space savings and extended battery life. This...

Japan Boosts Domestic Green Energy Supply Chain with ¥83.3 Billion Subsidy

Source: Gemini Grounding (METI)

Summary: Japan's Ministry of Economy, Trade and Industry (METI) has allocated approximately ¥83.3 billion in the FY2025 supplementary budget for its "GX Supply Chain Construction Support Program." This initiative aims to foster domestic manufacturing of green energy co...

WHY ENGINEERS SHOULD CARE

Supply chain managers and technical planners in renewable energy should note Japan's aggressive push for domestic content, targeting 65% for offshore wind by 2040. This substantial subsidy program and...

This Week's Japan Technology Highlights

Japan is accelerating next-gen battery tech: Toyota targets 450-500 Wh/kg solid-state EVs by 2027, while TDK achieves 1,000 Wh/L for wearables.

China Watch | Energy & Storage

Full English content available after pipeline regeneration.

CATL & BYD Solid-State Battery Progress: Engineering Challenges to Mass Production

■ China's Move

CATL Chairman Dr. Robin Zeng indicated that large-scale commercialization of solid-state batteries is not anticipated before 2030, citing significant engineering challenges (July 12-19, 2026 reports). CATL aims for small-scale, all-solid-state production by 20...

■ Technical Verification

[CONFIRMED] CATL's condensed matter battery (hybrid solid-liquid) is in application in aviation and high-end EVs. / CATL has begun pilot production of solid-state cells with an energy density of 500 Wh/kg.

[BOTTLENECK] Solid-solid interface layer consistency: Inconsistencies during production lead to microstructural misalignment, increasing internal resistance and accelerating cell degradation. This is a fundament...

■ Implications for Western Engineers

- Battery R&D teams: Benchmark CATL's "condensed matter" (hybrid solid-liquid) approach as a viable near-term pathway to higher en...
- EV platform designers: Plan for potential integration of small-scale solid-state battery packs in high-end or specialized vehicl...
- Materials scientists: Focus research on improving solid-solid interface stability and developing scalable manufacturing processe...

Key Trends This Week (5 Total)

TR-01 HIGH

Cross-Domain

Asian Dominance in Green Tech Manufacturing & IP Accelerates

Asian Firms Lead 3 Key Green Tech Sectors, Outpacing Western Rivals

Asian companies, particularly from China, Japan, and South Korea, are demonstrating overwhelming leadership in patent filings, efficiency records, and GWh-scale manufacturing for solid-state batteries (Toyota, CATL, Samsung SDI), perovskite solar cells (LONGi, CAS, Qcells), and grid-scale energy storage (BYD, CATL). This dominance creates a critical supply chain and competitive challenge for Western players, who risk reliance on Asian innovation and production capacity.

Toyota SSB Patents

3,511

LONGi Perovskite Efficiency

35.5%

BYD Grid Storage Contract

11.275 GWh

► Western OEM ► Western Material Supplier ► Western Equipment Maker

Refs: S1-01 S1-07 S1-21 S1-30 S1-32 S1-37 S1-39 S2-01 S2-04 S2-05 S2-09 S2-10 S2-13 S3-06 S3-09 S3-10 S3-38 S4-02 S4-06 S4-10 S4-16

TR-02 HIGH

Cross-Domain

AI-Driven Data Center Demand Reshapes Energy Infrastructure

AI Workloads Drive 2.9 GWh BESS Deployments, Fuel Cell Adoption

The exponential growth of AI workloads is creating unprecedented demand for reliable, low-emission power, fundamentally reshaping energy infrastructure. Data centers are rapidly transitioning from traditional diesel generators to Battery Energy Storage Systems (BESS) for grid stability and reduced CapEx, with Google deploying 2.9 GWh. Hydrogen fuel cells are also gaining traction for distributed power, with PowerCell securing 300 MW orders for AI data centers, highlighting a critical new market for advanced energy solutions.

Google BESS Capacity

2.9 GWh

PowerCell Data Center Orders

300 MW

ESS Tech Customer Opportunities

\$1 Billion

► Western OEM ► Western Foundry ► Western Material Supplier ► Western Equipment Maker

Refs: S3-16 S3-34 S4-01 S4-03 S4-08 S4-17 S4-20 S4-21

TR-03 MED

Hydrogen Energy

Policy Uncertainty & Infrastructure Bottlenecks Hinder Green Hydrogen Scale-Up

Policy Shifts & Grid Constraints Slow \$17B US Hydrogen Projects

Despite strong global demand (>100M tons), the green hydrogen market faces significant hurdles from policy shifts and infrastructure bottlenecks. Over \$17 billion in US projects are delayed due to policy uncertainty, while the EU is loosening production standards and cutting auction budgets. Grid transmission constraints are emerging as a primary barrier to low-carbon hydrogen production, necessitating urgent investment in electrolyzer manufacturing and hydrogen infrastructure to meet decarbonization targets.

US Project Delays

EU Auction Budget

Global Hydrogen Demand (2025)

\$17 Billion	€500 Million	100 Million Tons
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► Western OEM ► Western Foundry ► Western Equipment Maker ► Western Distributor

Refs: S3-02 S3-04 S3-17 S3-18 S3-21 S3-22 S3-24 S3-25 S3-26 S3-28 S3-29 S3-32 S3-37 S3-41 S3-42 S3-44 S3-45

TR-04 MED Cross-Domain

Advanced Material Science Drives Battery & Solar Performance Gains

Novel Electrolytes & Coatings Boost Battery Life, Solar Efficiency

Breakthroughs in material science are critical for advancing both battery and solar technologies. In solid-state batteries, novel composite polymer electrolytes (ACS, Quantum Leap) and ultrathin coatings (Argonne, ACS) are addressing interfacial stability and dendrite growth, boosting cycle life by up to 300%. For perovskite solar cells, new electron transport materials (EurekAlert!) and dual surface passivation (PLOS One) are pushing efficiency records beyond 35% and enhancing long-term stability, demonstrating the power of material innovation.

SSB Performance Boost	Perovskite Efficiency Record	Li-S Battery Cycles
300%	35.5%	1000+

► Western Material Supplier ► Western Equipment Maker ► Western OEM ► Western T&M; Provider

Refs: S1-03 S1-05 S1-08 S1-09 S1-10 S1-11 S1-13 S1-16 S1-17 S1-18 S1-19 S1-22 S1-26 S1-36 S1-38 S1-40 S1-42 S1-44 S2-02 S2-03 S2-06 S2-07 S2-08 S2-12 S2-14 S2-16 S3-06 S3-08 S3-09 S3-10 S4-07 S4-09

TR-05 LOW Next-Gen Storage

Diversification Beyond Lithium-Ion Accelerates for Grid & Specialized Use

Sodium-Ion, Iron-Air, CO2 Batteries Gain Traction for Grid Stability

The energy storage market is diversifying beyond lithium-ion, driven by cost, safety, and long-duration requirements. Sodium-ion batteries are seeing rapid commercialization for grid-scale applications (CATL, ESS Tech, Peak Energy), offering cost-effectiveness and abundant materials. Long-duration solutions like Form Energy's 100-hour iron-air battery and Energy Dome's 10-hour CO2 battery are emerging for grid stability, while aqueous zinc batteries (SuperDielectrics) target data centers. This trend reduces reliance on critical minerals and expands storage options.

Sodium-Ion Deployment (CATL)	Iron-Air Duration	CO2 Battery Lifespan
5 GWh	100 Hours	30+ Years

► Western OEM ► Western Material Supplier ► Western Equipment Maker ► Western Foundry

Refs: S1-12 S1-15 S4-02 S4-03 S4-04 S4-06 S4-08 S4-12 S4-16 S4-18 S4-19

Macro Market Indicators

Indicator	Direction	Value	Note	Source
Global Hydrogen Demand (2025)	↑	>100 Million Tons	Reported by IEA's 'Global Hydrogen Review 2026'	S3-04
US Green Hydrogen Project Delays	↓	\$17 Billion	Value of projects facing delays or cancellations due to policy changes	S3-02
EU Hydrogen Auction Budget	↓	€500 Million	Budget for Europe's fourth hydrogen auction, reduced from previous targets	S3-22
Global Energy Transition Market (2026)	↑	\$3.17 Trillion	Projected market size, doubling to \$5.99T by 2032	S3-44

Macro Environment Summary

The global energy transition market is projected to reach \$3.17 trillion by 2026, driven by renewables and hydrogen. However, significant headwinds persist, with over \$17 billion in US green hydrogen projects facing delays due to policy uncertainty, and the EU cutting its hydrogen auction budget. Despite these challenges, global hydrogen demand surpassed 100 million tons in 2025, indicating strong underlying market pull. Infrastructure bottlenecks, particularly in electricity grids, are emerging as a critical constraint, necessitating urgent investment.

Market Data: LIT (Battery & Storage) Weekly Trend

68.38 USD -5.45%

Action Recommendations by Player

Action Recommendations for Western OEM

OEM BMW, Honda, Tesla, Ford

BMW is testing Solid Power cells in i7s; Honda partnered with QuantumScape and developed a dendrite suppression method. US automakers are exploring solid-state for EVs, but Asian OEMs lead in mass production targets.

Risk

- If Chinese OEMs achieve 350-500 Wh/kg SSB mass production by 2027, Western OEMs without secured supply contracts will face 12-18 month product launch delays
- Reliance on Asian SSB technology and manufacturing capacity risks IP leakage and supply chain control for Western OEMs

Opportunity

- Partner with Western SSB developers (Solid Power, QuantumScape, Factorial) to co-develop and secure early supply for 2027-2030 EV models
- Integrate next-gen storage (Na-ion, iron-air) into grid-connected EV charging infrastructure to reduce operational costs

Actions This Week

- Schedule Q3 2026 capacity reservation meetings with Solid Power and Factorial Energy for SSB supply by Q4
- Initiate joint R&D; on SSB pack integration and thermal management with Western partners by Q4 2026
- Evaluate strategic partnerships with perovskite solar developers for BIPV integration into future vehicle designs by Q1 2027

□ Scenario: If Chinese CATL achieves 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

Foundry

Limited direct mentions, but US firms like Peak Energy plan 4 GWh/year sodium-ion BESS manufacturing. QuantumScape initiated pilot production in San Jose for solid-state batteries.

Risk

- Lack of GWh-scale Western manufacturing capacity for next-gen batteries (SSB, Na-ion) creates reliance on Asian foundries, risking IP leakage and supply chain control
- High capital expenditure for new manufacturing lines and rapid technological shifts risk equipment obsolescence if not adaptable

Opportunity

- Establish pilot lines for advanced battery components (electrolytes, cathodes) or full cell assembly, targeting \$4B+ SSB market by 2030
- Offer specialized manufacturing services for perovskite solar cell components and modules, leveraging precision deposition techniques

Actions This Week

- Evaluate feasibility of converting existing facilities for SSB/Na-ion pilot lines by Q4 2026
- Engage with Western material suppliers (Umicore, BASF) for joint manufacturing ventures by Q1 2027

- Develop modular manufacturing processes for electrolyzer components to support green hydrogen scale-up by Q2 2027
- Scenario: If Western material suppliers develop scalable SSB components, but no Western manufacturing capacity exists, then Asian foundries will capture market share — invest in pilot line capabilities by Q3 2027.
- Quick Win : Conduct a Q3 2026 internal audit of existing manufacturing assets for potential conversion to solid-state or sodium-ion battery component production.

Action Recommendations for Western T&M; Provider

T&M;

SwRI and SMU are conducting joint research on SSB interface degradation. QinetiQ tested SuperDielectrics' zinc battery, demonstrating exceptional performance.

■ Risk

- Rapid evolution of new battery chemistries and solar technologies creates a need for new, specialized testing protocols and equipment, risking obsolescence of current offerings
- Failure to develop standardized Western certification for emerging green technologies could slow market adoption and create competitive disadvantage

■ Opportunity

- Develop specialized testing and certification services for solid-state batteries (dendrite formation, thermal stability) and perovskite solar cells (long-term stability, extreme environment performance)
- Offer advanced diagnostic and monitoring solutions for grid-scale BESS and hydrogen fuel cell systems, leveraging AI for predictive maintenance

■ Actions This Week

- Launch a dedicated R&D; program for SSB dendrite detection and thermal runaway testing by Q4 2026
- Partner with perovskite developers (Oxford PV) to co-develop stability testing standards by Q1 2027
- Expand service offerings to include certification for hydrogen fuel cell systems and infrastructure by Q2 2027

□ Scenario: If new battery and solar technologies lack standardized Western certification, market adoption will slow — invest in developing new testing protocols and equipment by Q2 2027.

□ Quick Win : Attend the upcoming DOE Solid-State Battery Summit to identify emerging testing needs and potential research partners this week.

Action Recommendations for Western Material Supplier

Material

Umicore leads SSB electrolyte patents. Factorial Energy partnered with Tulip Tech for drone batteries. Argonne Lab developed MgO coating for sulfide electrolytes.

■ Risk

- Asian material suppliers are rapidly innovating, potentially cornering the market for critical components like advanced electrolytes and catalysts, risking Western reliance
- Supply chain disruptions and geopolitical tensions could limit access to raw materials for next-gen battery and solar technologies

■ Opportunity

- Focus on high-value, proprietary materials for SSB (halide, composite polymer electrolytes, advanced cathodes) and perovskite solar cells (ETMs, passivation layers), targeting \$4B+ SSB electrolyte market by 2030
- Develop advanced catalysts for green hydrogen production (PEM, SOEC) to reduce reliance on expensive platinum-group metals

■ Actions This Week

- Accelerate R&D; on halide and composite polymer electrolytes for SSBs by Q4 2026
- Secure IP for novel perovskite ETMs and passivation materials by Q1 2027
- Initiate discussions with Western OEMs and battery developers to co-develop and qualify next-gen electrolyte materials this month

□ Scenario: If Western material suppliers fail to secure IP and scale production of next-gen electrolytes, they will become reliant on Asian imports — prioritize strategic R&D; and patent filings by Q3 2027.

□ **Quick Win** : Initiate discussions with Western OEMs (BMW, Ford) and battery developers (Solid Power, QuantumScape) to co-develop and qualify next-gen electrolyte materials this month.

Action Recommendations for Western Distributor

Distributor

No direct mentions of Western distributors in the context of new energy tech. Their role would be in distributing components, materials, or finished products.

■ Risk

- Rapid technological shifts and geopolitical tensions can disrupt traditional supply chains, requiring agile sourcing and logistics for new materials and components
- Failure to adapt to new energy supply chains could lead to loss of market share to specialized players focused on green technologies

■ Opportunity

- Establish specialized distribution channels for next-gen battery components (e.g., solid electrolytes, sodium-ion cells) and perovskite solar modules, leveraging existing logistics networks
- Provide value-added services for hydrogen energy components, including storage and transport solutions, to support industrial adoption

■ Actions This Week

- Conduct a market analysis of emerging SSB and Na-ion component suppliers (Western and non-Chinese Asian) by Q4 2026
- Develop logistics solutions for hydrogen fuel cell components and perovskite solar modules by Q1 2027
- Identify 3-5 key Western or allied-nation suppliers of solid-state battery precursors or sodium-ion cells and initiate partnership discussions this week

□ Scenario: If Western distributors do not adapt to new energy supply chains, they will lose market share to specialized players — invest in new product line expertise and logistics by Q3 2027.

□ **Quick Win** : Identify 3-5 key Western or allied-nation suppliers of solid-state battery precursors or sodium-ion cells and initiate partnership discussions this week.

Action Recommendations for Western Equipment Maker

Equipment

ITM Power secured \$62.45M UK grant for 1GW electrolyzer manufacturing line. Honda adopted roll-pressing for SSB manufacturing to improve efficiency and reduce costs.

■ Risk

- High capital expenditure required for new manufacturing lines and rapid technological obsolescence if equipment cannot adapt to evolving material science
- Asian equipment suppliers may dominate the market for next-gen energy manufacturing equipment if Western firms do not innovate and scale quickly

■ Opportunity

-
- Develop and supply advanced manufacturing equipment for solid-state battery production (e.g., roll-to-roll for electrolytes, precision assembly), perovskite solar cell fabrication, and green hydrogen electrolyzers (e.g., PEM, SOEC)
 - Offer modular, adaptable equipment designs that can be reconfigured for different battery chemistries or solar cell architectures, reducing investment risk

■ Actions This Week

- Prioritize R&D; for high-throughput, precision manufacturing equipment for solid-state battery electrolytes by Q4 2026
- Engage with Western perovskite developers (Oxford PV) to design next-gen module assembly lines by Q1 2027
- Research Honda's roll-pressing method for SSBs and assess its applicability to current equipment lines, scheduling an internal review by end of week

□ Scenario: If Western equipment makers fail to provide competitive, scalable manufacturing solutions for next-gen energy tech, Asian equipment suppliers will dominate — invest in modular, adaptable equipment designs by Q2 2027.

□ Quick Win : Research Honda's roll-pressing method for SSBs (S1-25) and assess its applicability to current equipment lines, scheduling an internal review by end of week.

Impact Matrix (Players × Trends)

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

Player	TR-01 HIGH Asian	TR-02 HIGH AI-Dri	TR-03 MED Policy	TR-04 MED Advanc	TR-05 LOW Divers
Western OEM					
Western Contract Manufacturer					
Western T&M; Provider					
Western Material Supplier					
Western Distributor					
Western Equipment Maker					

Timeline This Week (8 Events)

Date	Tag	Headline	Source
2026-07-09	policy	California Governor Newsom signs SB 1350, designating green hydrogen as renewable energy	USA S3-18
2026-07-10	policy	EU launches fourth hydrogen auction with €500M boost for green fuel production	Europe S3-22
2026-07-11	milestone	Max Planck Institute uncovers mechanism of lithium dendrite failure in solid-state batteries	Germany S1-08
2026-07-13	policy	China enacts national solid-state battery standard, defining 'all-solid-state' as <5% liquid electrolyte	China S1-30, S1-39
2026-07-14	milestone	Qcells achieves industry-first UL and IEC certifications for perovskite-silicon tandem solar technology	South Korea S2-10
2026-07-15	milestone	LONGi achieves new world record of 35.5% efficiency for perovskite-silicon tandem solar cell	China S2-01
2026-07-16	deal	CATL and Alfen sign MOU to deploy 5 GWh of Tener Sodium-Ion Battery Storage in Europe from 2027	China, Netherlands S4-16
2026-07-17	deal	OMV secures €450M EIB loan for 140 MW green hydrogen plant in Austria	Austria S3-03

Company Spotlight

LONGi ↑ Achieved 35.5% efficiency for perovskite-silicon tandem solar cell, a new world record.

This marks continuous improvement, surpassing their previous 34.85% record in less than a year, accelerating perovskite commercialization.

- Western PV manufacturers: Evaluate strategic partnerships with leading perovskite developers to integrate high-efficiency tandem technology by Q1 2027.

CATL [300750.SZ] ↑ Announced 1 GWh sodium-ion battery rollout by year-end, 5 GWh in Europe from 2027.

CATL's aggressive sodium-ion deployment, including a major European deal with Alfen, signals a pivotal shift in grid storage away from lithium-ion.

- Western grid operators & BESS integrators: Prioritize qualification of CATL's sodium-ion solutions for 2027 projects to diversify supply and mitigate lithium price volatility.

Intelligent Energy ↑ Unveiled 120kW hydrogen fuel cell powertrain for heavy-lift drones, secured record orders.

IE's fuel cell systems offer 3-5x longer flight durations than batteries, positioning hydrogen as a game-changer for industrial UAVs and defense.

- Western aerospace & defense OEMs: Initiate feasibility studies for integrating IE's 120kW fuel cells into next-gen heavy-lift drone platforms by Q4 2026.

Technology Roadmap

2026

- ◆ China enacts national SSB standard (S1-30)
- ◆ Gotion High-Tech begins 400Wh/kg semi-solid cell production (S1-21)
- ◆ Toyota solid-state EVs launch (S1-43)
- ◆ CATL deploys 1 GWh sodium-ion BESS (S4-02)

2027

- ◆ Samsung SDI targets 900 Wh/L SSB mass production (S1-07)
- ◆ Dongfeng Motor plans 50,000 SSB EV deliveries (S1-37)
- ◆ MG (SAIC) launches PHEVs with semi-solid batteries (S1-24)
- ◆ CATL & Alfen deploy 5 GWh Na-ion BESS in Europe (S4-16)
- ◆ OMV's 140 MW green hydrogen plant operational (S3-03)

2028

- ◆ Avantus Rexford 2 solar-plus-storage (800 MWh BESS) commercial operation (S4-05)
- ◆ Nofar USA 400 MWh BESS commercial operation (S4-15)
- ◆ India waives inter-state transmission charges for RE-attached BESS (S4-12)

2029

- ◆ JERA develops Japan's first low-carbon ammonia value chain (S3-38)

2030

-
- ◆ India targets 5 million tons annual green hydrogen production (S3-19)
 - ◆ India targets 200 GWh domestic battery manufacturing capacity (S4-12)
 - ◆ GAC aims for high-capacity SSB mass production (S1-20)

References (127 Total)

ID	Title	Source	Date	Region	Sub-Topic
S1-01	Toyota Maintains Dominant Lead in Solid-State Battery Patents Amidst Surging Competition from LGES and Samsung SDI	Patsnap	2026-07-10	International	Solid-State Batteries
S1-02	Solid-State Battery Cell Design Patent Landscape Reveals Early Concentration with TYFAST and Uchicago Argonne LLC Dominance	Patsnap	2026-07-13	International	Solid-State Batteries
S1-03	Advanced Composite Polymer Electrolyte Boosts Interfacial Stability and Long-Term Cycling in NASICON-Based Solid-State Lithium Batteries	ACS Applied Energy Materials	2026-07-09	US	Solid-State Batteries
S1-04	Umicore Leads Solid-State Battery Electrolyte Patent Race, Revealing Significant Entry Opportunities in Ceramics Sector	Patsnap	2026-07-13	International	Solid-State Batteries
S1-05	Halide Cathode Materials Poised to Revolutionize All-Solid-State Lithium Batteries through Multi-Electron Reactions	National Science Review (Oxford Academic)	2026-07-16	International	Solid-State Batteries
S1-06	Chinese Scientists Develop Organic-Inorganic Gel Electrolyte Resolving Capacity Degradation in Solid-State EV Batteries	OkDiario	2026-07-16	China	Solid-State Batteries
S1-07	BMW Begins i7 Testing with Solid Power's All-Solid-State Cells; Samsung SDI Targets 900 Wh/L Production by Late 2027	Febatt	2026-07-14	International	Solid-State Batteries
S1-08	Max Planck Institute Uncovers Mechanism of Lithium Dendrite Failure in Solid-State Batteries, Published in Nature	The Robotics Media	2026-07-11	Germany	Solid-State Batteries
S1-09	MIT Researchers Boost Solid-State Battery Performance by 300% by Addressing Grain Boundary Dendrite Formation	InsideEVs via TechCrunch Disrupt	2026-07-13	US	Solid-State Batteries
S1-10	Quantum Leap Innovations Announces Breakthrough in Solid-State Battery Durability with Novel Composite Electrolyte	InTheBatt	2026-07-12	International	Solid-State Batteries
S1-11	Xiamen and Zhejiang Universities Achieve High-Safety 4.5V Lithium Metal Batteries with DES-Based Solid Polymer Electrolyte	IEST Instrument	2026-07-13	China	Solid-State Batteries
S1-12	Direct Growth of Na-Ion Conducting Glass Solid Electrolyte Achieves Significant 6.2 Ω Interfacial Resistance Reduction for Room-Temperature Sodium-Sulfur Pouch Cells	ResearchGate	2026-07-11	International	Solid-State Batteries
S1-13	Ultrathin Li3YCl6-Based Coatings Enable High-Areal-Capacity All-Solid-State Batteries with Improved NMC811 Cathode Cycling Performance	Chemistry of Materials (ACS Publications)	2026-07-14	US	Solid-State Batteries

ID	Title	Source	Date	Region	Sub-Topic
S1-14	Talent New Energy Drives 'Green Future' with Solid-State Batteries, Announces Mass Production of Semi-Solid Electric Motorcycles with Yadea	WIPO	2026-07-14	International	Solid-State Batteries
S1-15	Thermal Safety Review for Rail Transit Traction Batteries Compares Chemistries, Highlights Solid-State Battery Safety	Energy & Fuels (ACS Publications)	2026-07-10	US	Solid-State Batteries
S1-16	Osaka University, AIST Unravels 'Superionic Conduction' Mechanism: Ions Flow Like Liquid Through Solid Crystal	Asia Research News	2026-07-16	Japan	Solid-State Batteries
S1-17	Succinic Anhydride Effectively Suppresses Dendrite Growth in Lithium Metal Anodes, Improving Solid-State Battery Cycle Life	ResearchGate	2026-07-09	International	Solid-State Batteries
S1-18	Argonne Lab Unveils 1-Nanometer Magnesium Oxide Coating: A Breakthrough for Sulfide Solid Electrolyte Stability	Argonne National Laboratory	2026-07-16	US	Solid-State Batteries
S1-19	ACS Paper: Li-Al-Si-Zn Alloy Anode Achieves Ultra-Rapid Charging and Extended Life in All-Solid-State Batteries, Retaining 80% Capacity After 2050 Cycles	ACS Sustainable Chemistry & Engineering	2026-07-09	US	Solid-State Batteries
S1-20	Breaking Dendrite Dogma: Max Planck Points to Hydrostatic Pressure, As Chinese Firms Drive Solid-State Battery Mass Production	El Debate	2026-07-11	Spain	Solid-State Batteries
S1-21	China Unifies Solid-State Battery Definition as CATL Targets 500Wh/kg Samples, BYD Plans 20GWh Line, and Gotion Commences 400Wh/kg Cell Production in Late 2026	All-About-Industries	2026-07-15	China	Solid-State Batteries
S1-22	AZoM Reports Thiourea Coating Boosts Lithium-Rich Cathode Capacity Retention to 97% After 600 Cycles, Revolutionizing Solid-State Battery Performance	AZoM	2026-07-16	Unknown	Solid-State Batteries
S1-23	Volt Coffer Reports European & Asia-Pacific Automakers Accelerate Solid-State Battery Deployment, Targeting Doubled EV Range and 40+ Minute Drone Flights	Volt Coffer	2026-07-10	Unknown	Solid-State Batteries
S1-24	MG (SAIC) to Launch PHEVs with 'SolidCore' Semi-Solid-State Batteries in 2027, Aiming for Enhanced Efficiency and Extended Range in Extreme Temperatures	Electrek	2026-07-09	China	Solid-State Batteries
S1-25	Honda Develops Novel Dendrite Suppression Method for Solid-State Batteries, Achieving Cost Reduction and Extended Lifespan with Thin Plastic Barrier and Roll-Press Manufacturing	Top Speed	2026-07-15	Japan	Solid-State Batteries

ID	Title	Source	Date	Region	Sub-Topic
S1-26	ACS Paper: Spin-Coated Asymmetric Ultrathin Salt-Rich Composite Polymer Electrolyte Achieves 82.5% Capacity Retention After 500 Cycles in Lithium Metal Batteries	ACS Applied Materials & Interfaces	2026-07-09	US	Solid-State Batteries
S1-27	Samsung SDI Announces 2027 Solid-State Battery Mass Production Plan, Targeting Robotics, AAM, and Drone Markets for Initial Penetration	The Elec Inc.	2026-07-13	South Korea	Solid-State Batteries
S1-28	Tattu Unveils Revolutionary Semi-Solid State Battery for Industrial Drones: 350 Wh/Kg, 1200+ Cycles, Enhanced Safety and Flight Time via Dual Electrolyte Innovation	Tattu	2026-07-16	China	Solid-State Batteries
S1-29	Gotion High-Tech's Semi-Solid-State Battery Passes Extreme Tests, Four Overseas Plants Begin Production; Partnership with SANY Group Targets Over 10GWh for Trucks	Gasgoo	2026-07-14	China	Solid-State Batteries
S1-30	China Enacts National Solid-State Battery Standard: Defines 'All-Solid-State' as Under 5% Liquid Electrolyte, Dongfeng and Doctex Commission GWh-Scale Factories for EV Integration	Asia Financial	2026-07-13	China	Solid-State Batteries
S1-31	QuantumScape Partners with Honda on Solid-State Batteries, Initiates Pilot Production in San Jose to Enhance EV Range and Safety	Atlas EV Hub	2026-07-15	US	Solid-State Batteries
S1-32	China Nationalizes Solid-State Battery Development with CASIP Program: CATL Targets 500Wh/kg Samples, Chinese Academy of Sciences Unveils 451.5Wh/kg Prototype with Over \$830M Investment	Youtube (Channel: "Tech of Future")	2026-07-12	China	Solid-State Batteries
S1-33	SHENGYA Reports Solid-State and Semi-Solid Drone Batteries Improve Extreme Temperature Performance, Enhancing Industrial UAV Flight Time and Safety	SHENGYA	2026-07-10	China	Solid-State Batteries
S1-34	Toyota Targets 40-Year EV Battery Life with Solid-State Technology: Over 8,000-10,000 Cycles and 1,000km Range Goal	EVDANCE	2026-07-09	Japan	Solid-State Batteries
S1-35	Factorial Energy and Tulip Tech Partner for Next-Gen Solid-State Drone Batteries, Boosting Flight Range Over 30%	Quiver Quantitative / GLOBE NEWSWIRE	2026-07-13	US	Solid-State Batteries
S1-36	SwRI and SMU Launch Joint Research to Address Solid-State Battery Interface Degradation, Pursuing Long-Life, High-Efficiency Designs	Southwest Research Institute (SwRI)	2026-07-16	US	Solid-State Batteries

ID	Title	Source	Date	Region	Sub-Topic
S1-37	China's Dongfeng Motor Plans 50,000 Solid-State Battery EV Deliveries by 2027, Achieving 350 Wh/kg Energy Density	Megaproject	2026-07-14	China	Solid-State Batteries
S1-38	Conductive and Stable CPE Interlayer Solves NASICON Solid-State Battery Challenges, Enabling Over 300 Hours Stable Cycling and 90% Capacity Retention	ACS Publications	2026-07-09	International	Solid-State Batteries
S1-39	China's Stringent Solid-State Battery Standard Ignites Gigawatt-Scale Production and Market Acceleration	[, Vertex AI Search redirect]	2026-07-14	China	Solid-State Batteries
S1-40	SwRI and SMU Pioneer Interfacial Engineering for Solid-State Battery Life Extension: Ultrathin Film on Lithium Metal Anode Boosts Reliability and Safety	Labroots	2026-07-14	US	Solid-State Batteries
S1-41	Solid-State Battery Manufacturing Advances to Pilot Lines, Automotive Programs, and Vehicle Testing: QuantumScape and Honda Strengthen Collaboration	XWELL	2026-07-16	International	Solid-State Batteries
S1-42	Samsung Patents Novel Halide Solid-State Electrolyte LiHfNaCl6 for Safer, Longer-Lasting All-Solid-State Batteries	Patentlyze	2026-07-17	South Korea	Solid-State Batteries
S1-43	EV Charging Forecast: Toyota Solid-State EVs to Launch in 2026, Targeting 800km+ Range and Sub-10 Minute Charging	Nexxt Industry	Date unknown	International	Solid-State Batteries
S1-44	Neutron Diffraction Traces Lithium Motion in Solid-State Batteries in Real-Time: Guiding Electrode Design and Ion Conductivity Optimization	ill.eu	2026-07-09	France	Solid-State Batteries
S2-01	LONGi Achieves New World Record of 35.5% Efficiency for Perovskite-Silicon Tandem Solar Cell	PV Magazine Global	2026-07-15	China	Perovskite Solar Cells
S2-02	Chinese Scientists Achieve Record 28.04% Efficiency and 625-Hour Stability in Perovskite-Organic Tandem Solar Cell with Novel TDB Additive	Renewables Now	2026-07-15	China	Perovskite Solar Cells
S2-03	Helmholtz-Zentrum Berlin Develops 3-Junction Perovskite Solar Cell Achieving 27.3% Efficiency and Over 770 Hours of Stable Operation with Graphene and SAMs	ConnectSci	2026-07-11	Germany	Perovskite Solar Cells
S2-04	Chinese Academy of Sciences Achieves World Record 28.04% Efficiency in Perovskite-Organic Tandem Solar Cells	Pandaily	2026-07-14	China	Perovskite Solar Cells
S2-05	LONGi Breaks World Record Again with 35.5% Efficient Crystalline Silicon-Perovskite Tandem Solar Cell	LONGi News	2026-07-15	China	Perovskite Solar Cells

ID	Title	Source	Date	Region	Sub-Topic
S2-06	Precision Interface Chemistry Propels Perovskite Solar Cell Efficiency Beyond 26% Mark in International Collaboration	EurekAlert!	2026-07-17	US	Perovskite Solar Cells
S2-07	International Team Develops 31%-Efficient Indium-Free Perovskite-Silicon Tandem Mini-Module Using Reactive Plasma Deposition	PV Magazine	2026-07-17	Germany	Perovskite Solar Cells
S2-08	Steve Albrecht's Team Boosts Perovskite Solar Cell Efficiency by Up to 2.4% with Novel Carborane-Based Electron Transport Material	EurekAlert!	2026-07-16	US	Perovskite Solar Cells
S2-09	LONGi Achieves 35.5% World Record Efficiency for Perovskite-Silicon Tandem Solar Cell	Perovskite-Info	2026-07-15	China	Perovskite Solar Cells
S2-10	Qcells Achieves Industry-First UL and IEC Certifications for Perovskite-Silicon Tandem Solar Technology, Paving Way for Commercialization	PV Tech	2026-07-17	South Korea	Perovskite Solar Cells
S2-11	Solar Module Price Stabilization Shifts Focus to Perovskite Technology; Oxford PV Demonstrates Over 25% Tandem Efficiency, Targets 27% Next Year	pv magazine Global	2026-07-16	Germany	Perovskite Solar Cells
S2-12	Perovskite Solar Cells for Extreme Environments Target Ultra-Stability with Degradation Mechanism Elucidation and AI Prediction	MDPI	2026-07-16	Switzerland	Perovskite Solar Cells
S2-13	Perovskite Solar Cells Achieve 34.85% Lab Efficiency and 30.6% Commercial Module Efficiency, Driving Towards Low-Cost Options	Industry Insights (Accio)	2026-07-13	Unknown	Perovskite Solar Cells
S2-14	Dual Surface Passivation Boosts Perovskite Solar Cell Efficiency from 21.37% to 25.11% and Enhances Long-Term Stability	PLOS One	2026-07-10	US	Perovskite Solar Cells
S2-15	Oxford University and Japan Collaborate to Develop Ultra-High-Efficiency Solar Cells: Targeting 35%+ for All-Perovskite Tandems and 40%+ for Perovskite/Silicon Hybrids	jobRxiv	2026-07-14	UK	Perovskite Solar Cells
S2-16	TCI Unveils TM-DHP: A Novel Additive to Boost Efficiency and Stability in Lead-Free Tin Perovskite Solar Cells by Mitigating Oxidation	Perovskite-Info	2026-07-15	Israel	Perovskite Solar Cells
S2-17	Hanwha Qcells Hosts Space Solar Power Workshop, Showcasing Perovskite-Silicon Tandem Pilot Line to 40 International Experts for Enhanced Collaboration	Business Korea	2026-07-14	South Korea	Perovskite Solar Cells
S3-01	Tanaka Kikinzoku Energizes 500 kW Pure Hydrogen Fuel Cell at Hiratsuka Plant, Covering 34% of Facility's Power Needs	PV Magazine	2026-07-17	Japan	Hydrogen Energy

ID	Title	Source	Date	Region	Sub-Topic
S3-02	Plug Power Sells Texas Green Hydrogen Project Site to Stream Data Centers Amid \$17 Billion U.S. Project Delays	Industrial Info	2026-07-17	US	Hydrogen Energy
S3-03	OMV Secures €450M EIB Loan for 140 MW Green Hydrogen Plant in Austria, Targeting Significant CO2 Reduction	MobilityPlaza	2026-07-17	Austria	Hydrogen Energy
S3-04	IEA's 'Global Hydrogen Review 2026' Reports Global Demand Exceeds 100 Million Tons, While Middle East Conflicts and Policy Delays Contract Production Pipeline	Renewable Watch	2026-07-17	International	Hydrogen Energy
S3-05	India Launches Nation's First Domestically-Built Hydrogen-Powered Train, 'NaMo Green Rail,' to Accelerate Railway Decarbonization Towards 2070 Net-Zero Goal	The Washington Post	2026-07-17	India	Hydrogen Energy
S3-06	China's Platinum Hydrogen Tech Secures Multi-Million Yuan Pre-A Round, Achieves 50% Higher Stability in Precious Metal Catalysts for Green Hydrogen Production	36Kr	2026-07-17	China	Hydrogen Energy
S3-07	EU-Funded HyShip Project Accelerates Hydrogen Shipping Commercialization with Samskip's SeaShuttle Vessels on Rotterdam-Oslo Route	Port Strategy	2026-07-17	EU	Hydrogen Energy
S3-08	International Researchers Develop Novel Catalyst Utilizing Ruthenium-Vanadium Dioxide 'Auxiliary Driving Strategy' to Boost Water Splitting Efficiency	AZoM	2026-07-17	International	Hydrogen Energy
S3-09	CAS Researchers Develop High-Efficiency Te-MoS ₂ Hydrogen Evolution Catalyst Achieving 1000 mA/cm ² Stable Performance at 364 mV Overpotential in Acidic Electrolyte via Single-Element Dual-Site Substitution	Chinese Academy of Sciences (CAS)	2026-07-16	China	Hydrogen Energy
S3-10	Fuzhou University and Collaborators Establish Novel AI-Quantum Chemistry Framework for Designing High-Performance Fe-N-C Single-Atom Catalysts for Fuel Cells	Mirage News	2026-07-16	China	Hydrogen Energy
S3-11	India Commissions Nuclear-Assisted Copper-Chlorine Thermochemical Cycle Hydrogen Production Facility in Kalpakkam, Gaining Operational Experience for Nuclear Hydrogen Scale-Up	World Nuclear News	2026-07-15	India	Hydrogen Energy
S3-12	Intelligent Energy Unveils 120kW Hydrogen Fuel Cell Powertrain for Heavy-Lift Drones, Secures Record UAV Orders Offering 3-5X Battery Flight Time	Intelligent Energy	2026-07-15	UK	Hydrogen Energy

ID	Title	Source	Date	Region	Sub-Topic
S3-13	UCLA & Ewha Womans University Develop 'Alkali Thermal Treatment (ATT)' Process to Convert Unsorted Mixed Plastic Waste into High-Purity Hydrogen Fuel with Zero CO ₂ Emissions	UCLA Samueli Newsroom	2026-07-15	US	Hydrogen Energy
S3-14	Superheated Hydrogen-Rich Fluids Discovered Deep Below Atlantic's 'Lost City,' Potentially Fueling Unique Ecosystem and Revealing New Insights into Deep Earth Hydrogen Generation	Science X	2026-07-15	International	Hydrogen Energy
S3-15	Intelligent Energy Developing 'IE-Flight' Next-Gen Hydrogen Fuel Cell with High-Power Evaporative Cooling and Modular Design for Aircraft, Advancing Research Despite Airbus Delays	Aviation Week	2026-07-15	UK	Hydrogen Energy
S3-16	PowerCell and ECL Forge Strategic Partnership with Bosch Support to Deploy Over 300 MW Hydrogen Fuel Cells for AI Data Centers	Hydrogen Europe	2026-07-14	Europe	Hydrogen Energy
S3-17	International Study Identifies Three Key Factors for Boosting Green Hydrogen Market Competitiveness: Decreasing Renewable Electricity Prices, Scaling Electrolyzer Manufacturing, and Targeted Policy Incentives	EurekAlert!	2026-07-12	International	Hydrogen Energy
S3-18	California Governor Newsom Signs SB 1350, Designating Green Hydrogen as Renewable Energy Source Under RPS and Providing Financial Incentives for Power Plants	The Optimist Daily	2026-07-09	US	Hydrogen Energy
S3-19	India Launches 10 Green Hydrogen Mobility Corridors, Deploying 37 FCEV/H ₂ -ICE Trucks and Buses Under National Green Hydrogen Mission	Trade Brains / ByPardeep.in	2026-07-09	India	Hydrogen Energy
S3-20	thyssenkrupp nucera CEO Dr. Werner Ponikwar Appointed to German Federal Government's National Hydrogen Council	thyssenkrupp nucera	2026-07-09	Germany	Hydrogen Energy
S3-21	EU Excludes Russian, Belarusian Hydrogen from Emerging Market, Bolstering Energy Security	EUR-Lex - European Union	2026-07-09	Europe	Hydrogen Energy
S3-22	Europe Launches Fourth Hydrogen Auction with €500M Boost for Green Fuel Production	pV magazine Global	2026-07-10	Europe	Hydrogen Energy
S3-23	Icelandic Geothermal SOEC Project Achieves Groundbreaking \$1.75/kg Green Hydrogen Production	pV magazine Global	2026-07-11	アイスランド	Hydrogen Energy

ID	Title	Source	Date	Region	Sub-Topic
S3-24	UK Government Updates Clean Flexibility Roadmap, Secures Primary Legislative Power for Hydrogen Power Business Model Establishment	GOV.UK	2026-07-13	UK	Hydrogen Energy
S3-25	Plug Power Sells Graham, Texas Hydrogen Project, Achieves Over \$275 Million in Liquidity Improvement with New York Gateway Deal	Industrial Info Resources	2026-07-13	US	Hydrogen Energy
S3-26	EU Commission's 2026 Energy Roadmap: Prioritizing Electrification, Hydrogen, and Post-2030 Framework for Decarbonization	AGENCE EUROPE	2026-07-13	Europe	Hydrogen Energy
S3-27	Toyota Enters Dakar Rally 'Future Mission 1000' with Fuel Cell Hilux Prototype, Demonstrating FC Technology	PistonHeads UK	2026-07-13	Japan	Hydrogen Energy
S3-28	UK Hydrogen Industry Urges Incoming Prime Minister Andy Burnham to Maintain Policy Continuity and Investment Competitiveness, Labeling Hydrogen a Strategic Industry	Renewable energy magazine	2026-07-14	UK	Hydrogen Energy
S3-29	Europe Pivots on Green Hydrogen: EC Loosens Production Standards to Accelerate Decarbonization Amid Missed Targets	Euractiv	2026-07-14	Europe	Hydrogen Energy
S3-30	Nel ASA Reports Significant Electrolyzer Order Growth in Q2 2026, Led by PEM Demand, Despite Expanded Operating Loss Due to Legal Costs	Nel Hydrogen	2026-07-15	Norway	Hydrogen Energy
S3-31	Toyota and BMW Reunite for 'VEEF' Project, Advancing Existing Vehicle Decarbonization with Carbon-Neutral Gasoline	CarBuzz	2026-07-15	Japan	Hydrogen Energy
S3-32	S&P; Global Reports Europe's Renewable Energy Highs, EU Hydrogen Auction Budget Cuts, and India's Planned e-Methanol Tender	S&P; Global	2026-07-15	Europe 、 India	Hydrogen Energy
S3-33	Saudi Arabia's Green Technology and Sustainability Market Enters Rapid Growth Phase, Ken Research Reports	openPR.com	2026-07-16	Saudi Arabia	Hydrogen Energy
S3-34	FuelCell Energy Bolsters Distributed Low-Emission Power with On-Site Fuel Cell Systems Amid Rising Grid Pressure from AI Demand	Zacks.com	2026-07-13	US	Hydrogen Energy
S3-35	Hexagon Purus Q2 Revenue Down 25% But Hydrogen Infrastructure Surges, EBITDA Loss Narrows	Investing.com	2026-07-16	Norway	Hydrogen Energy
S3-36	ITM Power Secures \$62.45 Million UK Government Grant to Build 1GW Electrolyzer Manufacturing Line for Chronos Stacks	Blackridge Research & Consulting / ITM Power	2026-07-10	UK	Hydrogen Energy

ID	Title	Source	Date	Region	Sub-Topic
S3-37	US IRS Adjusts 2026 Clean Hydrogen Production Tax Credit (§45V) for Inflation	AdvanceH2 / IRS	2026-07-13	US	Hydrogen Energy
S3-38	JERA and Samsung C&T; Sign Strategic MoU to Fortify Hydrogen and Ammonia Value Chains in Asia-Pacific	JERA Press Release	2026-07-13	Japan	Hydrogen Energy
S3-39	PowerCell Navigates Volatile Hydrogen Market with 46% Q2 Revenue Dip, Secures Pivotal LH2 Marine and Multi-MW Power Generation Orders	Investing.com	2026-07-16	Sweden	Hydrogen Energy
S3-40	ITM Power Forms Strategic Partnership with Protium Green Solutions to Accelerate Industrial-Scale Green Hydrogen Plant Development in UK	Research the market	2026-07-10	UK	Hydrogen Energy
S3-41	The "Hydrogen Mirage": Green Steel Timelines Slip as High Costs and Slow Electrolyzer Scaling Hinder Commercial Deployment in Europe	Steelonthenet	2026-07-09	Europe	Hydrogen Energy
S3-42	California Energy Commission Launches HIPO Program, Offering up to \$45 Million in Hydrogen Infrastructure Grants	Granted AI	Date unknown	US	Hydrogen Energy
S3-43	RMI Report: Hydrogen-DRI and EAF Combination Emerges as Key Path to Near-Zero Emissions Steelmaking, Existing Conversions Cost \$150-200M	RMI	2026-07-13	US	Hydrogen Energy
S3-44	Gridlock Ahead: Energy Transition Market Soars to \$3.17 Trillion, Yet Infrastructure Bottlenecks Loom Large	MarketScale	2026-07-12	世界	Hydrogen Energy
S3-45	IEA Global Hydrogen Review 2026: Over 40% of Low-Emissions Hydrogen Projects Reliant on Trade, Infrastructure Development Lags	IEA	Date unknown	France	Hydrogen Energy
S4-01	Hitachi Energy Delivers Integrated Grid-to-Cell BESS Solutions for Commercial, Industrial, and Data Center Resilience	Hitachi Energy	2026-07-11	Japan	Next-Gen Storage
S4-02	Long-Duration Grid Storage Accelerates: Form Energy's 100-Hour Iron-Air Battery & CATL's 1 GWh Sodium-Ion Rollout	Corporate Knights	2026-07-15	Unknown	Next-Gen Storage
S4-03	ESS Tech Unveils 1.2 MWh Modular Sodium-Ion Battery System "ESS Bridge" with Zero Thermal Runaway for Utilities and Data Centers	Utility Dive	2026-07-14	US	Next-Gen Storage
S4-04	Three US BESS Companies Accelerate Sodium-Ion Commercialization, Peak Energy to Build 4 GWh/Year Manufacturing Facility	Energy-Storage.news	2026-07-10	US	Next-Gen Storage

ID	Title	Source	Date	Region	Sub-Topic
S4-05	Avantus and Fluence Partner for 800 MWh BESS in California's Rexford 2 Solar-Plus-Storage Project, Boosting Domestic Manufacturing	Energy-Storage.news	2026-07-15	US	Next-Gen Storage
S4-06	Japan's Public-Private Alliance Targets Sodium-Ion Battery Commercialization for Grid-Scale Storage	東京理科大学	2026-07-13	Japan	Next-Gen Storage
S4-07	Chongqing University Team Develops 2.22 Ah Stable Lithium-Sulfur Pouch Cell with "Electron-Injection Softening Strategy," Achieving Over 1000 Cycles	EurekAlert!	2026-07-15	China	Next-Gen Storage
S4-08	SuperDielectrics Unveils "Faraday 3" Aqueous Zinc Battery, Offering 13x Longer Cycle Life and Zero Thermal Runaway for Data Centers	TechRadar	2026-07-13	UK	Next-Gen Storage
S4-09	Argonne National Laboratory Boosts All-Solid-State Lithium-Sulfur Battery Performance by High-Speed Mixing, Retaining Over 80% Performance After 450 Cycles	CiVL	2026-07-12	US	Next-Gen Storage
S4-10	BYD Energy Storage Secures 11.275 GWh Battery Supply Deal for Abu Dhabi's "Round the Clock" Renewable Energy Project, The World's Largest Solar-Plus-Storage Initiative	Electrek	2026-07-10	China	Next-Gen Storage
S4-11	Avantus Secures \$525 Million in Construction Financing for California's Aratina 2 Solar-Plus-Storage Project, Targeting Commercial Operation by End of 2026	Earnings Cycle Outlook	2026-07-11	US	Next-Gen Storage
S4-12	India Waives Inter-State Transmission Charges for RE-Attached BESS Projects by June 2028, Plans Over 200 GWh Domestic Manufacturing Capacity by 2030	XBattery	2026-07-11	India	Next-Gen Storage
S4-13	Spearmint Energy Secures Site Permit for 150MW/600MWh Midwater Battery Storage Project in MISO Grid	Business Wire	2026-07-16	US	Next-Gen Storage
S4-14	Tyfast Energy and AIion Partner to Accelerate U.S. Production of LVO Lithium Batteries for High-Performance Applications	Business Wire	2026-07-16	US	Next-Gen Storage
S4-15	Nofar USA Closes Deal for 400MWh Brownfield BESS Project, Targeting Late 2028 Commercial Operation	Business Wire	2026-07-17	US	Next-Gen Storage
S4-16	CATL and Alfen to Deploy 5GWh of Tender Sodium-Ion Battery Storage in Europe from 2027	CnEVPost	2026-07-16	China, Netherlands	Next-Gen Storage
S4-17	AI Data Centers Reshape Power Infrastructure, Shifting from Diesel to BESS for Enhanced Grid Stability and Efficiency	ESS News	2026-07-15	Global	Next-Gen Storage

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S4-18	Energy Dome and SEC Partner to Develop Victoria's First 10-Hour, 20MW/200MWh CO2 Battery Storage Project	Energy Dome (Press Release)	2026-07-10	Australia	Next-Gen Storage
S4-19	Idemitsu Australia Proposes Nation's Largest 108MW/864MWh Vanadium Flow Battery at Former Coal Mine Site	Renew Economy	2026-07-13	Australia	Next-Gen Storage
S4-20	Google Breaks Ground on Record-Setting Steel River Energy Center in Arkansas: 2.5GW Solar, 2.9GWh Battery Storage	Google Blog	2026-07-14	US	Next-Gen Storage
S4-21	Sunrun Expands "Distributed Data Center" Pilot, Integrating Computing Hardware with Home Solar and Battery Networks	Utility Dive	2026-07-15	US	Next-Gen Storage

Editor's Note

Navigating the Green Energy Crossroads: Western Strategy for 2026-2030

The energy and storage domain is at a critical inflection point, characterized by rapid technological advancements and intensifying global competition. While breakthroughs in solid-state batteries, perovskite solar cells, and next-gen storage promise unprecedented performance and sustainability, Western manufacturers, investors, and executives must critically assess their strategic positioning. Asian players are demonstrating clear leadership in scaling production and securing intellectual property, particularly in battery and solar manufacturing, creating a significant competitive gap.

The demand for energy solutions is being further amplified by the exponential growth of AI data centers, which are driving a rapid shift towards Battery Energy Storage Systems (BESS) and distributed power. This presents a substantial market opportunity for Western innovators in advanced materials, specialized equipment, and integrated energy solutions. However, policy uncertainties and infrastructure bottlenecks, especially in the nascent hydrogen economy, require agile responses and sustained governmental support to unlock full potential.

To thrive in this dynamic environment, Western stakeholders must prioritize strategic R&D; investments in critical material science, secure diversified supply chains, and foster cross-sector collaborations. Focusing on niche high-value applications, developing robust testing and certification standards, and advocating for consistent, supportive policy frameworks will be crucial. The coming 2-4 years will be decisive in establishing long-term competitive advantages in the global green energy transition.

- ◆ How can Western OEMs and material suppliers accelerate joint development and pilot production of solid-state battery components to counter Asian market dominance by 2028?
- ◆ What specific policy mechanisms are needed in the US/EU/UK to de-risk green hydrogen infrastructure investments and scale electrolyzer manufacturing to competitive levels by 2030?
- ◆ Which emerging long-duration storage technologies (e.g., sodium-ion, iron-air, CO2 batteries) offer the most viable pathways for Western companies to secure market share in grid stabilization and AI data center power by 2027?

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