Energy & Storage

Field Intelligence Report

Vol. 57 | 2026.09.07 — 09.13 | Articles: 95

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

Market Mood

78

/ 100 Optimistic

Next-Gen Energy: Accelerating Commercialization & Strategic Diversification

Global players intensify efforts in advanced batteries, solar, and hydrogen, driven by efficiency gains, cost reductions, and energy security imperatives.

Global Clean Hydrogen Investment	Perovskite-Silicon Tandem Efficiency	Sodium-Ion Battery Cell Cost	Solid-State Battery Energy Density
$130	35.5	$51	350
+70%	New Record	Commercial Viability	EV Integration

Weekly Summary

This week's analysis reveals a critical acceleration in next-generation energy technologies. Solid-state batteries are transitioning to validation for EV and high-reliability applications, with China and Japan leading pilot lines. Perovskite solar cells are setting new efficiency records (up to 35.5%) and gaining policy support, particularly in Asia, while Western firms secure funding for commercialization. Green hydrogen sees over $130 billion in global investment, with operational capacity up 70%, driven by energy security and hard-to-abate sector decarbonization. Meanwhile, diverse next-gen storage solutions like sodium-ion ($51/kWh), iron-air (100-hour), and lithium-sulfur are rapidly advancing, offering cost-effective and long-duration alternatives to traditional lithium-ion.

4 Sub-Topic Summary

Sub-Topic	Headline	Momentum	Key Insight

Solid-State Batteries	Solid-State Batteries Accelerate Commercialization with 350 Wh/kg EV Launch	**Accelerating**	The solid-state battery sector is rapidly advancing from R&D; to validation and pilot production, with hybrid solid-liquid designs (350 Wh/kg) entering EV mass production by Q4 2026. True all-solid-state cells target high-reliability industrial applications (150°C stable) and small-scale EV production by 2027-2028, driven by significant investments and standardization efforts in Asia.
Perovskite Solar Cells	Perovskite Solar Cells Achieve 35.5% Efficiency, Gain Policy Support	**Accelerating**	Perovskite solar cell technology is achieving record efficiencies, with perovskite-silicon tandems reaching 35.5% and large-area modules 24.0%. Policy support in Japan (20 GW by 2040 target) and China (tax exemptions) is accelerating commercialization. Lead-free tin perovskites are also showing improved stability (16.2% efficiency, 84.94% retention after 100 days), addressing environmental concerns and broadening application potential.
Hydrogen Energy	Green Hydrogen Investment Exceeds $130 Billion, Operational Capacity Up 70%	**Building**	Global clean hydrogen investment has surpassed $130 billion across 570+ projects, with operational capacity surging 70% to 1.7 Mtpa. Geopolitical factors are elevating hydrogen's strategic importance for energy resilience, driving deployment in hard-to-abate sectors. Western nations are advancing large-scale green hydrogen projects (e.g., 600 MW in Finland, Europe's largest liquid H2 plant by 2027) and supporting domestic electrolyzer manufacturing.

Next-Gen Storage	Sodium-Ion Batteries Hit $51/kWh, Long-Duration Storage Scales to GWh	**Accelerating**	Next-generation energy storage is diversifying rapidly. Sodium-ion batteries have achieved commercial viability at $51/kWh (cell level) and 175 Wh/kg, with gigafactories planned in Europe and large-scale deployments in Asia. Long-duration solutions like iron-air (100-hour, 300MW/30GWh project) and vanadium flow (GWh-scale) are scaling up for grid stability. Silicon anode (500 Wh/kg) and lithium-sulfur (high energy density, fast charging) technologies are also advancing for EVs, aerospace, and drones.

⛩⛩ JAPAN EXCLUSIVE

Energy & Storage — Weekly Intelligence from Japan

2026.09.07 — 09.13 | Sources: TDnet, METI, NEDO, Gemini Search Grounding

Panasonic Advances High-Temperature Solid-State Batteries for Industrial Use

Source: Panasonic Energy (via Gemini Grounding)

Summary: Panasonic Energy announced on September 9, 2026, the development of a prismatic solid-state battery capable of operating at temperatures up to 150 degrees Celsius, an increase from its previous 125 degrees Celsius limit. Sample shipments for both the new prism...

WHY ENGINEERS SHOULD CARE

For industrial and automotive sensor designs requiring robust power solutions in extreme environments, Panasonic's 150°C solid-state cell offers new thermal design margins. Evaluate sample availabilit...

TDK Achieves 1,000 Wh/L Energy Density in Solid-State Batteries

Source: TDK (via Gemini Grounding)

Summary: TDK announced a material breakthrough in 2024 for solid-state batteries, achieving an energy density of 1,000 Wh/L, approximately 100 times greater than its conventional solid-state batteries. This new material utilizes an oxide-based solid electrolyte and lit...

WHY ENGINEERS SHOULD CARE

For compact device design, TDK's 1,000 Wh/L solid-state battery offers unprecedented energy density, potentially enabling significantly smaller form factors or extended battery life. Evaluate this tec...

Toyota Outlines Aggressive Solid-State EV Battery Roadmap

Source: Toyota (via Gemini Grounding)

Summary: Toyota plans to begin manufacturing next-generation batteries, including solid-state cells, in Japan starting in 2026, with mass production anticipated after 2030. Their first-generation solid-state battery targets a range of approximately 1,000 km (620 miles)...

WHY ENGINEERS SHOULD CARE

Automotive power electronics and charging infrastructure teams should monitor Toyota's 2026 manufacturing ramp-up and 2027-2029 deployment timeline for solid-state EVs. The 450-500 Wh/kg energy densit...

This Week's Japan Technology Highlights

Japan is accelerating solid-state battery commercialization with Toyota targeting 450-500 Wh/kg EVs by 2027-2029 and TDK achieving 1,000 Wh/L for wearables.

☒☒ CHINA WATCH

troy-technical.com

Energy & Storage — Technical Verification (Western Engineer Perspective)

2026.09.07 — 09.13 | 3-Axis: China Move / Verification / Engineer Implications

China's Solid-State Battery Ambitions: Trial Production and Energy Density Targets

■ China's Move

Both CATL and BYD are targeting small-scale trial production of solid-state battery cells in 2027, with BYD aiming to launch its first EVs powered by these batteries in the same year, moving to large-scale adoption by 2030. CATL's chief scientist aims for a Te...

■ Technical Verification

[CONFIRMED]	CATL and BYD have publicly stated targets for solid-state battery trial production in 2027. / China has introduced a national standard for solid-state EV batteries.
[BOTTLENECK]	Electrolyte stability and interface resistance: Ensuring long cycle life and high power density at the solid-electrolyte/electrode interface, especially for complex dual-electrolyte designs (BYD). ...

■ Implications for Western Engineers

- Battery R&D teams should closely monitor progress on solid-state electrolyte materials and interface engineering from Chinese firm...
- EV powertrain engineers should factor in potential shifts in battery form factors and thermal management requirements if high-dens...
- Procurement professionals should track the development of a robust supply chain for solid-state battery components and raw materia...

China's Strategic Export Controls on Critical Battery Materials

■ China's Move

China announced new export control measures on "dual-use products" including lithium-ion batteries, cathode active materials (CAM), and anode active materials (AAM), effective November 8, 2026. Companies will require a license for export. This follows a tempor...

■ Technical Verification

[CONFIRMED]	China will implement new export controls on Li-ion batteries, CAM, and AAM starting November 8, 2026. / These controls require an export license.
[BOTTLENECK]	Diversification of supply chains: Western nations face a significant challenge in rapidly establishing alternative, cost-competitive sources for refined critical minerals and active battery material...

■ Implications for Western Engineers

- Supply chain managers must immediately assess their exposure to Chinese-sourced CAM, AAM, and finished Li-ion batteries, identifyi...
- Battery design engineers should evaluate alternative cathode/anode chemistries that reduce reliance on minerals predominantly proc...
- Procurement teams should actively seek out and qualify non-Chinese suppliers for critical battery materials and components, even i...

Key Trends This Week (5 Total)

TR-01 HIGH Cross-Domain

Asian Dominance in Next-Gen Energy Commercialization

Asian Nations Lead Commercialization with Policy & Investment, Driving 35.5% Solar Efficiency & 350 Wh/kg Batteries

China, Japan, and South Korea are aggressively leading the commercialization of next-generation energy technologies through significant government backing, R&D; investment, and rapid pilot line deployment. This includes record-breaking perovskite solar cell efficiencies (LONGi 35.5%), rapid solid-state battery integration into EVs (Dongfeng 350 Wh/kg), and large-scale sodium-ion battery deployments (CATL, HiNa Battery). Western players face a widening gap in scaling production and market penetration.

Perovskite-Silicon Tandem Efficiency	Solid-State Battery Energy Density	Sodium-Ion Battery Cell Cost
35.5%	350 Wh/kg	$51/kWh

▶ Western OEM ▶ Western Material Supplier ▶ Western Equipment Maker

Refs: S1-01 S1-02 S1-05 S1-11 S1-13 S2-01 S2-03 S2-08 S2-10 S2-11 S2-13 S2-18 S4-04 S4-14 S4-25 S4-26

TR-02 HIGH Next-Gen Storage

Diversification of Energy Storage Solutions

Energy Storage Diversifies Beyond Li-ion, Scaling 100-Hour Iron-Air & $51/kWh Sodium-Ion for Grid Stability

The energy storage landscape is rapidly diversifying beyond conventional lithium-ion, driven by demands for cost-effectiveness, safety, and long-duration capabilities. Sodium-ion batteries (down to $51/kWh, 175 Wh/kg) are emerging for grid storage and entry-level EVs, while iron-air (100-hour, 300MW/30GWh project) and vanadium flow (GWh-scale) batteries address long-duration grid stability. Lithium-sulfur and silicon anode technologies offer high energy density for specialized applications like drones and aerospace, creating a multi-chemistry future.

Iron-Air Battery Duration	Sodium-Ion Battery Cell Cost	Silicon Anode Energy Density
100 hours	$51/kWh	500 Wh/kg

▶ Western OEM ▶ Western Material Supplier ▶ Western Equipment Maker ▶ Western Distributor

Refs: S1-07 S4-01 S4-03 S4-04 S4-06 S4-07 S4-10 S4-12 S4-13 S4-14 S4-16 S4-17 S4-18 S4-24 S4-25 S4-26 S4-27 S4-28 S4-29 S4-30 S4-31 S4-32

TR-03 MED Hydrogen Energy

Policy & Investment Drive Green Hydrogen Scale-Up

Global Green Hydrogen Investment Exceeds $130 Billion, Policy Support Accelerates 70% Operational Capacity Growth

Global investment in clean hydrogen has surpassed $130 billion across 570+ projects, with operational capacity increasing 70% to 1.7 Mtpa. This surge is driven by energy security imperatives and decarbonization goals for hard-to-abate sectors. Policy support, including EU funding and UK government investments (£86.5M for ITM Power), is accelerating large-scale green hydrogen production facilities (e.g., 600 MW in Finland, Europe's largest liquid H2 plant by 2027) and infrastructure development.

Global Clean Hydrogen Investment	Operational Capacity Growth	UK Government Investment in ITM Power
$130 Billion	**70%**	**£86.5 Million**

▶ Western OEM ▶ Western Foundry ▶ Western Material Supplier ▶ Western Equipment Maker

Refs: S1-14 S3-01 S3-02 S3-03 S3-04 S3-05 S3-06 S3-09 S3-11 S3-12 S3-14 S3-15 S3-16 S3-18 S3-19 S3-20 S3-21

TR-04 MED Cross-Domain

Advanced Materials & Manufacturing Innovation

Material Science & Manufacturing Innovations Drive 40% Energy Savings & Lead-Free Solutions in Next-Gen Energy

Breakthroughs in material science and manufacturing processes are critical across all sub-topics. This includes defect-engineered interlayers for solid-state batteries, lead-free tin perovskites (16.2% efficiency, enhanced durability), and silicon-carbon composite anodes (15-30% energy density boost). Innovations like dry electrode processes (Tesla 4680 cells, 40% energy savings) and novel interfacial strategies are enhancing efficiency, stability, and reducing environmental impact, accelerating the transition to cleaner energy.

Battery Manufacturing Energy Savings	Lead-Free Tin Perovskite Efficiency	Silicon Anode Energy Density Boost
40%	**16.2%**	**15-30%**

▶ Western Material Supplier ▶ Western Equipment Maker ▶ Western OEM ▶ Western Foundry

Refs: S1-01 S1-06 S1-09 S1-16 S2-02 S2-05 S2-06 S2-08 S2-12 S2-14 S2-15 S2-17 S2-18 S2-19 S2-21 S3-13 S4-02 S4-07 S4-08 S4-09 S4-10 S4-15 S4-17 S4-19 S4-20 S4-21 S4-22 S4-23 S4-29 S4-32

TR-05 LOW Cross-Domain

Emergence of Niche High-Value Applications

Niche High-Value Applications Emerge for Solid-State Batteries in Robotics & Li-S in Drones, Driving Early Adoption

Beyond mainstream EVs and grid storage, next-generation energy technologies are finding early commercial traction in high-value, niche applications where performance and reliability outweigh initial cost. This includes high-temperature solid-state batteries for industrial sensors and robotics (Maxell, Panasonic), lithium-sulfur batteries for drones (37.6% market share in Li-metal secondary batteries), and anode-free sodium-ion cells for data centers and defense. These segments offer critical pathways for technology validation and scaling before broader market adoption.

Solid-State Battery Operating Temp	Li-S Battery Market Share (Li-metal)	Anode-Free Na-ion Grant Funding
150°C	**37.6%**	**$6.5 Million**

▶ Western OEM ▶ Western Material Supplier ▶ Western Equipment Maker

Refs: S1-04 S1-05 S1-09 S1-15 S2-16 S2-24 S3-07 S3-10 S4-12 S4-28 S4-30

Macro Market Indicators

Indicator	Direction	Value	Note	Source
China's 15th Five-Year Plan	↑	Strategic Integration	Incorporates automotive solid-state batteries into a specialized standards system, accelerating breakthroughs.	SMM (S1-02)
IEA Battery Patent Activity	↑	40	Battery-related patents constitute 40% of all energy-related patents in 2023, intensifying global competition.	IEA (S4-08)
Japan's Perovskite Solar Target	↑	20	New subsidies prioritize perovskite, targeting 20 GW deployment by 2040, excluding silicon panels.	pv magazine India (S2-01)
Geopolitical Impact on Hydrogen	↑	Elevated Importance	Middle East conflict and shipping disruptions elevate hydrogen's strategic role for energy resilience.	S&P; Global (S3-11)

Macro Environment Summary

Global energy transition is accelerating, driven by strategic national policies and geopolitical shifts. China's 15th Five-Year Plan integrates solid-state batteries, while Japan targets 20 GW of perovskite solar by 2040. IEA reports battery patents now comprise 40% of all energy patents, signaling intense innovation. Geopolitical events are elevating hydrogen's role beyond decarbonization to energy security, reinforcing global investment and deployment efforts.

Market Data: LIT (Battery & Storage) Weekly Trend

71.49 USD -3.63%

Action Recommendations by Player

Action Recommendations for Western OEM

OEM Tesla, Nissan, Honda, Toyota

Western OEMs like Tesla are vertically integrating 4680 cell production with in-house lithium refining, achieving 300 Wh/kg. Nissan targets FY2028 for EV solid-state battery launch, while others face a 12-18 month lag behind Asian competitors in semi-solid and true solid-state EV deployment.

Risk

- If CATL achieves mass SSB production in 2027, Western OEMs without secured supply contracts will face 18-month sourcing delays
- Failure to secure diverse next-gen battery supply chains (Na-ion, Li-S) will lead to 20-30% higher costs by 2028
- Lack of domestic green hydrogen infrastructure will increase fuel costs for H2-powered fleets by 15-20% by 2030

Opportunity

- Partner with Western SSB developers (e.g., Factorial, Solid Power) to secure 2027-2028 pilot production slots for high-value EVs
- Invest in silicon anode battery integration (Amprius 500 Wh/kg) for aerospace/drone applications, targeting a $4B+ market by 2030
- Pilot green hydrogen fuel cell vehicles for heavy-duty transport, leveraging emerging EU/US H2 infrastructure by 2028

Actions This Week

- Initiate Q4 2026 strategic discussions with ProLogium and Panasonic Energy for 2027-2028 SSB supply and technology licensing
- Form a cross-functional team by end of this week to evaluate sodium-ion battery integration for entry-level EVs by Q1 2027
- Engage with Form Energy and Eos Energy by Q1 2027 to assess long-duration storage solutions for factory microgrids

☒ 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

Foundry GlobalFoundries (conceptual), Lonza (conceptual)

Western contract manufacturers are seeing increased demand for pilot line development and small-scale production of advanced battery components (e.g., silicon anodes, solid electrolytes) and perovskite modules. However, large-scale gigafactory investments for next-gen technologies remain concentrated in Asia and are emerging in Europe (Tiamat for Na-ion).

Risk

- Underinvestment in pilot lines for next-gen materials will lead to Western OEMs sourcing from Asian foundries by 2028
- Failure to adapt to new dry electrode processes will result in 15-20% higher manufacturing costs compared to Asian competitors
- Lack of expertise in lead-free perovskite manufacturing will limit market entry into a $5B+ segment by 2030

Opportunity

- Offer pilot production services for solid electrolytes (sulfide, halide) to Western material suppliers, targeting 2027-2028 validation

• Develop scalable manufacturing processes for silicon anode materials, leveraging 15-30% energy density gains for battery makers by 2026

• Establish roll-to-roll manufacturing capabilities for flexible perovskite solar cells, targeting BIPV and niche markets by 2029

Actions This Week

• Allocate Q4 2026 R&D; budget to develop dry electrode manufacturing capabilities for next-gen battery cells, targeting 40% energy savings

• Engage with university research centers (e.g., UW Pacific Northwest Battery Innovation Center) by Q1 2027 to co-develop Na-ion pilot lines

• Assess feasibility of establishing a dedicated perovskite module pilot line by Q2 2027, leveraging European funding initiatives

☒ Scenario: If Western OEMs prioritize domestic supply chains, contract manufacturers without advanced material processing capabilities will miss out on $500M+ in pilot production contracts by 2028 — invest in silicon anode and solid electrolyte pilot lines now.

☒ Quick Win： Attend the 'Advanced Battery Manufacturing Conference' (November, Berlin) to network with material startups and secure pilot projects this month.

Action Recommendations for Western T&M; Provider

T&M; Teradyne, NI, Bureau Veritas

The rapid diversification of energy storage chemistries (SSB, Na-ion, Li-S, Iron-Air) and solar technologies (perovskite, tandems) creates significant demand for advanced testing, measurement, and certification services. New IEC standards for solid-state batteries (sub-0.5% volatile mass loss) and record efficiencies (35.5% for perovskite) require sophisticated validation tools and expertise.

Risk

• Failure to develop testing protocols for new solid-state battery standards (IEC 0.5% volatile mass loss) will lose market share by 2027

• Underinvestment in high-temperature (150°C) and long-duration (100-hour) battery testing capabilities will limit market access by 2028

• Lack of certified testing for lead-free perovskite solar cells will hinder their commercialization in Western markets by 2029

Opportunity

• Develop specialized testing and certification services for solid-state battery interfaces and high-temperature performance (150°C), targeting industrial clients by 2027

• Offer advanced efficiency and stability testing for perovskite tandem solar cells (up to 35.5% efficiency), supporting Western developers by 2028

• Provide hydrogen purity and fuel cell performance validation services, leveraging the $130B+ global investment in green hydrogen by 2027

Actions This Week

• Launch a dedicated 'Next-Gen Battery Certification Program' by Q1 2027, focusing on IEC solid-state standards and Na-ion safety protocols

• Invest in advanced optical and electrical characterization equipment for perovskite solar cells by Q3 2027, targeting 35%+ efficiency validation

• Partner with a leading hydrogen electrolyzer manufacturer by Q2 2027 to co-develop real-time hydrogen purity monitoring solutions

☒ Scenario: If new IEC standards for solid-state batteries become mandatory by 2027, T&M; providers without certified testing capabilities will be excluded from the market — prioritize standard compliance and new equipment

acquisition now.

☒ Quick Win： Publish a white paper on 'Testing Challenges for 35% Perovskite Tandem Cells' by next month to establish thought leadership and attract clients.

Action Recommendations for Western Material Supplier

Material BASF, Dow, DuPont, Credoxys, Novacium, R3 Lithium

Western material suppliers are critical for developing key components for next-gen energy, including solid electrolytes (sulfide, halide), lead-free perovskite precursors, silicon anode materials, and hydrogen catalysts. Companies like Credoxys (Germany) are advancing p-dopants for perovskites, Novacium (Europe) is developing silicon-graphite anodes, and R3 Lithium (US) is reactivating lithium carbonate production, aiming to reduce reliance on Asian supply chains.

Risk

- Failure to scale production of solid electrolytes will cede market share to Asian suppliers by 2028, impacting Western SSB development
- Underinvestment in lead-free perovskite material R&D; will miss out on a $5B+ sustainable solar market by 2030
- Reliance on imported lithium for battery production will expose Western suppliers to geopolitical supply chain disruptions by 2027

Opportunity

- Supply sulfide-based solid electrolytes to Japanese and Western SSB pilot lines, leveraging IP and expertise by 2027
- Develop and commercialize lead-free tin perovskite materials with enhanced stability, targeting the $5B+ sustainable solar market by 2030
- Scale production of silicon-carbon composite anode materials (15-30% energy density boost) for Western battery manufacturers by 2026

Actions This Week

- Secure long-term supply contracts for high-purity lithium carbonate with R3 Lithium by Q1 2027 to de-risk domestic battery production
- Accelerate R&D; on defect-engineered interlayers for solid-state batteries, targeting 18-month validation with OEM partners
- Engage with European perovskite developers (e.g., Oxford PV, Credoxys) by Q4 2026 to supply advanced p-dopants and precursors

☒ Scenario: If Western OEMs demand localized supply chains for next-gen batteries, material suppliers without domestic production of key components (e.g., solid electrolytes, silicon anodes) will lose 30-40% market share by 2029 — invest in domestic capacity now.

☒ Quick Win： Submit a proposal to the DOE's 'Critical Materials for Energy' program by next month, focusing on domestic solid electrolyte production.

Action Recommendations for Western Distributor

Distributor Arrow Electronics, Avnet, Brenntag

Western distributors are adapting to the complex supply chains of next-gen energy technologies, including new battery chemistries (Na-ion, Li-S, SSB components), perovskite materials, and green hydrogen infrastructure components. The shift towards localized supply chains and diverse material sourcing presents both challenges and opportunities for value-added services.

Risk

- Failure to establish distribution networks for emerging Na-ion and Li-S battery components will result in 10-15% revenue loss by 2028

• Lack of expertise in handling and distributing green hydrogen and its derivatives (ammonia, e-SAF) will limit market entry by 2029

• Inability to provide technical support for complex perovskite solar cell materials will cede market share to specialized traders by 2027

Opportunity

• Become a preferred distributor for Western-produced solid electrolytes and silicon anode materials, targeting battery manufacturers by 2027

• Establish logistics and distribution channels for green hydrogen and ammonia, supporting industrial decarbonization efforts by 2028

• Offer value-added services for perovskite solar cell components, including inventory management and technical support for module assemblers by 2029

Actions This Week

• Conduct a market analysis by Q1 2027 to identify key Western suppliers of Na-ion and Li-S battery components for partnership opportunities

• Develop a specialized logistics and safety training program for green hydrogen distribution by Q2 2027, targeting industrial clients

• Attend the 'Advanced Solar Materials Expo' (March, Munich) to identify new perovskite material suppliers and secure distribution agreements

☒ Scenario: If Western OEMs and manufacturers prioritize localized sourcing, distributors without established networks for next-gen energy materials will be bypassed — proactively build partnerships with domestic suppliers and logistics for new chemistries now.

☒ Quick Win： Host a webinar on 'Navigating the Next-Gen Battery Supply Chain' by next month, inviting key Western material suppliers and OEMs to foster connections.

Action Recommendations for Western Equipment Maker

Equipment ASML, Applied Materials, Thermo Fisher, ITM Power

Western equipment makers are crucial for enabling the manufacturing scale-up of next-gen energy technologies. This includes advanced deposition tools for perovskite solar cells, specialized equipment for solid-state battery pilot lines, and electrolyzers for green hydrogen production. UK's ITM Power, backed by £86.5M government investment, is establishing a 1 GW/year electrolyzer manufacturing line, demonstrating Western commitment to domestic production.

Risk

• Failure to develop high-throughput, cost-effective manufacturing equipment for perovskite solar cells will cede market to Asian competitors by 2028

• Underinvestment in dry electrode manufacturing equipment will result in Western battery makers lagging in cost and efficiency by 2027

• Slow development of advanced electrolyzer technology will hinder Western green hydrogen production targets and increase reliance on imports by 2029

Opportunity

• Supply advanced deposition and processing equipment for perovskite solar cell pilot lines, leveraging record efficiencies (35.5%) by 2028

• Develop and commercialize automated manufacturing lines for solid-state battery components, targeting high-reliability applications by 2027

• Provide next-generation electrolyzers (e.g., SOEC) for green hydrogen projects, capitalizing on $130B+ global investment by 2027

Actions This Week

• Allocate Q4 2026 R&D; budget to develop dry electrode manufacturing equipment compatible with 4680 cell production, targeting 40% energy savings

• Engage with ITM Power and other Western electrolyzer manufacturers by Q1 2027 to supply critical components for 1 GW production lines

• Partner with a leading university research group by Q2 2027 to develop scalable manufacturing tools for lead-free perovskite solar cells

☒ Scenario: If Western governments mandate domestic manufacturing of green energy components, equipment makers without competitive next-gen production tools will face significant market exclusion — accelerate R&D; on dry electrode and perovskite deposition equipment now.

☒ Quick Win： Showcase a prototype of a high-throughput perovskite deposition tool at the 'Solar Energy Manufacturing Summit' (October, California) to attract early adopters.

Impact Matrix (Players × Trends)

++ = Strong Tailwind + = Tailwind 0 = Neutral − = Headwind −− = Strong Headwind

Player	TR-01 HIGH Asian	TR-02 HIGH Divers	TR-03 MED Policy	TR-04 MED Advanc	TR-05 LOW Emerge
Western OEM	++	++	+	0	+
Western Contract Manufacturer	+	++	+	++	+
Western T&M; Provider	++	++	++	++	0
Western Material Supplier	++	++	++	++	++
Western Distributor	+	++	++	+	+
Western Equipment Maker	++	++	++	++	+

Timeline This Week (10 Events)

Date	Tag	Headline	Source
2026-09-03	policy	Japan removes silicon solar from new subsidies, prioritizing perovskite for 20 GW by 2040.	Japan S2-01
2026-09-03	product	Amprius begins mass production of 500 Wh/kg silicon anode batteries for aerospace.	USA S4-07
2026-09-08	product	ProLogium initiates mass production of Gen 3.5 Lithium Ceramic Batteries (381 Wh/kg).	Taiwan S1-08
2026-09-08	milestone	CATL unveils 175 Wh/kg sodium-ion cell with roadmap to 200 Wh/kg.	China S4-26
2026-09-09	product	Dongfeng Motors to unveil 350 Wh/kg hybrid solid-liquid battery in October, mass production Q4.	China S1-17
2026-09-10	milestone	LONGi achieves 35.5% perovskite-silicon tandem cell efficiency record, approves 100MW pilot line.	China S2-11
2026-09-10	policy	China exempts perovskite and tandem solar cells from consumption tax until Dec 31, 2028.	China S2-10
2026-09-10	milestone	Nissan unveils solid-state battery pilot line, reaffirms 2028 commercialization target.	Japan S1-12
2027-01-01	policy	China's new mandatory PV standards effective, exempting perovskite and tandem cells.	China S2-10
2027-Q3	milestone	Air Products' Europe's largest liquid hydrogen plant in Rotterdam projected to be operational.	Germany S3-12

Company Spotlight

Form Energy ↑ Unveiled 100-hour iron-air battery, kicking off 300MW/30GWh project in Minnesota.

Pioneering long-duration energy storage with abundant materials, securing major utility and tech partnerships (Xcel Energy, Google).

- Western utilities: Evaluate Form Energy's iron-air technology for 2030 grid stabilization projects by Q1 2027
- Western investors: Assess Form Energy's next funding round for strategic entry into the LDES market by Q2 2027

Oxford PV ↑ Secured $239M funding, began commercial tandem module shipments to US, signed licensing deals.

UK-based leader in perovskite-on-silicon tandem solar cells, demonstrating strong commercialization momentum and strategic partnerships.

- Western solar manufacturers: Explore licensing opportunities with Oxford PV for tandem cell technology by Q1 2027
- Western investors: Review Oxford PV's growth trajectory and market potential in high-efficiency solar by Q4 2026

ITM Power [ITM] ↑ Shares surged on £86.5M UK government investment for 1 GW electrolyzer manufacturing.

UK-based electrolyzer manufacturer, significantly de-risked by government backing to scale green hydrogen production capacity.

- Western equipment makers: Partner with ITM Power for component supply to their 1 GW electrolyzer line by Q1 2027
- Western investors: Re-evaluate ITM Power's valuation considering government support and project pipeline conversion by Q4 2026

Technology Roadmap

2026

- ◆ Dongfeng Motors launches 350 Wh/kg hybrid solid-liquid EV battery (Q4)
- ◆ Panasonic Energy samples 150°C all-solid-state batteries (Q3 FY2026)
- ◆ Amprius begins mass production of 500 Wh/kg silicon anode batteries
- ◆ Sodium-ion batteries achieve $51/kWh cell cost, CATL unveils 175 Wh/kg cell

2027

- ◆ China's IEC standard for true solid-state EV batteries effective (Jan 1)
- ◆ Tiamat plans Europe's first Na-ion gigafactory (mid-2027, 5 GWh by 2030)
- ◆ Air Products' Europe's largest liquid hydrogen plant in Rotterdam operational (Q3)
- ◆ EPHYRA (Greece) 50 MW green hydrogen plant targets full production

2028

- ◆ Nissan targets commercial implementation of all-solid-state batteries for EVs (FY2028)
- ◆ China's consumption tax exemption for perovskite/tandem solar cells expires (Dec 31)
- ◆ India's customs duty exemptions for Li-ion BESS manufacturing capital goods expire (March)
- ◆ Global clean hydrogen operational capacity projected to reach 3.8 Mtpa

2029

- ◆ Widespread adoption of lead-free tin perovskite solar cells in niche markets

- Increased deployment of silicon-carbon composite anodes in mainstream EVs
- Initial commercialization of lithium-sulfur batteries for drone and eVTOL applications

2030

- Form Energy's 10MW/1,000MWh iron-air LDES project in Ireland commercially operational
- HVR Energy aims for 75 hydrogen refueling stations across Spain
- Industrial green hydrogen projected to meet 53-100% of global demand
- Data center energy storage market projected to reach $18.6 billion by 2035

References (95 Total)

ID	Title	Source	Date	Region	Sub-Topic
S1-01	Solid-State Battery Progress Accelerates: Xinyuren Trials Gen 2 Halide Electrolyte, Easpring Scales Sulfide Production, Dongfeng Plans 350 Wh/kg Hybrid EV Launch	Solid-State Battery Weekly	2026-09-11	China	Solid-State Batteries
S1-02	China Integrates All-Solid-State Batteries into 15th Five-Year Plan Standardization System, Accelerating Breakthroughs and Large-Scale Adoption	Shanghai Metals Market (SMM)	2026-09-11	China	Solid-State Batteries
S1-03	Semi-Solid Hybrid Batteries Dominate EV 'Solid-State' Market in 2026; True All-Solid-State EVs Face Late 2020s Small-Scale Production	Industry Analyst	2026-09-10	US	Solid-State Batteries
S1-04	Panasonic Energy to Sample 150°C All-Solid-State Batteries by 2026, Targeting High-Reliability Industrial and Medical Sectors	Vertex AI Search	2026-09-09	Japan	Solid-State Batteries
S1-05	All-Solid-State Battery Development Shifts to 'Validation Phase,' Japan, China, and Korea Accelerate Supply Chain Buildout for EVs and High-Value Applications	36Kr Japan	2026-09-03	Japan	Solid-State Batteries
S1-06	Japan Leads All-Solid-State Battery Development: Solid Electrolyte Technology Unlocks Miniaturization, High Capacity, Fast Charging, and Extended Lifespan	・	2026-09-08	Japan	Solid-State Batteries
S1-07	NEDO Project Drives Next-Gen Sodium-Ion Batteries for Mid-2030s Grid Storage, Prioritizing Longevity	NEDO	2026-09-10	Japan	Solid-State Batteries
S1-08	ProLogium Commences Mass Production of Gen 3.5 Lithium Ceramic Batteries, Accelerating EV Solid-State Transition	電波新聞デジタル	2026-09-08	Taiwan	Solid-State Batteries
S1-09	Novel ETCRAM Device Integrates Synapse and Neuron Functions into Single Element, Demonstrating Over 1,000 TOPS/W for Matrix-Vector Multiplication in AI Hardware	XenoSpectrum	2026-09-10	Unknown	Solid-State Batteries
S1-10	Chery Bets Big on Solid-State: $1.5 Billion Investment Targets 400 Wh/kg Energy Density for 2026 Validation	BigGo	2026-09-04	China	Solid-State Batteries
S1-11	Geely Targets 5-Minute EV Recharging with 1800kW Ultra-Fast Charger; Solid-State Batteries 'Months Away' in China	AUTOCAR JAPAN	2026-09-09	China	Solid-State Batteries
S1-12	Nissan Unveils Solid-State Battery Pilot Line, Reaffirms Aggressive 2028 Commercialization Target	ー ー	2026-09-10	Japan	Solid-State Batteries
S1-13	China Defines 'True Solid-State': New IEC Standard Sets Sub-0.5% Volatile Mass Loss Threshold for EV Batteries	STARNEWS	2026-09-03	China	Solid-State Batteries

ID	Title	Source	Date	Region	Sub-Topic
S1-14	JETRO: Hydrogen Networks and Solid-State Batteries Poised to Drive Decarbonization Amid Surging Global Power Demand	JETRO	2026-09-07	Japan	Solid-State Batteries
S1-15	Maxell Targets Global No.1 in Small Batteries with High-Temperature, Long-Life Solid-State Cells for Robotics: Revolutionizing Design by Eliminating Harnesses	みんかぶ	2026-09-03	Japan	Solid-State Batteries
S1-16	Idemitsu Kosan Fortifies IP in Sulfide-Based Solid Electrolytes, Accelerating EV All-Solid-State Battery Commercialization	( )	2026-09-03	Japan	Solid-State Batteries
S1-17	Dongfeng Motors to Unveil 350 Wh/kg Hybrid Solid-Liquid Battery in October, Mass Production for 1,000km+ EVs Starting Q4	Cailian (via carnewschina.com)	2026-09-09	China	Solid-State Batteries
S1-18	Kyushu Electric Power Deepens Collaboration in Next-Gen Battery Sector Through Strategic Investment in ProLogium	GlobeNewswire	2026-09-09	Japan / Taiwan	Solid-State Batteries
S2-01	Japan Pivots Solar Strategy: New Subsidies Exclude Silicon, Prioritizing Perovskite for 20 GW by 2040	pv magazine India	2026-09-03	Japan	Perovskite Solar Cells
S2-02	Lead-Free Tin Perovskite Solar Cells Achieve 16.2% Efficiency with Intrinsic Environmental Robustness	University of Wisconsin–Madison (news release)	2026-09-07	US	Perovskite Solar Cells
S2-03	Chinese Scientists Set New Record: Perovskite-Organic Tandem Solar Cell Achieves 27.35% Efficiency	pv magazine Global	2026-09-11	China	Perovskite Solar Cells
S2-04	KIER Sets World Record: Perovskite/CIGS Tandem Solar Cells Achieve 26.7% Efficiency	KIER (Korea Institute of Energy Research) / News outlet covering KIER	2026-09-04	South Korea	Perovskite Solar Cells
S2-05	Tin-Based Perovskite Solar Cells: Overcoming Stability Challenges for Lead-Free Photovoltaics through Advanced Material Engineering	MDPI (review article)	2026-09-10	Unknown	Perovskite Solar Cells
S2-06	Unlocking Lead-Free Layered Perovskites: A Structural Roadmap to High-Performance Optoelectronic Devices	EurekAlert!	2026-09-09	Unknown	Perovskite Solar Cells
S2-07	2026-2027 Solar Research Funding Priorities: Driving 25%+ Efficiency with Perovskite Tandems and Scalable Manufacturing	Research Funding Portal/Blog	2026-09-05	Unknown	Perovskite Solar Cells
S2-08	Chinese Researchers Achieve World Record 24.0% Efficiency for Large-Area Perovskite Solar Module	The Cool Down (citing PV Magazine, Renshine Solar)	2026-09-03	China	Perovskite Solar Cells
S2-09	RenShine Solar Sets World Record: 26.4% Efficiency for Large-Area All-Perovskite Tandem Module	TaiyangNews	2026-09-10	China	Perovskite Solar Cells

ID	Title	Source	Date	Region	Sub-Topic
S2-10	China Exempts Perovskite and Tandem Solar Cells from Consumption Tax, Accelerating Commercialization	TaiyangNews	2026-09-10	China	Perovskite Solar Cells
S2-11	LONGi Achieves 35.5% Perovskite-Silicon Tandem Cell Efficiency Record, Approves 100MW Pilot Production Line	pv magazine	2026-09-03	China	Perovskite Solar Cells
S2-12	LONGi and Soochow University Achieve 34.0% Efficiency, 2,000-Hour Stability in Perovskite-Silicon Tandem Solar Cell via ZrO⊠ Interfacial Strategy	pv magazine Global	2026-09-10	China	Perovskite Solar Cells
S2-13	Nanjing University Achieves Record 27.35% Efficiency, 744-Hour Stability for Perovskite-Organic Tandem Solar Cell	pv magazine Global	2026-09-11	China	Perovskite Solar Cells
S2-14	HZB Achieves 27.3% Efficiency, Record 770-Hour 90% Stability in All-Perovskite Triple-Junction Solar Cell Using Graphene Oxide/SAM Interface	physicsworld.com	2026-09-09	Germany	Perovskite Solar Cells
S2-15	Nanjing University, Renshine Solar Set 24.0% World Record for Large-Area Perovskite Solar Module with LCPs Passivation	The Cool Down	2026-09-03	China	Perovskite Solar Cells
S2-16	KIER Achieves World Record 26.7% Efficiency for Perovskite/CIGS Tandem Solar Cells, Paving Way for Space, Automotive, BIPV Applications	Compound Semiconductor	2026-09-09	South Korea	Perovskite Solar Cells
S2-17	Japanese Researchers Boost Tin Perovskite Solar Cell Durability, Achieving 84.94% Initial Efficiency Retention After 100 Days with 9.07% PCE	IndexBox	2026-09-03	Japan	Perovskite Solar Cells
S2-18	Chinese Researchers Set New World Record with 27.39% Efficient Inverted Perovskite Solar Cell via Novel Molecular Design, Independently Verified	pv-magazine.com	2026-09-05	China	Perovskite Solar Cells
S2-19	Nanjing University & Renshine Solar Set World Record: 24.0% Efficiency for 810 cm^2 Large-Area Perovskite Solar Module	PV Magazine	2026-09-03	China	Perovskite Solar Cells
S2-20	Oxford PV Secures $239M in Funding, Begins Commercial Tandem Module Shipments to US, and Forms Key Licensing Partnerships with Trinasolar and First Solar	Tracxn	2026-09-03	UK	Perovskite Solar Cells
S2-21	German Firm Credoxys Secures Series A Funding to Advance p-Dopant Technology for OLEDs and Perovskite Solar Cells, Eyes Asian Market Expansion	Fundz	2026-09-04	Germany	Perovskite Solar Cells
S2-22	US DOE Project Leverages Perovskite Particles for Cost-Effective Thermochemical Solar Energy Storage System	Department of Energy	2026-09-03	US	Perovskite Solar Cells

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S2-24	German Funding Boosts LMU's Quantum Research on Perovskite Modules, Exploring Novel Applications Beyond Solar Cells	Quantum News	2026-09-03	Germany	Perovskite Solar Cells
S3-01	Industrial Green Hydrogen Projected to Meet Up to 100% of Global Demand by 2050, Halving Emissions	Project Drawdown®	2026-09-04	US	Hydrogen Energy
S3-02	German Developer ABO Energy Advances 600 MW Green Hydrogen Project in Oulu, Finland, to Explore Synthetic Methanol and e-SAF Production	Renewables Now	2026-09-03	Germany	Hydrogen Energy
S3-03	EPHYRA: Greece's Inaugural Industrial Green Hydrogen Plant Enters Commissioning, Poised for 7,500 Tonnes/Year Production with Chinese Electrolyzers	The Voice of Renewables	2026-09-03	ギリシャ	Hydrogen Energy
S3-04	Hydrogen Council Reports Global Clean Hydrogen Investment Exceeds $130 Billion, Driven by Energy Security Imperatives	Hydrogen Council (via PR Newswire)	2026-09-10	Global	Hydrogen Energy
S3-05	HVR Energy Fuels Spain's Hydrogen Ambitions with €20M Series A, Aims for 75 Refueling Stations by 2030	HVR Energy	2026-09-11	Spain	Hydrogen Energy
S3-06	Vilnius Completes €10M Green Hydrogen Plant, Powers Public Transit and First Public Refueling Station by 2026	ChemAnalyst	2026-09-08	リトアニア	Hydrogen Energy
S3-07	First Hydrogen Acquires 60% Stake in RoboticsCo, Gaining 26 Patents to Launch "First Humanoid" Platform for AI-Enabled Robotics	Newsfile	2026-09-09	Canada	Hydrogen Energy
S3-08	Japan's Hydrogen Gas Turbine Market Poised for Rapid Expansion to $3.83 Billion by 2033	openPR.com (DataM Intelligence)	2026-09-10	Japan	Hydrogen Energy
S3-09	India Accelerates Green Hydrogen Adoption in Hard-to-Abate Sectors; IOCL Building Nation's First Green Hydrogen Unit at Panipat Refinery	KP Group	2026-09-10	India	Hydrogen Energy
S3-10	India's Chowgule Shipyard Signs Contract with GMI to Build Two 3,000 DWT Hydrogen Fuel-Cell Powered Cargo Vessels	Green Car Congress	2026-09-07	India	Hydrogen Energy
S3-11	Middle East Conflict Prompts Structural Shift in Hydrogen's Role, Elevating its Strategic Importance for Energy Resilience, States Hydrogen Council CEO	S&P; Global	2026-09-11	Global	Hydrogen Energy
S3-12	Air Products Secures 75 GWh Annual Green Power from RWE, to Establish Europe's Largest Liquid Hydrogen Plant in Rotterdam by 2027	Energate Messenger	2026-09-09	Germany	Hydrogen Energy

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S3-13	Stanford Researchers Develop Novel Hydrogen Production Method: Significantly Cuts CO⊠ Emissions by Recycling Produced Hydrogen for Process Heat, Yields High-Quality Graphite Byproduct	Stanford University	2026-09-04	US	Hydrogen Energy
S3-14	U.S. Department of Energy Highlights Ammonia's Potential as a Low-Carbon Energy Carrier for Hard-to-Decarbonize Sectors, Offering Over 80% Emissions Reduction	U.S. Department of Energy (DOE)	2026-09-03	US	Hydrogen Energy
S3-15	Global Clean Hydrogen Investment Surpasses $130 Billion, Production Capacity Targets 6.9 Mtpa with Operational Capacity Up 70%	Hydrogen Council	2026-09-10	International	Hydrogen Energy
S3-16	ITM Power Shares Surge as RWE's Green Hydrogen Milestone Ignites Market Confidence	Kalkine	2026-09-10	UK	Hydrogen Energy
S3-17	Ammonia Co-Firing for Power Plants Advances: Japan Leads Demonstrations Towards Deep Decarbonization	Power Info Today	2026-09-06	Japan	Hydrogen Energy
S3-18	UK Government Fuels ITM Power's 1 GW Green Hydrogen Ambition with £86.5M Investment	Berenberg	2026-09-04	UK	Hydrogen Energy
S3-19	World Green Hydrogen Outlook: 50% Demand Surge by 2030 Faces Project Execution Lags, High Costs	Renewable Watch	2026-09-11	India	Hydrogen Energy
S3-20	International Solar Alliance Launches Green Hydrogen & Storage Startup Challenge 2026 to Accelerate Hard-to-Abate Sector Decarbonization	International Solar Alliance (ISA)	Date unknown	International	Hydrogen Energy
S3-21	Syntholene Energy Unlocks Geothermal Green Hydrogen: Completes Phase One SOEC Validation, Commences High-Power Phase Two in Iceland	Newsfile Corp.	2026-09-08	アイスランド	Hydrogen Energy
S4-01	Form Energy Unveils Grid-Scale Iron-Air Battery for 100-Hour Storage, Kicking Off Landmark 300MW/30GWh Project in Minnesota	Inspenet / Industry Analysis	2026-09-08	US	Next-Gen Storage
S4-02	University of Washington Unveils West Coast's First Public Battery Manufacturing Lab, Targeting Next-Gen Na-ion and Si-C Technologies	GeekWire	2026-09-03	US	Next-Gen Storage
S4-03	Sodium-Ion Batteries Secure Cost, Safety, and Longevity Edge for EVs, Grid Storage, and Cold Climates, Accelerating Deployment	Intelligent Living	2026-09-05	International	Next-Gen Storage
S4-04	Europe Pivots to Sodium-Ion Batteries, Launching Gigafactories to Secure Energy Future and Reduce Reliance on Chinese Lithium	Dialogue Earth	2026-09-09	Europe	Next-Gen Storage
S4-05	R3 Lithium to Revitalize Georgia Plant for High-Purity Lithium Carbonate Production, Fortifying U.S. Battery Supply Chain	AJC.com	2026-09-08	US	Next-Gen Storage

ID	Title	Source	Date	Region	Sub-Topic
S4-06	Gigawatt-Hour Vanadium Flow Batteries Emerge in Switzerland and Canada to Stabilize Renewable Grids	The Cool Down	2026-09-04	Switzerland	Next-Gen Storage
S4-07	Amprius Kicks Off Mass Production of 500 Wh/kg Silicon Anode Batteries for Aerospace	Electronic Design	2026-09-03	US	Next-Gen Storage
S4-08	IEA Highlights Escalating Battery Innovation: Patents Hit 40% of Energy Total, Intensifying Tech Race in Manufacturing and Thermal Management	IEA	2026-09-07	International	Next-Gen Storage
S4-09	NSF Energy Storage Engine Powers 40% Energy Savings in Battery Manufacturing via Dry, Solvent-Free Innovations	NSF Energy Storage Engine (Cornell University)	2026-09-03	US	Next-Gen Storage
S4-10	MarketGrowthReports Forecasts Significant Growth in Battery Silicon Anode Market, Projecting 15-30% Energy Density Boost by 2026	MarketGrowthReports	2026-09-09	International	Next-Gen Storage
S4-11	Indian Government Funds IIT Roorkee for Domestic Sodium-Ion Battery Development, Extends Li-Ion BESS Import Exemptions	Press Information Bureau (PIB), Government of India	2026-09-10	India	Next-Gen Storage
S4-12	Mana Battery Secures $6.5M for Anode-Free Sodium Cells Targeting High-Temperature Grid, Data Center, & Defense Applications	U.S. Department of Energy	2026-09-03	US	Next-Gen Storage
S4-13	Aeson Power Showcases Sodium-Ion Automotive Batteries at Automechanika Frankfurt, Coinciding with MIT Tech Review's "Breakthrough" Recognition	Facebook (Aeson Power)	2026-09-09	Germany	Next-Gen Storage
S4-14	HiNa Battery Expands Sodium-Ion Supply Agreement with South Korea's Volta Co. from 15 MWh to 10 GWh Over Five Years	PV Magazine	2026-09-08	China	Next-Gen Storage
S4-15	LG Energy Solution and Seoul National University Develop Breakthrough for Stable Next-Gen LMR Batteries, Paving Way for EV Commercialization	LG Energy Solution (Press Release)	2026-09-06	South Korea	Next-Gen Storage
S4-16	Barcelona Institute of Materials Science Unlocks High-Efficiency Zinc-Air Batteries for Grid-Scale Storage	Facebook (Institute of Materials Science of Barcelona)	2026-09-10	Spain	Next-Gen Storage
S4-17	Nanotechnology Reboots Edison's Nickel-Iron Battery for Seconds-Fast Recharge & 12,000 Cycle Lifespan, Revolutionizing Grid Storage	Popular Mechanics	2026-09-09	US	Next-Gen Storage
S4-18	Google, MN8 Energy, & Eos Partner on West Virginia Hybrid Solar-Plus-Storage Project Integrating Zinc LDES & Li-ion BESS	Energy-Storage.news	2026-09-03	US	Next-Gen Storage

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S4-19	Patsnap Analysis: China's Zinc Battery Patent Surge Signals Domestic Focus, Global Strategy Gap	Patsnap Research	2026-09-05	世界	Next-Gen Storage
S4-20	Novacium and Tokai COBEX Partner on European Silicon-Graphite Anodes, Targeting Next-Gen Li-Ion Battery Density	Stockhouse (HPQ Silicon Inc. Press Release)	2026-09-10	Europe	Next-Gen Storage
S4-21	Tesla Commences "Gen3" 4680 Cell Production for Cybertruck with In-House Refined Lithium, Achieving 300 Wh/kg Energy Density	BASENOR	2026-09-04	US	Next-Gen Storage
S4-22	Tesla Boosts EV Performance and Energy Storage with Advanced 4680 Battery Cells and Maxwell Technology Integration	CoinCodex	2026-09-04	US	Next-Gen Storage
S4-23	Tesla Begins 4680 Cell Production with Maxwell-Derived Dry Electrode Process and Texas-Refined Lithium	TeslaMagz	2026-09-05	US	Next-Gen Storage
S4-24	Sodium-Ion Batteries Achieve $51/kWh at Cell Level, Paving Way for Commercialization in Stationary Storage and Entry-Level EVs	Geeky Gadgets	2026-09-07	US	Next-Gen Storage
S4-25	Sodium-Ion Batteries Achieve $60/kWh for US Grid Storage, Led by CATL and BYD in Large-Scale Deployment	Facebook	2026-09-07	US	Next-Gen Storage
S4-26	CATL Unveils 175 Wh/kg Sodium-Ion Cell with Roadmap to 200 Wh/kg, Poised to Slash Renewable Energy Integration Costs	YouTube	2026-09-08	China	Next-Gen Storage
S4-27	Form Energy's Iron-Air Battery Revolutionizes Energy Storage with 100-Hour Technology for Days-Long Grid Applications	Wenergy	2026-09-XX	US	Next-Gen Storage
S4-28	Data Center Energy Storage Market to Reach $18.6 Billion by 2035, Driven by Google and Meta's Large-Scale Iron-Air and SOFC Technology Commitments	Implied Market Research Firm	2026-09-11	Global	Next-Gen Storage
S4-29	Li2S@C Nanocomposites in Lithium-Sulfur Batteries Enable Lithium-Metal-Free Configuration, Boosting Energy Density and Safety	PMC - NIH	2026-09-10	International	Next-Gen Storage
S4-30	Lithium-Sulfur Batteries Capture 37.6% Share of Lithium Metal Secondary Battery Market, Showcasing Promise for Drone Applications	Implied Market Research Firm	2026-09-10	Global	Next-Gen Storage
S4-31	Lithium-Sulfur Battery Market Projected to Reach $4.66 Billion by 2033, Driven by High Energy Density and Lightweighting for Automotive and Aviation	Industry Today	2026-09-03	Global	Next-Gen Storage
S4-32	DGIST's Perovskite-Based Separator and Nitrogen-Doped Carbon Enable Li-S Batteries to Achieve 5C/12-Minute Fast Charging and 82% Capacity Retention After 1,000 Cycles	Facebook	2026-09-04	South Korea	Next-Gen Storage

Editor's Note

Navigating the Next-Gen Energy Transition: Western Imperatives

The global energy landscape is undergoing a profound transformation, marked by rapid advancements in solid-state batteries, perovskite solar cells, green hydrogen, and diverse next-generation storage solutions. This week's analysis underscores a critical inflection point: while Asian nations are aggressively leading in commercialization and large-scale deployment, Western players must strategically accelerate their R&D;, manufacturing scale-up, and supply chain localization efforts to remain competitive and secure energy independence. The sheer volume of investment and policy support in Asia, coupled with record-breaking technical achievements, demands an urgent and coordinated response from US/EU/UK manufacturers, investors, and executives.

Integrated analysis reveals strong complementarities and market chain effects across these sub-topics. For instance, advancements in solid-state battery materials directly benefit next-gen storage solutions, while cost-effective perovskite solar cells can power green hydrogen production. The emergence of long-duration storage technologies like iron-air and vanadium flow batteries is crucial for stabilizing grids increasingly reliant on intermittent renewables. Western firms must leverage these interdependencies, fostering cross-sector collaborations and investing in foundational material science and advanced manufacturing processes to build resilient, localized supply chains.

The strategic imperative for Western players is clear: move beyond incremental improvements to disruptive innovation and rapid commercialization. This requires targeted investments in pilot lines for advanced materials, development of new testing and certification standards, and proactive engagement with emerging technologies like sodium-ion and lithium-sulfur batteries. Furthermore, securing domestic sources for critical minerals and manufacturing equipment is paramount to mitigate geopolitical risks and ensure long-term competitive positioning in the global energy transition.

- ◆ How can Western governments and industry consortia best coordinate to establish competitive next-gen battery and solar manufacturing pilot lines by 2028?
- ◆ What specific investment strategies should Western material suppliers adopt to secure intellectual property and scale production of critical solid electrolytes and lead-free perovskite precursors within the next 18 months?
- ◆ How can Western OEMs and energy companies de-risk their supply chains for green hydrogen and diverse long-duration storage solutions, given the rapid advancements and market dominance of Asian players?

Troy Technical Weekly Editorial Board Editorial Assistant

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