

Institutional Research Group



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EMERGING TECH RESEARCH

Datacenter Power Needs Are Redrawing the Energy Storage Map

Key takeaways

- Lithium-ion batteries remain the default choice for deploying new stationary energy storage, but venture capital is increasingly shifting toward non-lithium technologies as much of lithium-ion's scale-up and ongoing cost reduction occur outside the VC ecosystem.
- Rapidly growing datacenter power demand and the continued adoption of intermittent renewables are the two core drivers behind the development of long-duration and non-lithium energy storage.
- VC deal value for energy storage technology peaked at \$8.7 billion in 2021 and fell to \$1.3 billion in 2025, though the 2026 deal value of \$2.8 billion (as of mid-September) already exceeds 2025's full-year total, driven in part by large rounds from Form Energy (\$750 million) and Antora Energy (\$550 million).
- Non-lithium batteries and alternative energy storage grew from roughly 25% of energy storage technology deal value between 2019 and 2023 to closer to 75% in 2024 and 2025, with alternative energy storage leading 2025 deal value at 40.7%.
- From 2020 to 2025, North America, Europe, and Asia each captured roughly a third of energy storage technology VC deal value on average, though North America led in 2024 and 2025 on the strength of large rounds from Form Energy, EnerVenue, Torus, and Natron Energy.



Drivers and applications

This note focuses on stationary energy storage technologies—systems that store energy to stabilize power systems or increase their flexibility—rather than mobility or portable devices, covering utility-scale, commercial and industrial, and residential use cases. On the lithium-ion side in particular, there is strong overlap with electric vehicles (EVs) and, to a lesser extent, portable devices, but companies operating solely in those end markets fall outside the scope of this note.

Lithium-ion remains the default choice for most stationary applications due to its maturity and availability. Pumped storage hydropower is a long-established alternative, though it is geographically limited by the need for suitable topography and water resources. Beyond these two established options, a range of technologies are being developed to address one or more of lithium-ion's shortcomings, including raw material sourcing, safety, and the difficulty of scaling economically to long-duration applications. Within chemical batteries, the leading alternatives to lithium-ion are sodium-ion, metal-air, and redox flow batteries, while nonchemical approaches—including compressed air, thermal, gravitational, kinetic, and capacitor-based energy storage—are also being commercialized, each suited to different durations and applications.

Energy storage for datacenters

Datacenter developers require access to significant electrical energy and are pursuing essentially any available energy source, including developing their own energy-generation assets alongside datacenter campuses, which has the additional benefit of simplifying grid interconnection. Natural gas generation is often a good technical fit for datacenter loads but is currently constrained by gas turbine shortages,¹ while dispatchable low-carbon alternatives such as nuclear and geothermal are generally not available for near-term deployment. These constraints are making the relatively low-cost, fast-to-deploy intermittent renewable sources like wind and solar more attractive, and energy storage—particularly long-duration storage—is well positioned to manage that intermittency for datacenter applications and the broader grid.

Resilience and independence in focus

Outside of climate tech's pure decarbonization benefits, a broader theme across the sector is a growing focus on energy resilience and independence. Energy storage supports this theme in two ways:

- Energy storage makes power systems more resilient, particularly as intermittent renewable generation grows as a share of the overall power mix. It is also useful for commercial and industrial customers and other smaller-scale systems seeking greater independence from grid disruptions. Because storage can enhance the flexibility of power systems, it can also ease grid interconnection challenges by reducing the net impact that new generation or load projects have on existing grid infrastructure.



- Non-lithium storage options often rely on more widely available material inputs than lithium-ion batteries, which can support the domestic manufacturing of energy storage technologies using domestically sourced materials, reducing supply chain risks.

The rise of non-lithium energy storage

From a VC dealmaking perspective, the rise of non-lithium energy storage partly reflects how much of lithium-ion's continued maturation—involving manufacturing scale-up and incremental cost reduction—now occurs outside the venture ecosystem, largely through established manufacturers rather than VC equity. This shift can be seen in the segment-level deal value data, where lithium-ion batteries dominated VC deal value from 2019 to 2023 before a reversal in 2024, 2025, and YTD 2026, when lithium-ion technology developers represented less than a third of total deal value in each year.

Many non-lithium technologies are approaching wider commercialization and offer certain advantages relative to lithium-ion, including material availability and supply chain resilience, easier scaling to long-duration applications, cost, and safety. Lithium-ion batteries still have a substantial maturity advantage and can benefit strongly from economies of scale because they are used in so many applications. Alternative energy storage technologies commonly have lower energy density than lithium-ion and are more limited in their applications outside stationary storage, such as EVs and portable devices.

Outlook

Looking ahead, energy storage demand will be driven by two core factors: rising datacenter power needs and the continued build-out of intermittent renewables outpacing power systems' ability to absorb intermittency. Renewables deployment has so far exceeded storage deployment, as large-scale power systems can manage some intermittency without adding dedicated flexibility. As renewables' share of the energy-generation mix keeps growing, though, storage will become increasingly valuable for power systems, independent of the additional demand already coming from commercial, industrial, and residential use cases.

This breadth of demand drivers means developers are not reliant on a single buyer type or application—resilience and cost savings are sufficient reasons to adopt energy storage technologies, even for entities uninterested in decarbonization. On the technology side, lithium-ion's maturity is changing the funding landscape. It remains the default choice for most stationary applications, but with much of its ongoing improvement now happening outside the VC ecosystem, capital is increasingly flowing toward novel chemistries and nonchemical energy storage technologies that offer advantages—in cost, safety, or duration—for specific use cases, even though they generally still trail lithium-ion in overall maturity and certain performance factors. Although VC deal value for the energy storage space is below the 2021 peak, much of this peak is strongly linked to EV deployment because the year saw many large funding rounds for multi-application battery developers.



Energy storage technology market map

Lithium batteries

Lithium batteries (commercial and industrial)

Free to go green.

Lithium batteries (grid scale)

Lithium batteries (mixed application)

Lithium batteries (residential)

Non-lithium batteries

Metal-air batteries

Redox flow batteries

Sodium-ion batteries

Other chemical batteries



Energy storage technology market map (continued)

Alternative energy storage

Capacitor energy storage



Compressed air energy storage



Gravitational energy storage



Kinetic energy storage



Thermal energy storage



Other alternative energy storage



VC activity

Overall VC deal activity

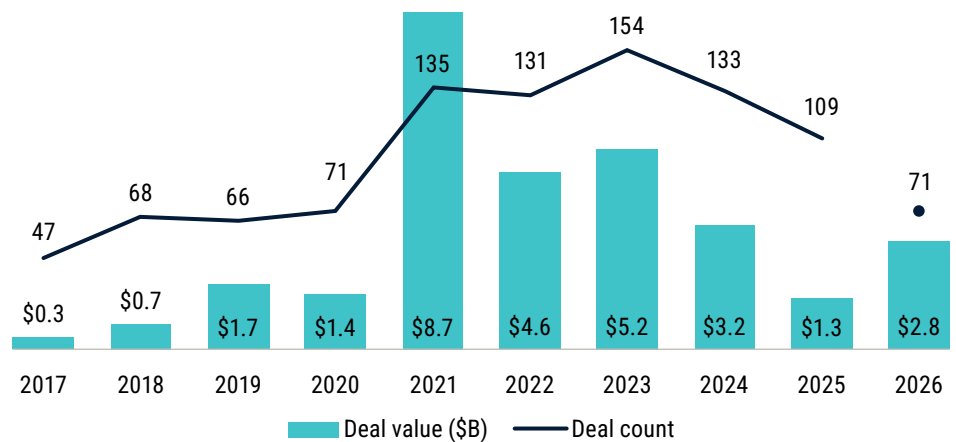
VC deal value for energy storage technologies peaked in 2021 at \$8.7 billion, more than six times the previous year's \$1.4 billion. Value has declined nearly every year since, falling to \$4.6 billion in 2022, rebounding to \$5.2 billion in 2023, and then dropping to \$3.2 billion in 2024 and \$1.3 billion in 2025. The 2025 figure was roughly 85% below the 2021 peak and the lowest annual value since 2018. As of mid-September, \$2.8 billion in deal value has been generated for the space in 2026, already more than double the previous year's value. Some of this higher deal value reflects two outsized rounds from August—Form Energy's \$750 million raise and Antora Energy's \$550 million raise—rather than more widespread growth in deal value. Nevertheless, 2026 is on track to exceed both 2025's low deal value and 2024's \$3.2 billion. The median deal value was \$7.3 million in 2025, following a four-year trend of roughly flat



median deal value. From 2022 to 2025, it fell very slightly from \$7.8 million to \$7.3 million, having previously ranged from \$4 million to \$6.6 million. As of mid-September 2026, the median deal value stood much higher at \$13.4 million, though the lower deal count makes this more subject to changes by year's end.

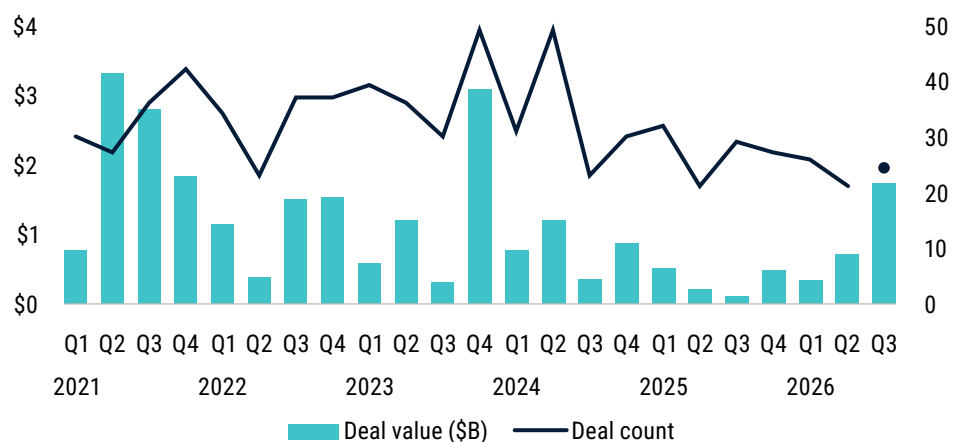
Deal count peaked later than deal value, reaching 154 deals in 2023. Over the past five full years, deal count has been less variable than value, with 135 deals in 2021, 131 in 2022, 154 in 2023, 133 in 2024, and 109 in 2025. Deal count has fallen far less steeply than deal value since 2021, indicating smaller round sizes. Some of this is explained by the changes in deal flow by segment: Large lithium-ion battery deals in the early 2020s have been replaced by greater deal flow for non-lithium technologies.

Energy storage tech VC deal activity



Source: PitchBook • Geography: Global • As of September 17, 2026

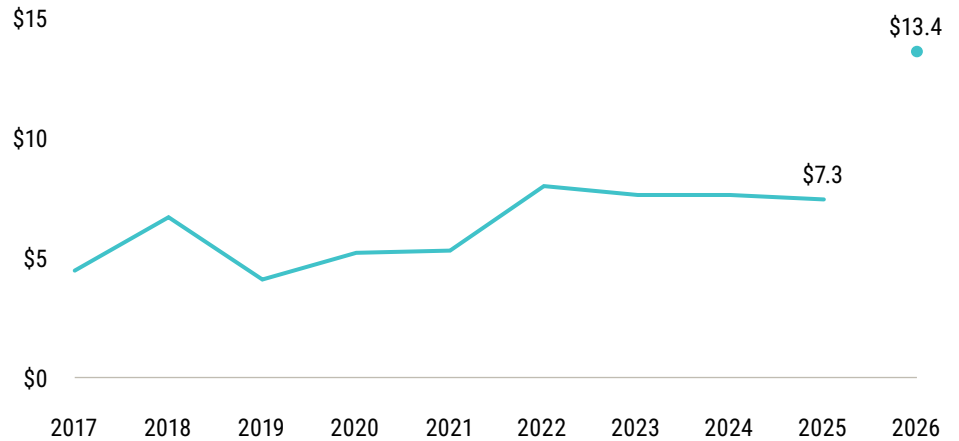
Energy storage tech VC deal activity by quarter



Source: PitchBook • Geography: Global • As of September 17, 2026

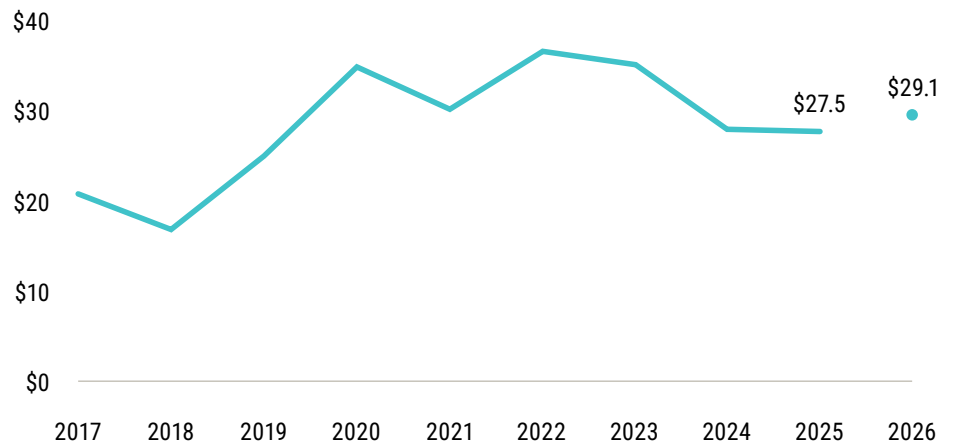


Median energy storage tech VC deal value (\$M)



Source: PitchBook • Geography: Global • As of September 17, 2026

Median energy storage tech VC pre-money valuation (\$M)



Source: PitchBook • Geography: Global • As of September 17, 2026

Segment-level activity

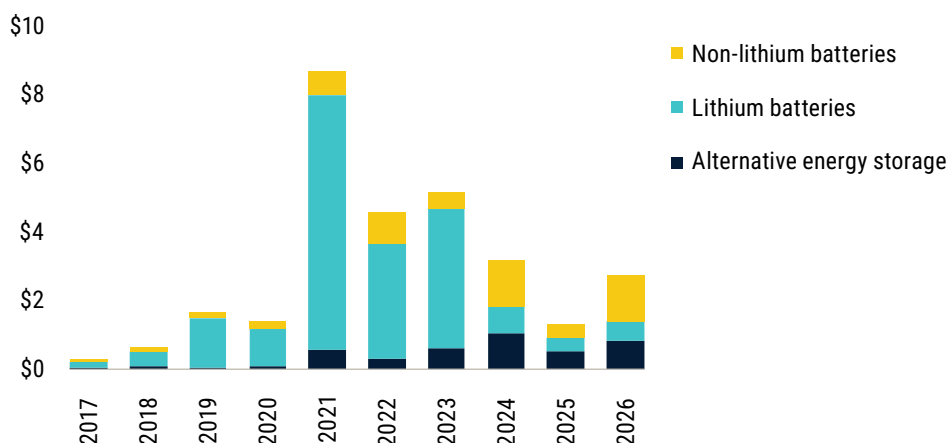
Within the overall decline in deal value from the 2021 peak is a long-term trend of deal value moving away from lithium batteries. Lithium batteries drove the majority of energy storage VC deal value from 2019 to 2023, averaging roughly three-quarters of deal value, with non-lithium batteries and alternative energy storage making up the remainder. That balance reversed in 2024 and 2025, when lithium batteries' share of deal value fell to 25% and 31.4%, respectively, while non-lithium batteries and alternative energy storage combined rose to 75% and 68.6% of the 2024 and 2025 totals, respectively. The reversal was even more pronounced through mid-September, when lithium batteries accounted for just 11.3% of Q3 deal value, though the two large rounds in non-lithium energy storage—those of Form Energy and Antora Energy—together accounted for \$1.3 billion of the \$1.7 billion in total Q3 deal value. Lithium



battery deal count was less variable from 2019 to 2025, averaging 38.2% of annual totals during this period, suggesting its recent fall in value is at least partially driven by a lack of large deals. This, in turn, is due to the maturation of lithium-ion batteries from a technology and manufacturing perspective.

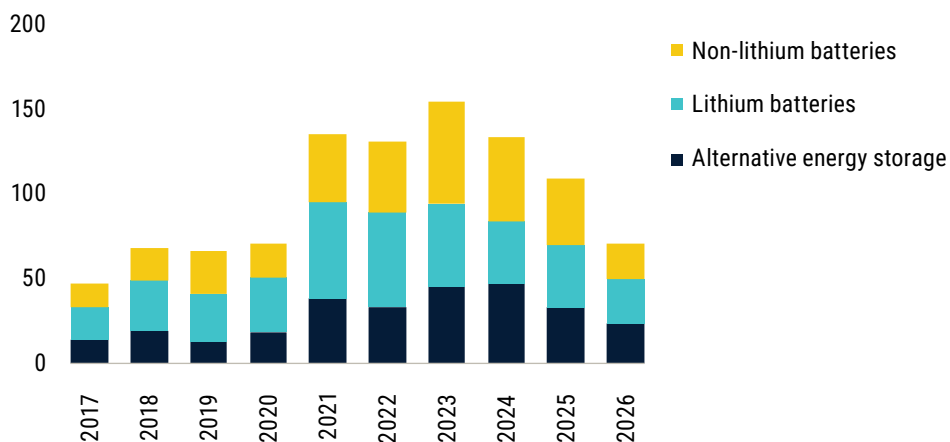
Alternative energy storage was the largest segment by deal value in 2025, at \$527.5 million (40.7% of the sector's total), ahead of lithium batteries (31.4%) and nonlithium batteries (28%). This represents a shift from 2024, when non-lithium batteries led by value (41.7%), and a more pronounced break from 2019 to 2023, when lithium batteries consistently represented the majority of deal value. 2025 deal count was fairly even across all three segments, with non-lithium batteries leading with 39 deals (35.8%), slightly ahead of lithium batteries (37 deals, or 33.9%) and alternative energy storage (33 deals, or 30.3%). Nonlithium batteries was the smallest segment by deal value in 2025 despite leading by count, indicating comparatively small average deal sizes in that segment.

Energy storage tech VC deal value (\$B) by segment



Source: PitchBook • Geography: Global • As of September 17, 2026

Energy storage tech VC deal count by segment



Source: PitchBook • Geography: Global • As of September 17, 2026

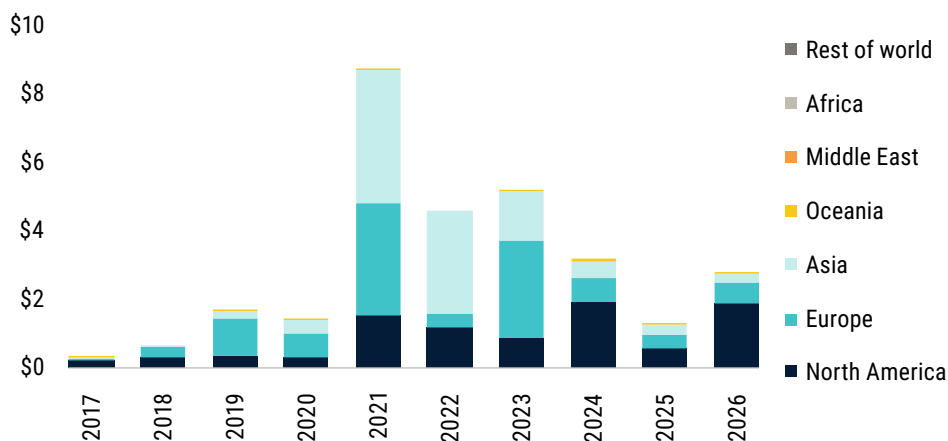


Regional and stage trends

From 2020 to 2025, annual deal value in the energy storage space was fairly balanced between North America, Europe, and Asia, which averaged 31.3%, 33.5%, and 34.4%, respectively, over the period. Asia was the largest region by deal value in 2021 and 2022, coinciding with large rounds for China-based battery makers—many of which manufacture lithium-ion batteries for a broad range of applications, including EVs. In 2024 and 2025, North America accounted for the bulk of VC funding into the space, partly due to large funding rounds raised by Form Energy, EnerVenue, Torus, and Natron Energy, though Natron Energy has since ceased operations.

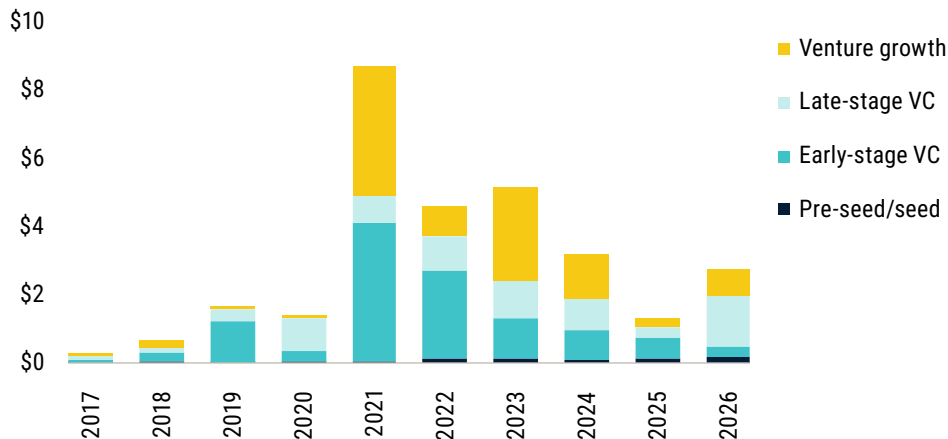
By funding stage, early-stage VC captured the largest average share of deal value from 2020 to 2025, at 36.5% annually, ahead of venture growth (30.5%) and late-stage VC (29.2%). Pre-seed/seed rounds consistently represented the smallest share during the period, at 3.8%.

Energy storage tech VC deal value (\$B) by region



Source: PitchBook • Geography: Global • As of September 17, 2026

Energy storage tech VC deal value (\$B) by stage



Source: PitchBook • Geography: Global • As of September 17, 2026



Top deals and investors

The three largest deals of 2025 were all more than \$100 million:

- **Torus' \$200 million Series B:** Torus develops flywheel-based energy storage systems that store energy as kinetic energy in a spinning mass for applications across grid stabilization, commercial and industrial energy management, and renewable energy intermittency mitigation.
- **Highview Power's \$172 million round:** Highview Power develops liquid-air energy storage systems that cool ambient air into a liquid for storage and later expand it to drive turbines. The systems are suited for short- and long-duration, commercial and industrial, and grid-scale energy storage.
- **Guanyu Power's \$124 million round:** Guanyu Power is a China-based lithium-ion battery manufacturer focused on a range of applications, including stationary energy storage and mobility.

Since 2016, Breakthrough Energy and InnoEnergy have been the most active investors in the space by deal count, each participating in 29 deals, ahead of Energy Impact Partners (15 deals) and Prelude Ventures (12 deals).

Energy storage tech investor map





Energy storage technologies

Technology	Description	Typical duration	Common applications	Key advantages	Key limitations
Lithium-ion batteries	Rechargeable batteries using various lithium-ion chemistries. The most mature and widely deployed stationary storage technology.	Short duration (one to eight hours).	Grid frequency regulation; renewables time-shifting; commercial, industrial, residential backup.	• High energy density and discharge rates. • Mature, widely available, and well understood by regulators. • Fairly readily recyclable, with second-life potential from EVs.	• High electrode material costs (even for lower-cost lithium iron phosphate). • Scaling challenges for long-duration applications. • Supply chain concerns about lithium and electrode materials.
Sodium-ion batteries	Similar cell design and manufacturing processes to lithium-ion but use sodium instead of lithium as the charge carrier.	Short to medium duration (two to six hours).	Grid storage, budget EVs, cold-climate applications.	• Lower-cost, more abundant materials than lithium. • Shared manufacturing equipment/expertise with lithium-ion can ease scale-up. • Better cold-temperature performance than lithium-ion.² • Diversifies material price risk.	• Manufacturing scale not yet achieved, leaving pricing similar to lithium iron phosphate, but with lower energy density than lithium-ion.
Metal-air batteries	Pair a metal anode (commonly zinc or iron) with air as the cathode.	Long duration (up to about 100 hours).	Multiday grid backup, renewables firming during extended lulls.	• Potential to use only low-cost, abundant materials. • Removes cathode cost/weight considerations. • Some chemistries have high theoretical energy density.	• Earlier stage of maturity. • Potential anode damage brings lifespan challenges. • Typically lower round-trip efficiency.
Redox flow batteries	Store energy in liquid electrolyte pumped through a cell.	Medium to long duration (four to 24 hours).	Microgrids, utility-scale storage, datacenters, military installations.	• Energy capacity scales independently of power output via tank size. • Long cycle life. • Well suited to long-duration applications.	• Less competitive for shorter-duration applications. • Can be reliant on vanadium supply chain, though alternative chemistries are emerging.

Source: PitchBook



Energy storage technologies (continued)

Technology	Description	Typical duration	Common applications	Key advantages	Key limitations
Other chemical batteries	Chemical batteries that do not fit into these groups, including zinc-based, liquid metal, aluminum-based, and hydrogen-based batteries.	Varies by chemistry.	Grid storage, microgrids, domestic manufacturing use cases.	• Many are designed to be low cost by using abundant materials. • Some have improved safety relative to lithium-ion.	• Typically earlier-stage and less commercially mature than other alternatives.
Kinetic storage	Stores energy as rotational motion in a spinning mass, discharging it via a generator.	Short duration (seconds to one hour).	Grid frequency regulation, power quality, uninterruptible power supply.	• Millisecond response time. • Minimal degradation from repeated cycling, allowing for long asset lifespan.	• Low energy density. • Continuous friction and other gradual losses. • Uneconomical for longer-duration storage.
Gravitational storage	Raises a mass (such as water, concrete blocks, or rail cars) and releases it to generate electricity on discharge. Pumped storage hydropower is the most mature form.	Long duration (six to 20-plus hours).	Grid-scale bulk energy storage.	• Long asset lifespans with low degradation over time. • Well suited to long-duration applications. • Often uses off-the-shelf components.	• Higher up-front capital costs and lower round-trip efficiency than lithium-ion. • Pumped storage hydropower constrained by suitable terrain and water access.
Thermal storage (including cryogenic)	Converts electricity into heat or cold for storage (such as in molten salt, heated rock/sand, or liquefied air) and reconverts it to electricity or uses it directly.	Long duration (six to 20-plus hours).	Industrial heat; commercial, industrial, grid-scale applications (liquid-air).	• Low-cost, widely available storage materials. • Well suited to industrial heat and long-duration grid applications.	• Lower round-trip efficiency due to multiple energy conversion steps. • Less suited to rapid-response or high-power applications.
Supercapacitors	Store energy electrostatically rather than via chemical reaction.	Short duration (seconds to minutes).	Grid frequency regulation, smoothing renewable output (typically alongside other energy storage).	• Fast charge/discharge cycles. • High cycle life with minimal degradation.	• Low energy density relative to batteries. • Uneconomical for bulk or long-duration energy storage.
Compressed air storage	Compresses air using electricity, stores it under pressure, and then releases it through a turbine to generate electricity.	Medium to long duration (four to 24-plus hours).	Grid-scale storage, renewables integration.	• Well suited to long-duration, grid-scale storage.	• Uneconomical for bulk or long-duration energy storage.

Source: PitchBook



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- 1: ["US-Driven Gas Turbine Crunch May Speed Global Clean Power Uptake," Reuters, Gavin Maguire, February 3, 2026.](#)
- 2: ["Sodium-Ion Battery Momentum Grows, but Challenges Remain," IEA, Teo Lombardo, et al., February 17, 2026.](#)



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