Gitega utility-scale energy storage

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The path forward for Long Duration Energy Storage (LDES) is far from simple. Its growth is tightly linked to the expansion of variable renewables, and while federal funding and regulatory support have been critical for early projects, shifting administrative priorities could create challenges--from reduced subsidies to tariffs on clean energy technologies.

Despite potential headwinds, advancements in technology and regional regulatory changes in markets with high renewable adoption are opening a window for LDES to become cost-effective for reliable, clean nighttime baseload power (the consistent supply required to meet grid demand).

Wind and solar have become essential parts of the clean energy grid, but they"re intermittent, meaning they don"t generate power around the clock. As renewable energy supply grows, so does the need for storage solutions that can ensure a stable power supply.

Today"s primary grid storage solutions--pumped hydro and lithium-ion (Li-ion) batteries--won"t be enough to realize the full potential of a cheap, clean grid powered by wind and solar.

In short, we’ll need new storage technologies to fully capitalize on increased solar and wind generation’s cost savings and climate benefits. Battery storage has grown rapidly over the past 15 years, with annual deployment rates nearing 5 GW. Over the next decade, Bloomberg New Energy Finance estimates that more than 200 GW of new battery storage could be added.

As the market evolves, innovative companies are stepping in to meet the demand for new solutions. Form Energy recently announced a $405 million funding round to scale its iron-air battery, a 100-hour storage solution, setting the stage for long-term grid stability.

Long duration energy storage (LDES) generally refers to systems that store energy for eight hours or more. One key advantage of LDES over Li-ion batteries is that power (measured in kW) and storage capacity (measured in kWh) can be sized independently. Thus, you can increase the capacity without needing to pay for more power.

Though LDES systems may initially cost more per kW than Li-ion, they become more affordable as storage capacity (kWh) increases; this is because costs are spread over a greater energy output, ultimately lowering the per-kWh cost of LDES and making it useful for various applications.

Today, battery storage is primarily used for peak shaving (providing power during periods of high energy demand when prices spike). Li-ion batteries excel in this part of the energy demand curve, often called the "duck curve," with Li-ion handling the highest-demand “head” of the curve.

As renewable supply and Li-ion battery storage grow (used for peak demand), there’s increasing interest in expanding storage capacity to cover the “duck’s neck” or the next broader, lower-demand periods. Emerging regulatory support for LDES reflects this shift, incentivizing storage solutions that can meet grid demand beyond short-term peaks.

While the listed regulatory changes weren"t explicitly designed to support LDES, they highlight a key challenge: without cost-effective storage solutions, the adoption of wind and solar could stall due to grid reliability concerns.

Relatively stable natural gas prices and policies that favor fossil fuels could increase economic pressure on renewables and storage. Tariffs on Chinese batteries and solar panels may further raise costs for solar and wind, challenging LDES in the near term. However, companies with a more domestic supply chain, like Form Energy, could gain an edge.

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