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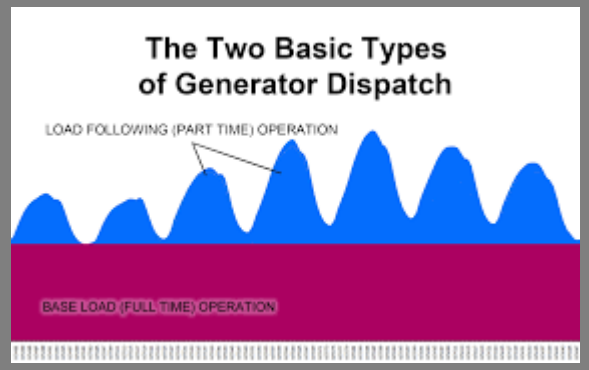
Advising Greentech companies to help maximize growth

What's the Most Critical Clean Energy Technology?

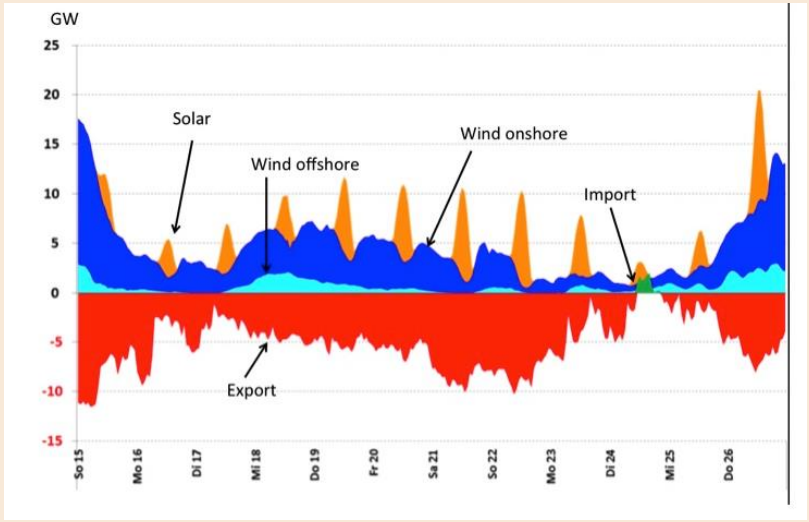
Hint: It's not solar or wind.



Solar and wind will continue to be problematic for utilities. And progress will ultimately grind to a halt without adequate battery storage.

And by adequate I'm referring to long-duration energy storage (LDES) with the ability to provide a minimum of 8-12 hours (and as much as 100 hours) of on-demand power that can transform intermittent renewable power into "base load" power.

Intermittency simply doesn't fly



- One of the numerous reason I'm not a fan of solar and wind as long-term solutions is their inability to provide consistent power on a 24/7 basis.
- The grid requires consistency to work, and to think that we can accomplish our net-zero power generation goals just by dotting the landscape with mini-intermittent utilities is naïve.
- It will require battery storage of sufficient length to smooth the production curve and allow utility operators to predict with certainty how much power these renewable assets can provide.

We're making progress, but is it sustainable?

Eye-popping records being set

The data summarized in this post is courtesy of the most recent Energy Storage Monitor published by American Clean Power Association, an industry trade group that represents over 800 clean energy companies. Data was also contributed by research firms Wood Mackenzie and BloombergNEF.

- I have to applaud the *Renewable Energy World* article that was the source material for this post for accurately portraying the market's current status. The headline read: *Storage is booming and batteries are cheaper than ever. Can it stay that way?*
- In Q3 2024 the U.S. deployed 3.8 gigawatts of energy storage. That was up 80% over the same period in 2023.
- In terms of megawatt-hours, the increase was 58%.
- OK – don't get too excited about all these eye-popping/record-setting numbers. This is indicative of new markets where percentage increases are large because the base number is small. Still, this is welcome news.

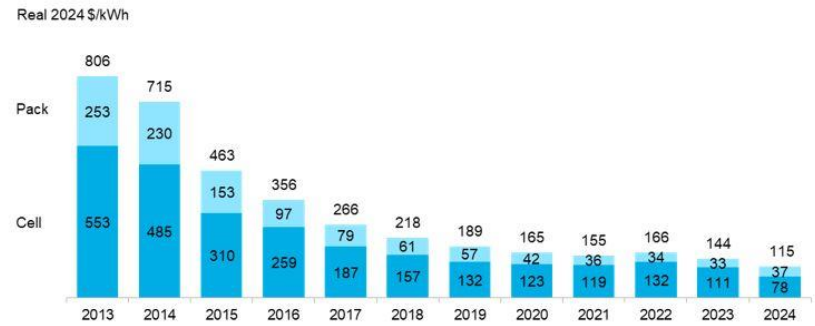
But as the Renewable Energy World article accurately highlighted : can it continue?

What's driving the market?

Grid-scale storage comprises most (90%) of the new capacity.

This is because of the previous point. Transforming utility-scale renewable installations to approach base load power is the point of greatest need and demand.

Figure 1: Volume-weighted average lithium-ion battery pack and cell price split, 2013-2024



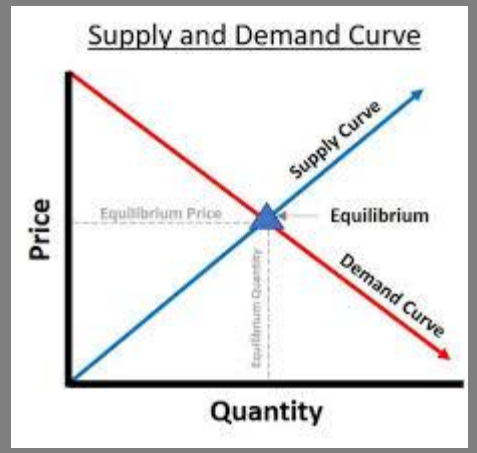
Source: BloombergNEF. Note: Historical prices have been updated to reflect real 2024 dollars. Weighted average survey value includes 343 data points from passenger cars, buses, commercial vehicles and stationary storage.

The Good News:

- The market drivers stem from the most basic economic theories: price, and supply and demand.
- The price of lithium-ion batteries declined at their steepest pace since 2017, dropping 20% from 2023 levels.
- The key metric of price per kilowatt-hour now sits at $115.

The Bad News:

- Battery manufacturers produced way more supply than market demand warranted.
- BloombergNEF estimates that there is 3.1 terawatt-hours of fully commissioned battery-cell manufacturing globally. That's 2.5X the annual demand.



Price declines are natural in emerging technologies and battery prices will continue to decline, but at a reduced rate.

Once supply-demand equilibrium is achieved, future declines will stem from what they should stem from – technological advancements.

The market will remain in a growth stage, but what's needed still doesn't exist.

- Wood MacKenzie believes that when the dust settles on 2024 overall storage installations will have grown 30%, but it doesn't believe that rate is sustainable.
- Between 2025 and 2028 projections are for a more modest annual growth of 10%.
- That's all well and good, but the storage being installed today is of the 2 – 4 hour variety. Long-term, that isn't going to cut it.
- The Department of Energy believes to achieve a net-zero economy by 2050, between 225 – 460 GW of LDES capacity will be required.
- The total investment is projected to be in the $330 billion range.

The challenge: no commercially deployable level of LDES currently exists. Progress in this area is essential to maintain momentum.

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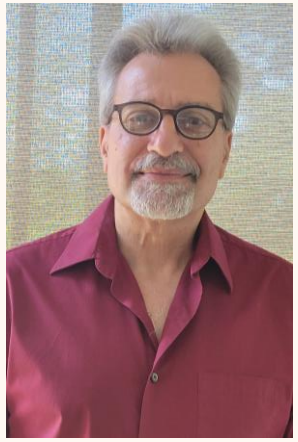

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Unbiased and Unfiltered

- An honest assessment of the climate change effort.
- I cover what's working – but more important - the issues/roadblocks that the industry would prefer to ignore.
- A must-read for anyone with a desire to understand what's really going on with renewable energy and climate change.

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