4TH ANNUAL

ENERGY STORAGE GRAND CHALLENGE

SUMMIT

Markets & Valuation

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ENERGY STORAGE GRAND CHALLENGE
U.S. DEPARTMENT OF ENERGY

TRACK FOCUS/OBJECTIVES

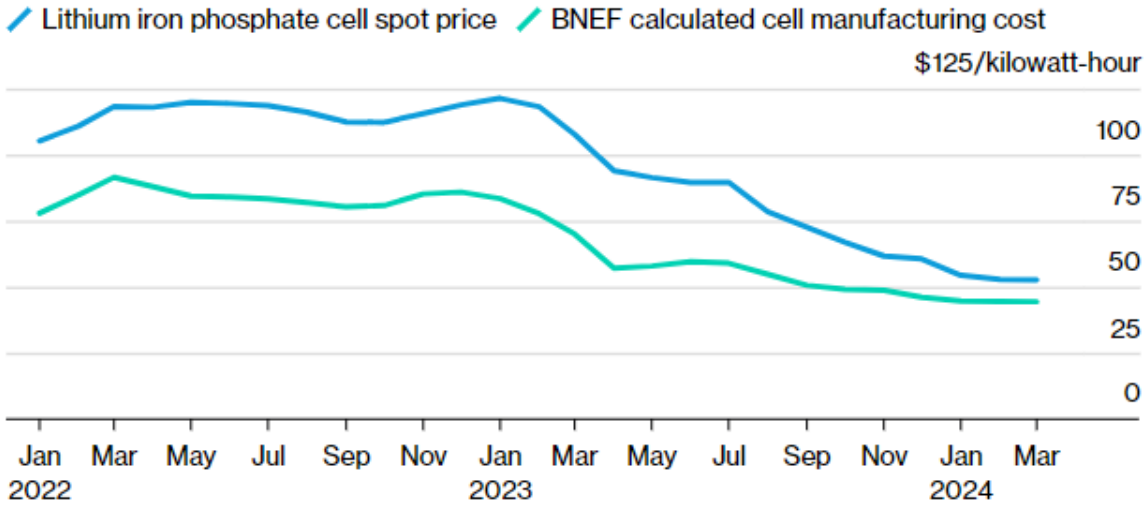
The ESGC Markets & Valuation (M&V) Track is a small federation of lab staff focused on:

- Providing insights and informing DOE future efforts based on current needs
- Supporting planning, regulatory, market and policy decision-making within the track and across the entire storage ecosystem
- Synergizing with other 3 ESGC tracks
- Sharing information & disseminating data, tools and analysis

Valuation Key Issue: Rapidly changing costs and performance of storage products across are making valuation critical and more difficult.

Battery Margins Are Being Squeezed

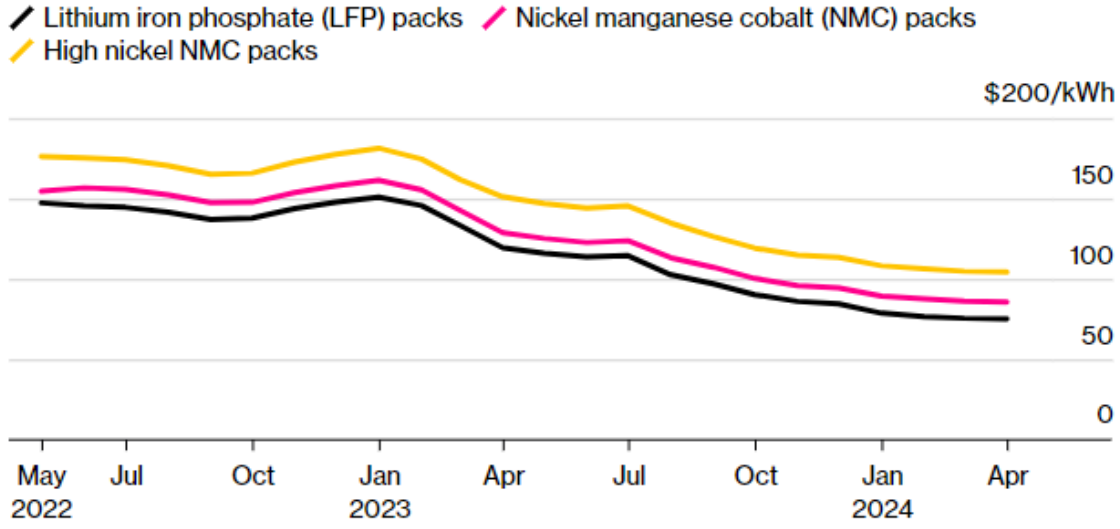
China cell spot prices and manufacturing costs



Source: BloombergNEF
Note: The cell mentioned here is in prismatic format and excludes taxes. LFP spot price comes from the ICC Battery price database. Estimated cell manufacturing cost is for LFP cells and uses the BNEF BattMan cost model.

Lithium-ion Battery Prices Are Dropping Fast

Battery pack prices in China



Source: BloombergNEF, ICC Battery
Note: NMC = Nickel manganese cobalt and includes prices for NMC111, NMC532 and NMC 622 batteries. High-nickel NMC includes NMC811, NMC955 and NCA

Informing DOE future efforts based on current needs

- For LDES to contribute to a clean energy future, it must surpass pilot stage.
  - Identify helpful avenues for future DOE/lab R&D
  - Identify the greatest needs beyond R&D in M&V (e.g., technical assistance, deployment)

- Examples of possible guidance coming from this track:
  - Assess value of LDES under different market, business models, and use cases;
  - Track policy/regulatory/market landscape impacting LDES;
  - Work with real-world decision makers to understand tradeoffs of new policies or market regulations
  - Co-optimize energy storage scheduling and dispatch to stack value across bulk and retail markets;
  - Support aggregated distributed resource participation
  - Continue to research synergies between stationary and transport markets by technologies.

- Proposed deliverable from the track: A list of both R&D and sector needs in M&V provided to DOE and industry.
  - Example: Can markets incentivize LDES in some limited way to move the technologies across the “valley of death”? What policies and regulations can allow LDES to compete with incumbent technology and improve market efficiency?

Support planning, regulatory, market & policy decision-making

- Support DOE and labs across distributed, grid-scale and transport storage with gathered information.
- Support all BIG-DIG projects across ESGC with information and expertise where M&V is relevant
- Specifically, support M&V projects
  - Jeremy Twitchell (PNNL) – ***Energy Storage Deployment Toolkit***
    - Provide information and best practices for storage deployment
  - Yonghong Chen (NREL) – ***Long Duration Energy Storage (LDES) Grid Integration –Valuation Framework and Incentive gaps***
    - Develop an LDES-centric evaluation platform to guide market design and policy

Markets Key Issue: Storage currently plays a role in markets, but when will long duration come into play?

Table ES-1. Summary of the Four Phases of Storage Deployment

Phase	Primary Services	National Deployment Potential (Capacity) in Each Phase	Duration	Response Speed
Deployment prior to 2010	Peaking capacity, energy time-shifting and operating reserves	23 GW of PSH	Mostly 8–12 hr	Varies
1	Operating reserves	<30 GW	<1 hr	Milliseconds to seconds
2	Peaking capacity	30–100 GW, strongly linked to PV deployment	2–6 hr	Minutes
3	Diurnal capacity and energy time shifting	100+ GW. Depends on both on Phase 2 and deployment of VRE resources	4–12 hr	Minutes
4	Multiday to seasonal capacity and energy time-shifting	Zero to more than 250 GW	>12 hr	Minutes

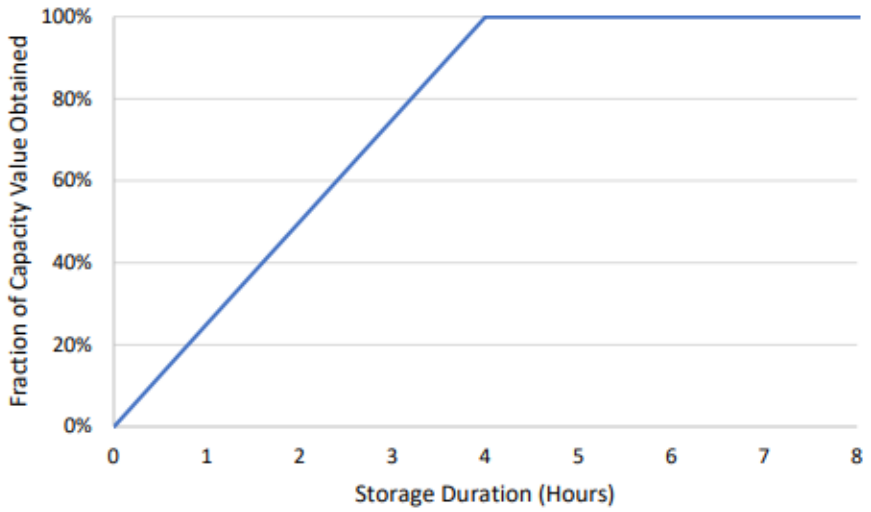
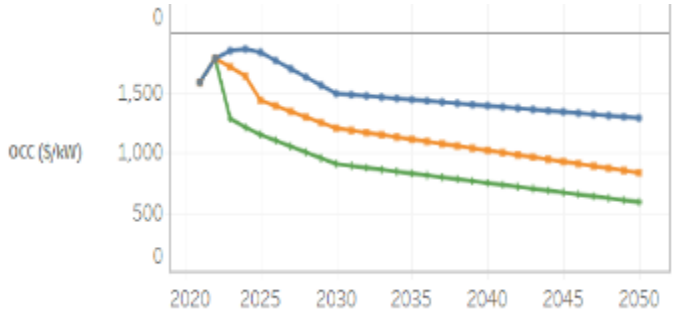


Figure 2. Fraction of capacity value captured as a function of duration for locations with the 4-hour capacity rule. Durations beyond 4 hours provides no additional financial value for provision of firm capacity.

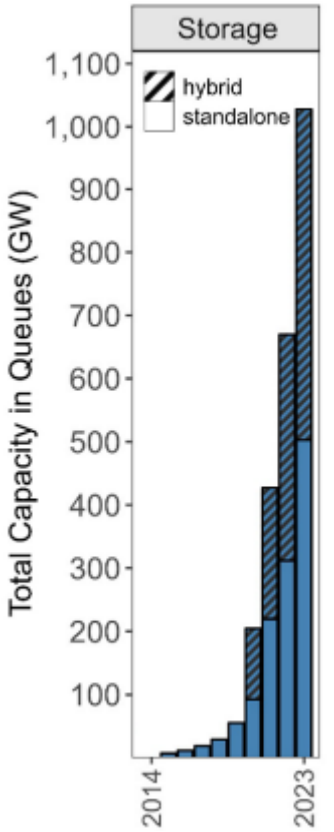
How to ensure technology readiness when market need develops?

Sharing Information within the Track

- Share insights across tracks, labs and industry
- Refute disinformation across media
- Potential topics of focus
  - Reliable cost trends of various technologies*
  - Performance of nascent technologies
  - Interconnection delays (distribution and bulk)**
  - Operational data dissemination
  - Dual participation challenges of aggregated, distributed energy resources across retail and wholesale markets
- Proposed Deliverable: Memo to DOE on areas of dis-information and likely impact on ESGC goals



*NREL ATB with updated future battery cost projections released June 2024



**LBNL Queued Up 2024 report

Actions

- Please attend the track special meeting later in the Summit
- Reach out to Nate Blair (nate.blair@nrel.gov) or Sydney Forrester (spforrester@lbl.gov) with questions or to participate!
- Watch for upcoming virtual meetings and other opportunities.

THANK YOU

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