



**REPORT SAMPLE**

# **ESS Price Forecasting Report**

**Q4 2024**



# ESS Price Forecasting Report

Ongoing supply chain issues, changing global market dynamics, and the rising demand for energy storage solutions are leading to challenges for buyers of energy storage system (ESS) equipment. To navigate this complex landscape, companies need a reliable tool to predict future cost and pricing trends. This is the driving force behind Clean Energy Associates' ESS Price Forecasting Report (PFR).

Released quarterly, the ESS PFR offers a comprehensive five-year cost and pricing outlook for Lithium Iron Phosphate (LFP) and Nickel Manganese Cobalt (NMC) battery containerized systems. This report is grounded in leading technology and material platforms, and it incorporates vital data on input material price and supply outlooks, market bottlenecks, and demand analysis to support its cost and price forecasts.

The ESS PFR is a crucial resource for decision-makers aiming to make well-informed choices in the ever-evolving energy storage industry. With detailed insights into containerized system price stacks, including forecasted "all-in" pricing and baseline price outlooks tailored to specific markets, subscribers are equipped with the knowledge they need to stay ahead.

## In this report you will find:

- **Cost & Pricing Outlook:** Five-year forecast for battery cell, DC container, and lithium pricing
- **Market Analysis:** Insights into supply, demand, and market bottlenecks.
- **Cost and Price Stacks:** Detailed "all-in" cost and pricing breakdowns.
- **Data-Driven Accuracy:** Proprietary methodologies backed by CEA expertise.

# Table of Contents

Executive summary

Battery cell cost/pricing

DC container cost/pricing

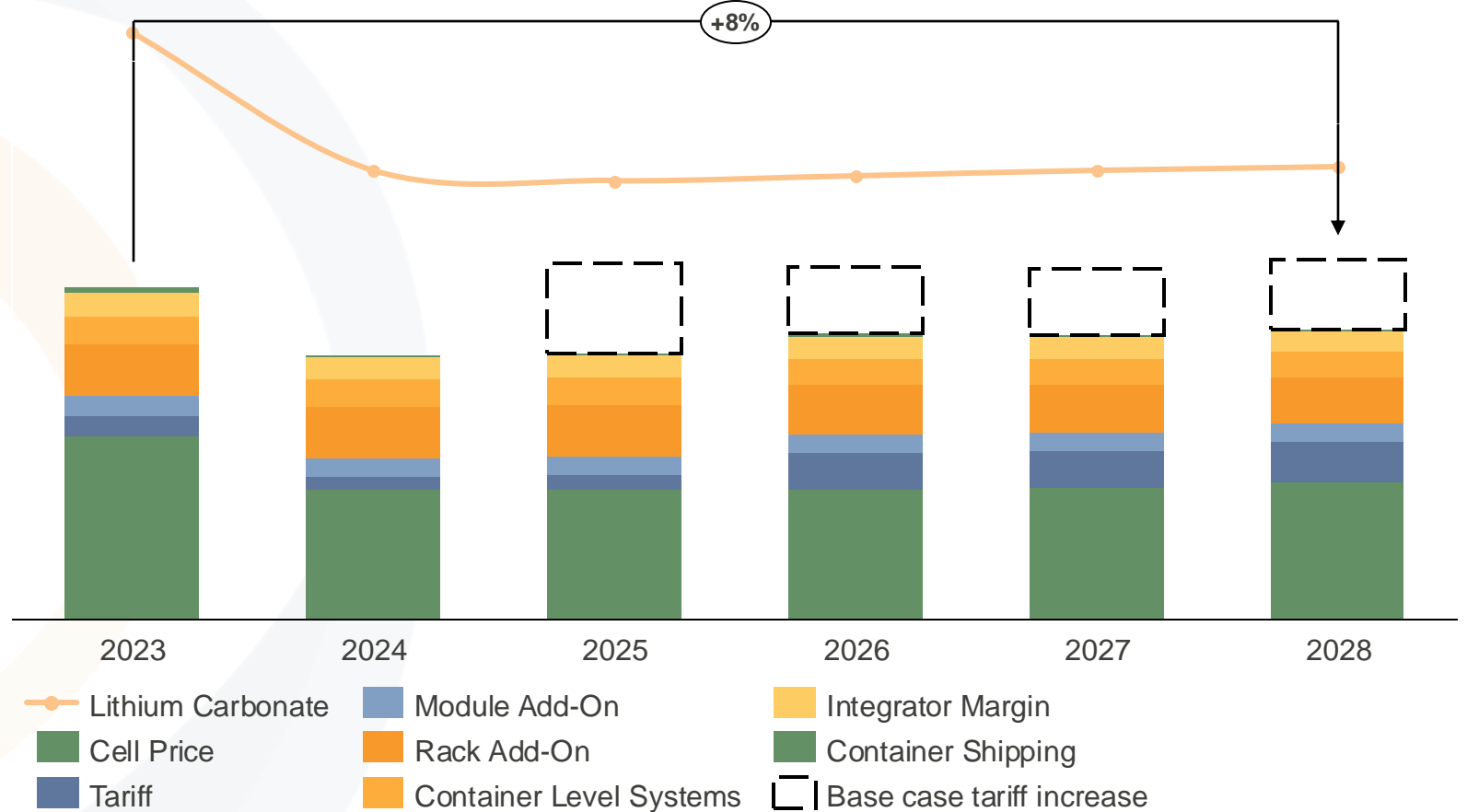
Methodology

# Significant tariff impacts from Section 301, potential AD/CVD

35% price increases likely, impacts larger for China-assembled DC blocks

- In our base case, Section 301 tariffs are increased to 60% while the anode active material AD/CVD petition succeeds, levying 200% duties on AAM both imported and contained within a battery.
- While a DC block imported directly from a manufacturer in China could see tariffs levied on the entire balance of system, batteries integrated in the US from imported parts would only see tariffs on those components imported from China, potentially saving over \$xx/kWh in tariff exposure.
- Regardless of the level of exposure, tariff-inclusive BESS prices will be above typical prices in 2023 in the base case. While there is a possibility for lower Section 301 rates, there is also a potential for even higher tariff rates given additional avenues of trade law being pursued.
- Thanks to limited ex-China LFP supply and limited appetite by integrators and developers for NMC and NCA batteries, tariff-inclusive Chinese import prices are likely to set the marginal price of BESS for at least the next two years.

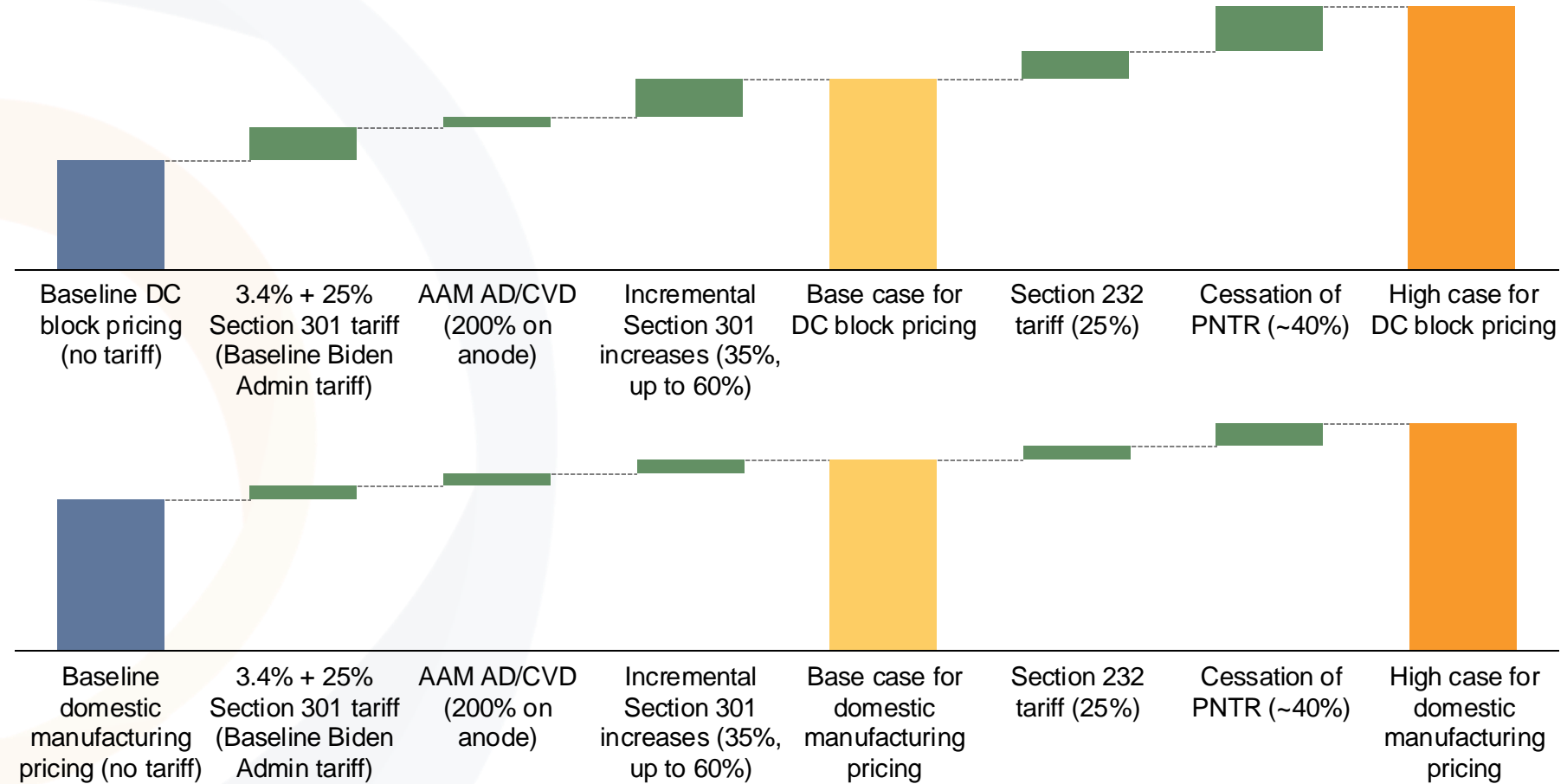
**U.S. DC container price, 320Ah cells, 5MWh, DDP from China (US\$/kWh) and lithium carbonate price (US\$/kg) outlook**



# Multiple tariff proposals obfuscate battery pricing outlook

- December's AD/CVD petition against anode active material from China marks the fourth such proposed tariff that could affect imported battery and battery materials prices.
- Between PNTR cessation, Section 232, Section 301, and now AD/CVD, batteries imported from China are currently at risk for exposure to nearly 150% tariff levies should all four of these proposals come to pass.
- It is unlikely that all of these tariffs will be levied simultaneously. Section 232 tariffs may be joined with lower Section 301 tariffs, or the Section 301 tariffs may be left at the level set by the Biden Administration. The PNTR bill has a good chance of being stopped in the Senate.
- The continuing complexity of the situation, especially given that only half of these potential tariffs would originate from the Executive Branch, makes it important to illustrate the range of potential outcomes.

**BESS price walk-up for current outstanding tariff proposals (\$/kWh)**

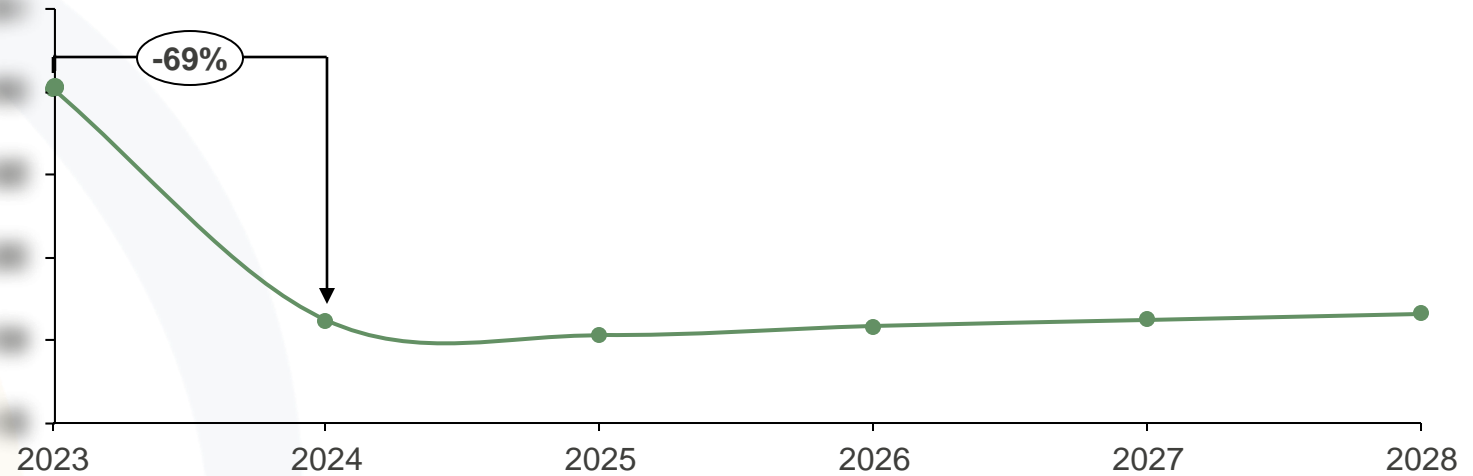


# Lithium prices show no signs of a rebound during outlook period

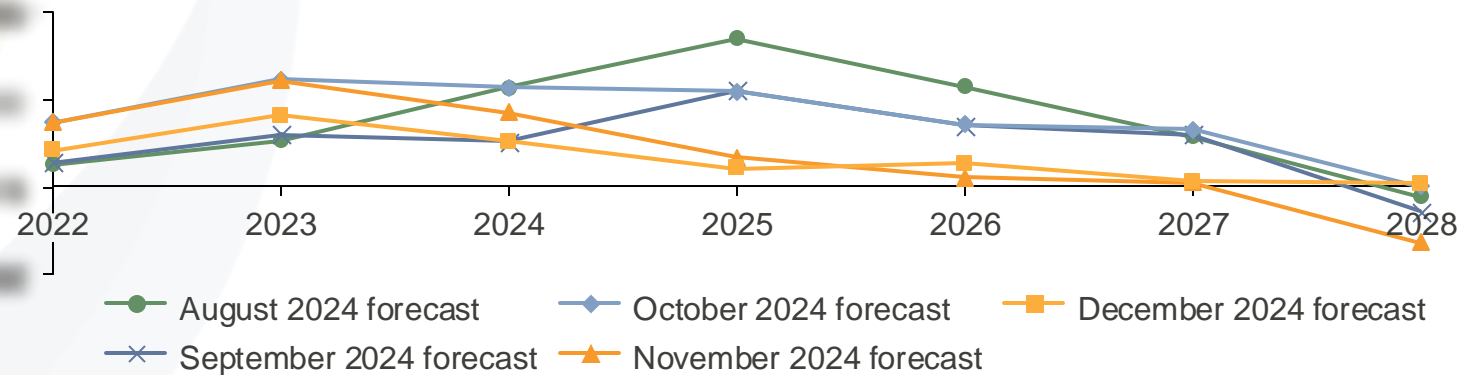
## Demand softness pushes material lithium price recovery out to 2030

- While lithium prices have remained relatively low since the beginning of 2024, the beginnings of a price recovery in Q2 were quashed by demand concerns stemming from trade actions by the U.S. and E.U..
- As predicted mine pullback rallies were short; further announcements of production cuts have not had notable impact (though most subsequent announcements were smaller). Stronger-than-projected Chinese EV demand in November did push prices up towards \$xx/kg, but this short-lived rally still gave enough time for prices to slump below \$xx/kg before the new year.
- As trade relations between the U.S. and China become cooler, demand outlooks have softened; current supply/demand balances show much smaller surpluses than projected earlier in the year, but any supply deficit has been pushed out to 2030 and beyond.
- Given continued industrial policy concerns, technological improvements, and existing supply base, lithium material prices are unlikely to have a significant impact on BESS prices in our outlook period, barring a rapid shift in demand.

### Lithium carbonate price outlook (US\$/kg)



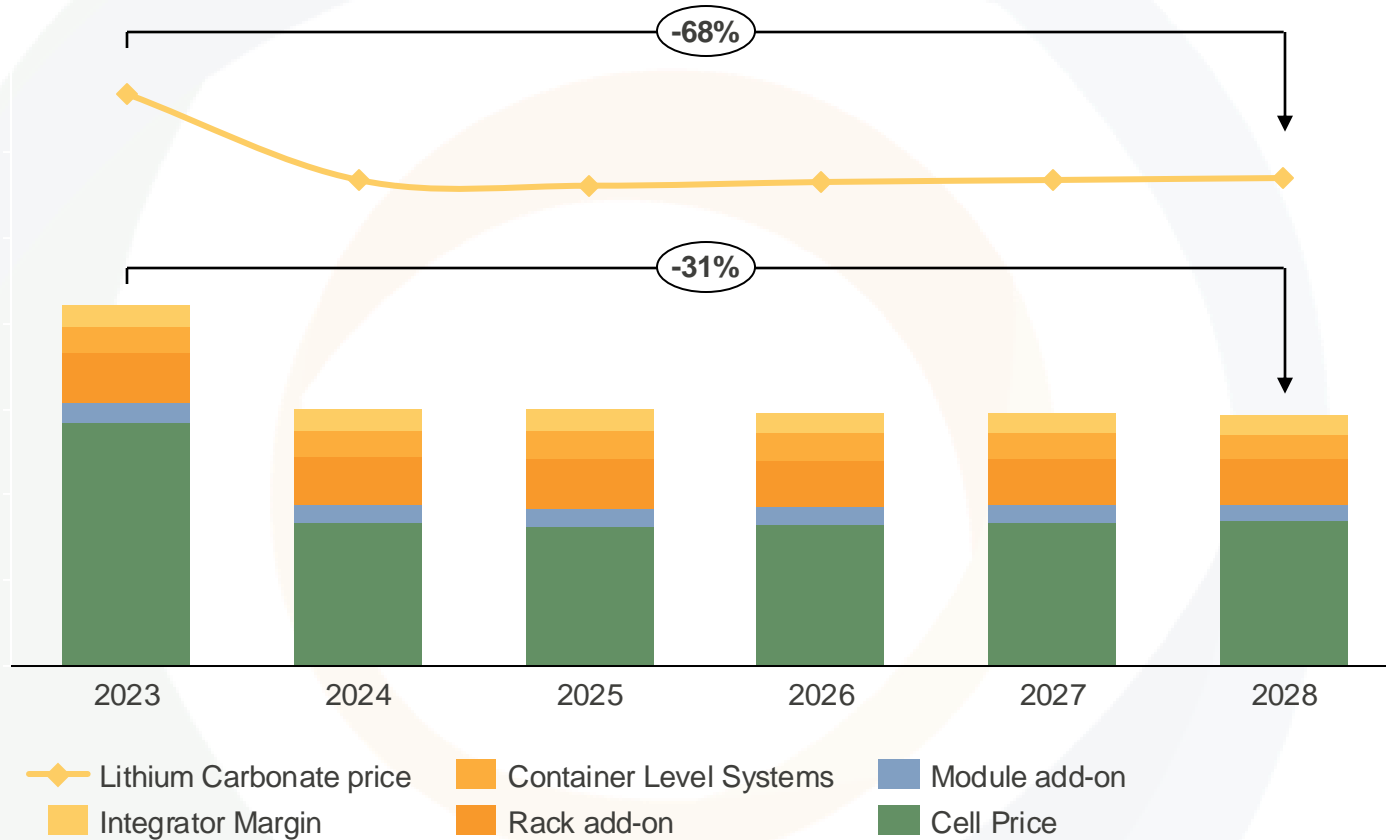
### Lithium supply/demand balance: outlook over time (,000 t LCE)



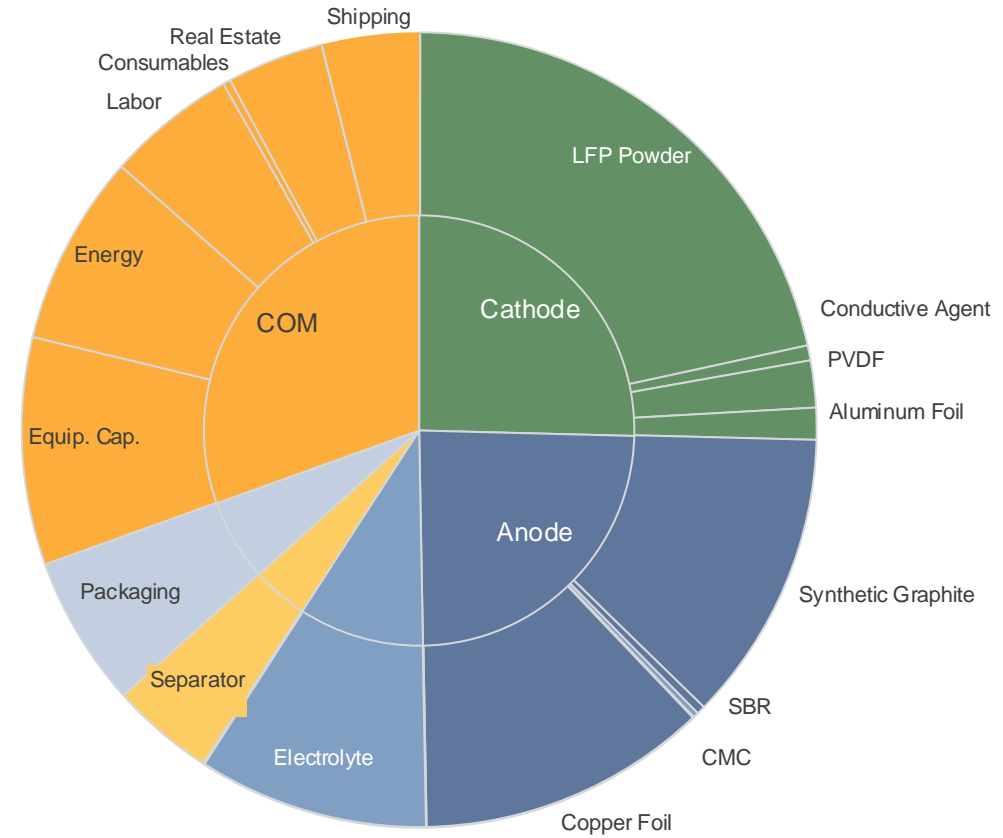
# E.U. made LFP cell costs between China, U.S.

E.U. labor and energy costs partly offset by lack of midstream tariffs

E.U. manufactured DC container price, 1.25MW/5MWh, (US\$/kWh) and lithium carbonate price (US\$/kg) outlook



E.U. LFP battery cell cost, 2024 (\$/kWh)

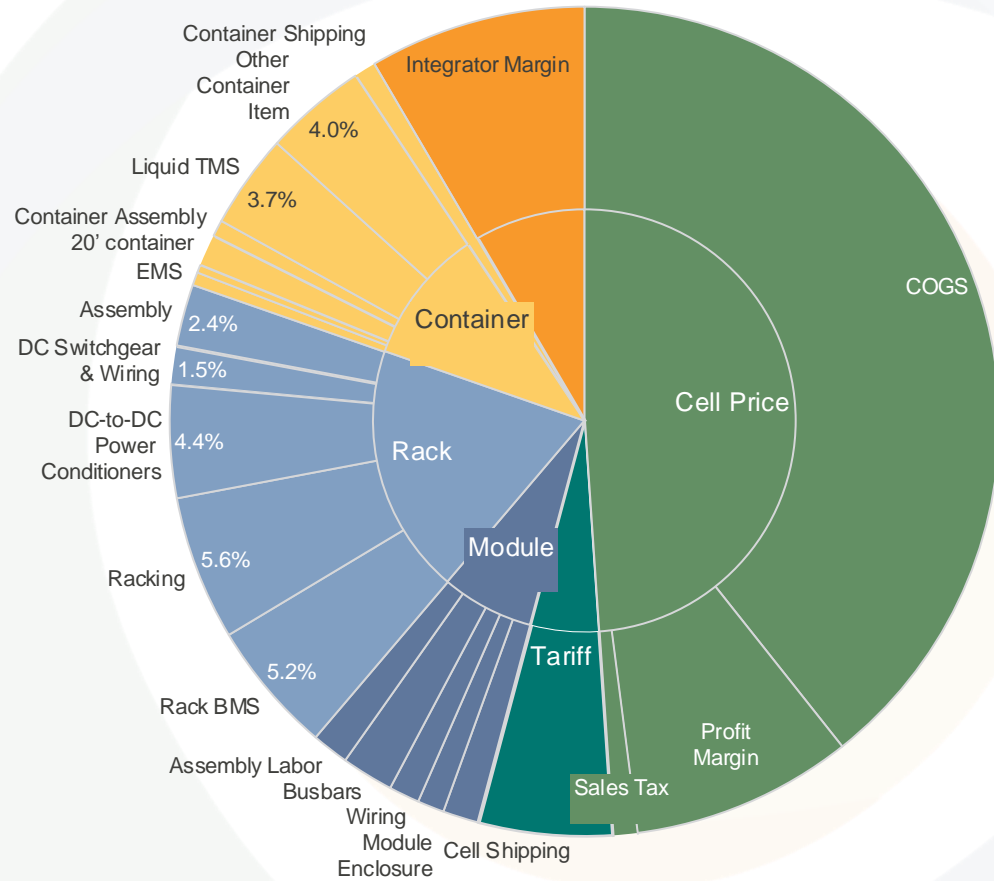




# BESS container price driven by cell COGS and vendor margins

Strong investment increasing capacity and competition

U.S. DC container price composition, 1MW/5MWh, DDP from China, CY2024 (US\$/kWh)



Category	Key commodity	Price outlook	Commentary
LIB cell COGS	Lithium carbonate	↔	Lithium markets stabilizing, with global surplus production forecasted annually thru 2030
	Synthetic graphite	↔	Prices stay low, but potential for non-price supply restrictions is increasing
DC racking, container and enclosure	Steel	↔	The global steel market still faces oversupply, although demand is improving. Near-term pricing flat, with slightly higher pricing likely by years end
Busbars & cabling	Copper	↔	Prices still volatile, but end-of-2024 spot prices have settled down to Q2 levels.
Switchgear and power conditioners	Power electronics	↔	Price producer index for electronics manufacture declining modestly through 1H 2024, but switchgear/relays PPI is flat.
BMS/EMS	Software	↑	The cost of industrial controller manufacturing as well as software programmer costs remain on the rise
Assembly labor	Electronics manufacture	↓	Higher levels of automation expected while hourly labor costs in China continue to drop, albeit slowly
Profit margins	N/A	↓	Competition and tariff risk driving margins down

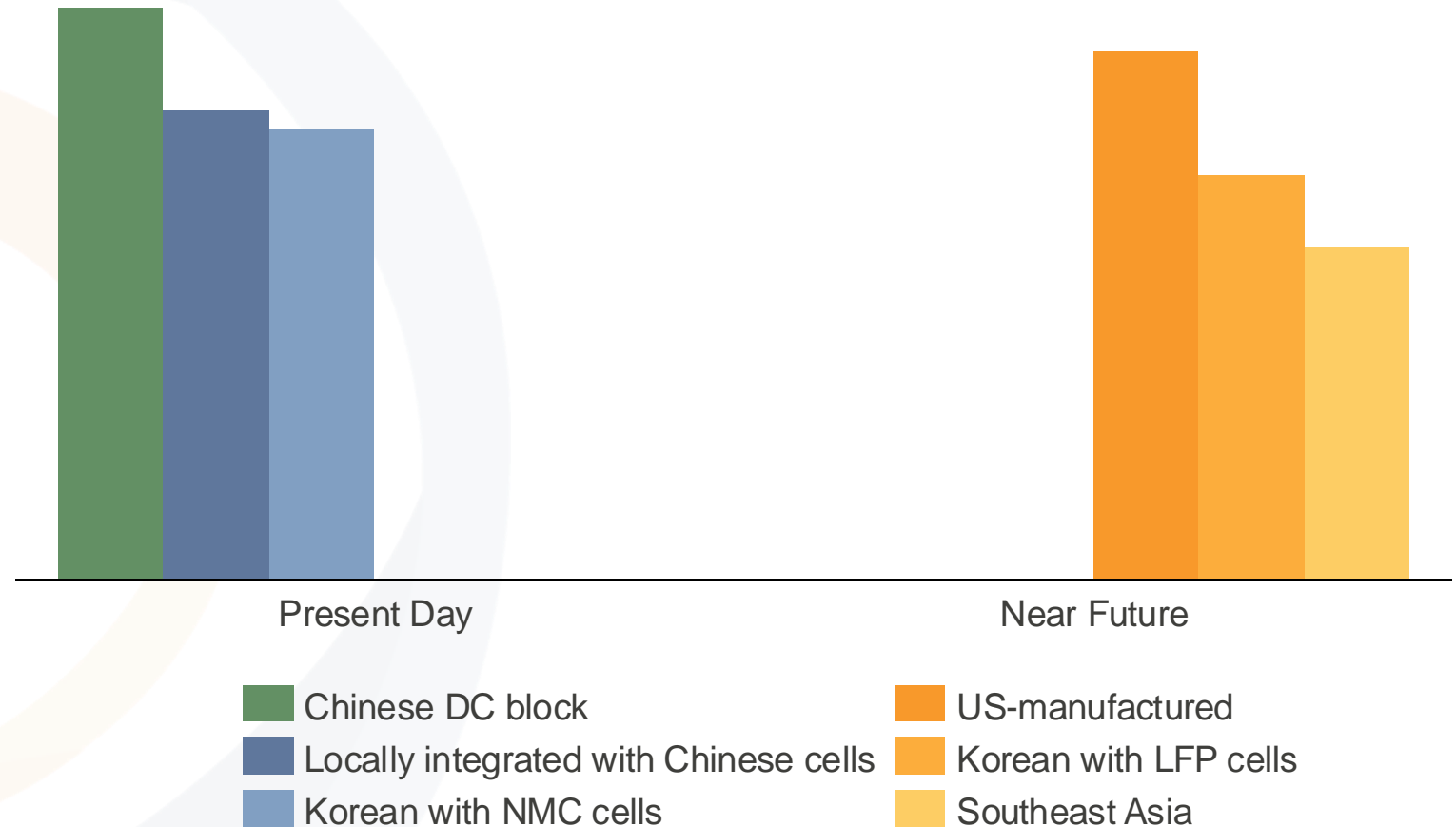


# Sourcing diversity has potential to drive battery cost reductions

## US and Southeast Asia manufacturing, South Korea LFP will provide future options

- New tariffs from the incoming Trump Administration will potentially increase prices of BESS from China by 35%, changing the calculus of battery sourcing in the near future.
- At present the only viable BESS procurement options are Chinese DC containers, locally integrated BESS with Chinese cells, or Korean BESS with NMC cells. US, Southeast Asia, and Korean LFP manufacturing will only become options in the 2025-27 timeframe, depending on the company and factory.
- Given these new options, developers and integrators will have more choices in battery procurement once the initial supply valley of 2025 and 2026 is crossed. It's worth noting that with the possible exception of systems built in Southeast Asia, all of these options will be more expensive than the present-day cost of a BESS with imported Chinese LFP cells.

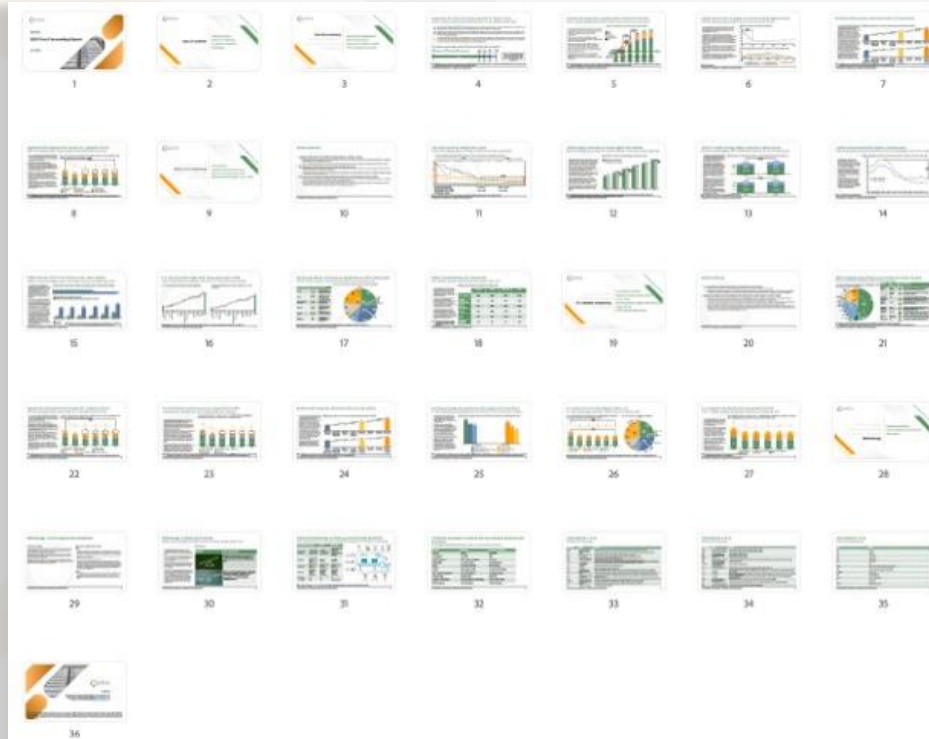
Projected DC container prices from present and future cell manufacturers, 2025



# Report Contents: 36 Pages of In-Depth Reporting

CEA's **Price Forecasting Program** is the leading source of price data and analysis in the solar and storage industry. We leverage the expertise of our solar and storage industry experts and analysts, our network of lab partners, independent industry experts and raw material suppliers, and our access to proprietary, trade association and public databases to report on current trends and anticipate changes that will transform the renewable energy landscape.

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## Table of Contents Q4 2024

- Executive Summary
- Battery cell cost/pricing
- DC container cost/pricing
- Methodology



# Thank You

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