CEA
Clean Energy Associates

REPORT SAMPLE

ESS Supply, Technology, and Policy Report

Q2 2024

ESS Supply, Technology, and Policy Report

The CEA Energy Storage Systems (ESS) Supply, Technology, and Policy Report (STPR) is published on a quarterly basis and covers global and regional supply chain analysis, technology trends, and regional policy analysis. Given the breadth of technological developments in energy storage, there will be a new technology focus each quarter; this quarter, the focus is on **emerging battery technologies**, including LMFP cathodes, sodium-ion batteries, and solid-state batteries.

The strategic value of the STPR lies in its ability to enhance project profitability by leveraging industry incentives. It establishes security of supply through a thorough understanding of trade policy and aids stakeholders in understanding the project performance implications of new technology adoption.

Deliverables of the STPR include a quarterly report and full analyst support for any questions pertaining to its coverage. With the STPR, stakeholders gain a detailed view of the supply landscape, technology trends, and policy impacts, empowering them to make informed decisions and optimize their strategies in the PV and energy storage sectors.

In this report you will find:

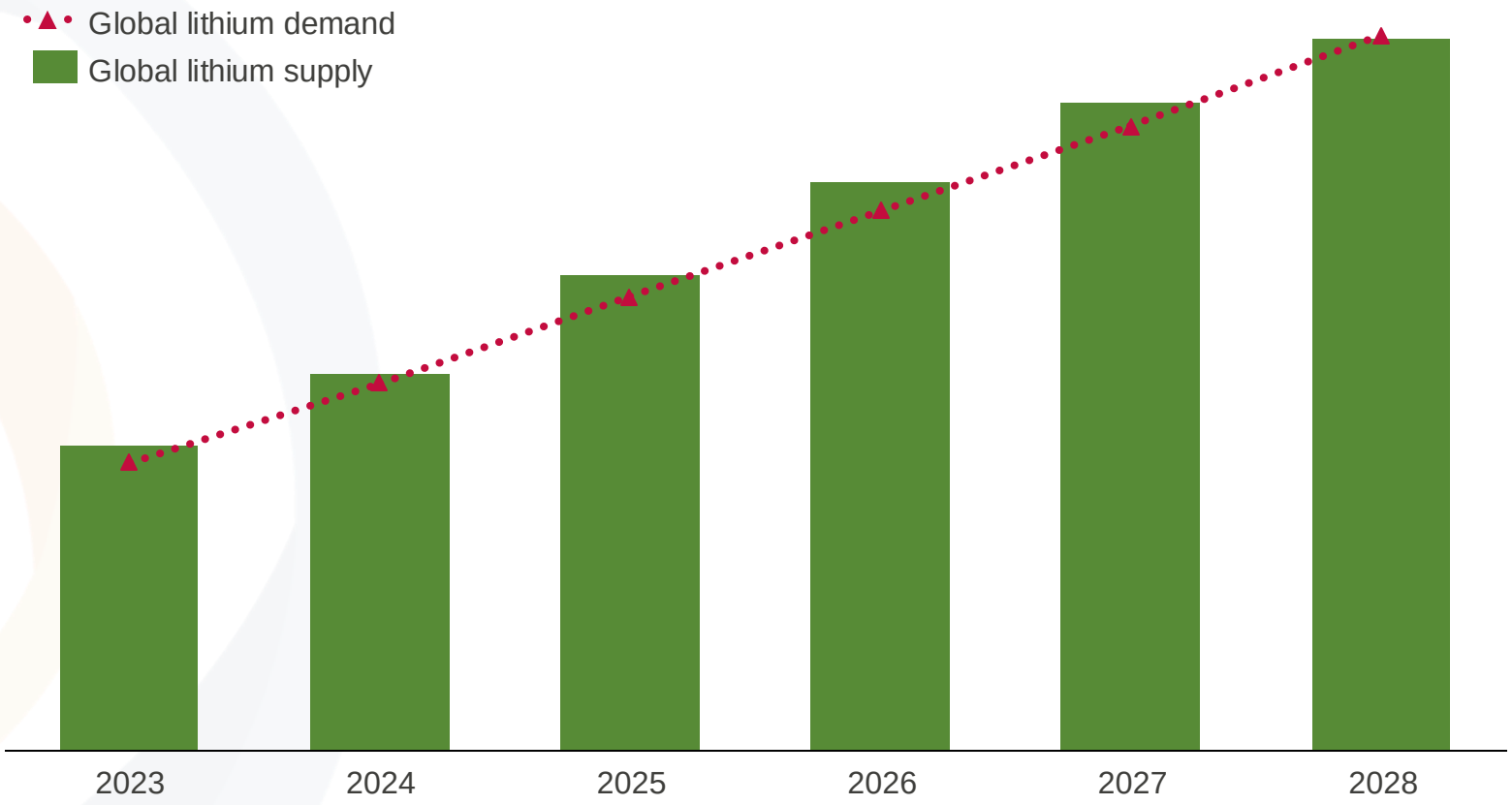
- Global and regional supply chain analysis
- Technology trends
- Regional policy analysis

Lithium supply continues to remain higher than the demand

Projected 2024 surplus, however, declined as hard-rock miners further cut production

- Lithium prices reached multiyear lows in July due to decelerating PEV sales growth, subsequent raw material oversupply, and destocking.
- While there has been a rise in the lithium supply from brine producers in China, Argentina, and Brazil, hard-rock miners in Australia like Arcadium and Albemarle continue to cut their lithium production for 2024 due to declining raw material prices. As a result, the projected 2024 lithium surplus volume is declined to *XX* kt LCE in July'24 from *XX* kt LCE in May'24.
- Non-integrated mining companies like Pilbara Minerals and Liontown Resources continue to bring their supply online since it is the only source of cash flow.
- The upcoming US presidential election poses uncertainties for federal EV tax credits, putting the domestic planned cell production capacities at risk of being delayed or cancelled, further impacting the projected global lithium demand-supply balance.

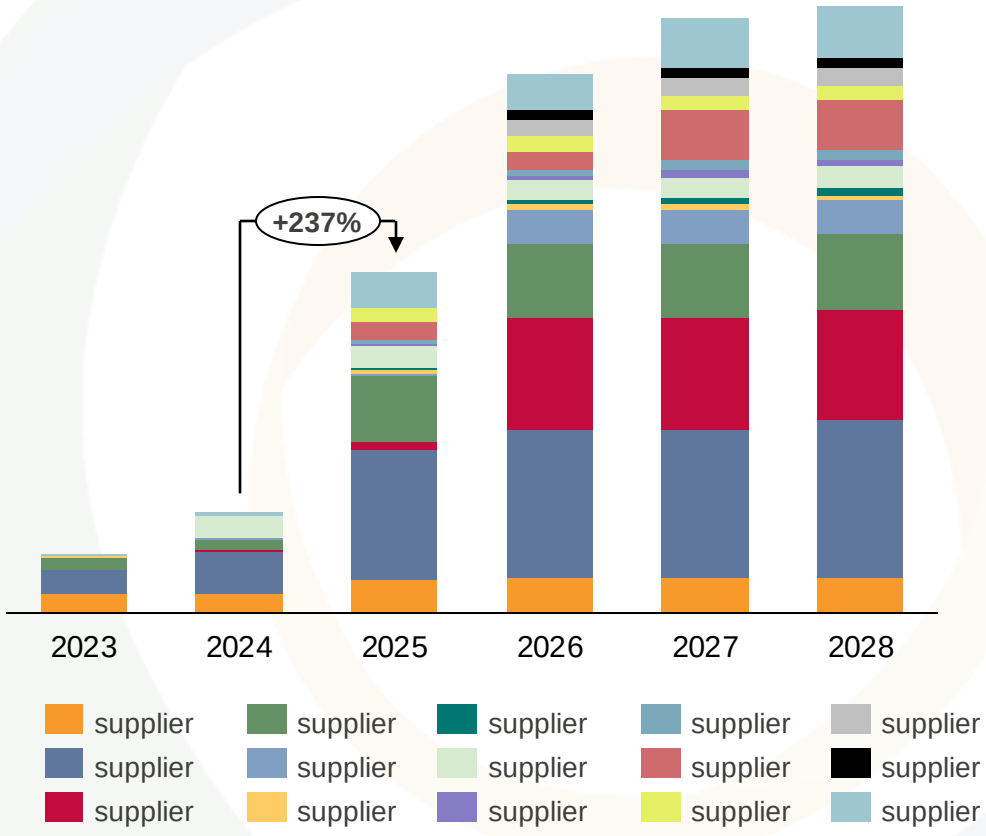
Global lithium demand/supply forecasts (kt LCE)



Small OEMs/Chinese suppliers continue to face challenges

Tier 1 (non-China) suppliers continue to adjust their planned capacity amid weak EV demand growth

U.S. LiB cell production capacity by supplier (GWh)



Chinese cell suppliers encounter headwinds

- Republicans are pushing to detain *one supplier* and *another supplier* under UFLPA regulation amid new evidence on the use of forced labor within their battery supply chains
- *One supplier* continues to face backlash from local communities for both its battery and battery material plant despite winning the court ruling to continue the development of its battery material plant in Michigan

Small suppliers/startups facing funding issues

- *One supplier's* plant- Magnis was removed from the board by its primary lender in late 2023 due to financial solvency issues
- *One supplier's* CEO/CTO resigned, 25% layoff in Q4'23, another 12% layoff in Q1'24
- *One supplier* issued layoffs as the company is struggling to obtain financing for its Clarksville plant; cancelled its battery separator plant project in Kentucky as the DOE cancelled the US$200 million grant due to the concerns over the company's alleged links to China's government
- *One supplier* delayed the operational timeline for its South Carolina battery plant by one year; updated operational timeline is Q4'25

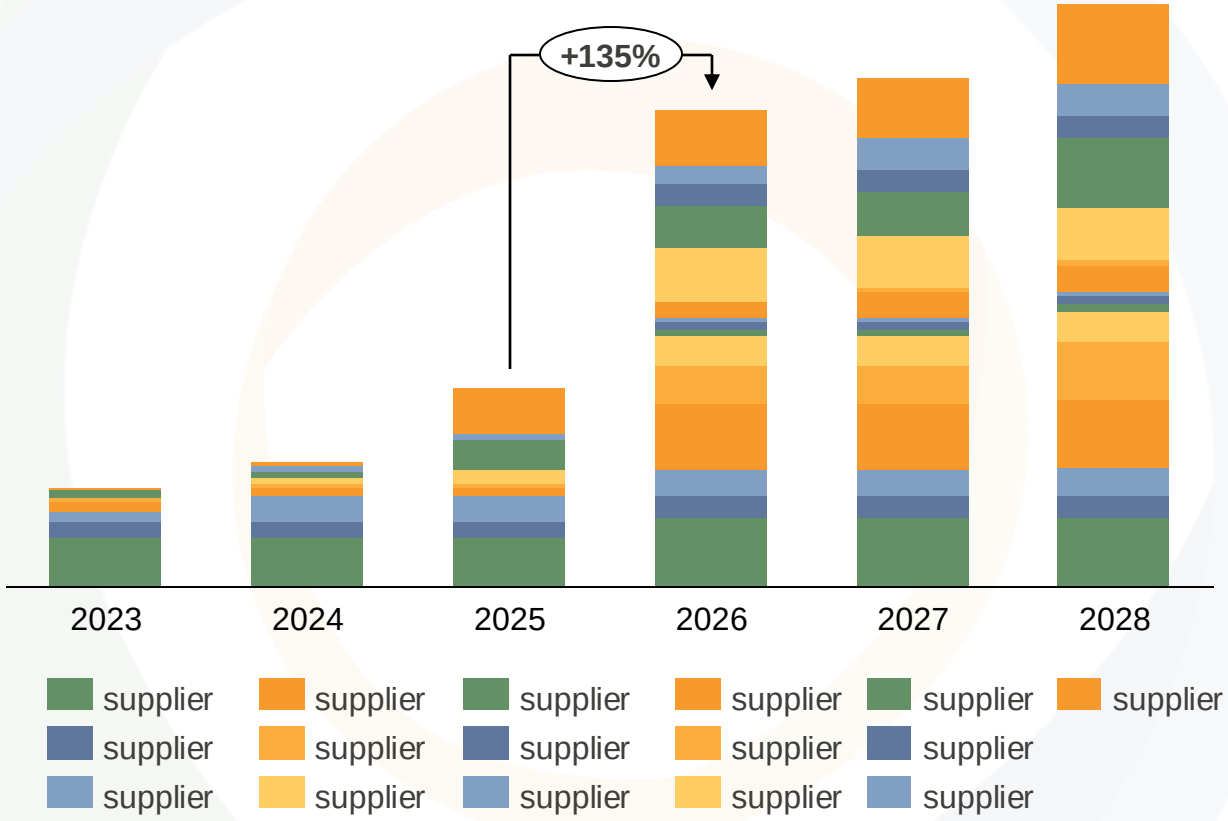
Tier 1, non-China suppliers reducing planned domestic capacity due to sluggish EV demand growth

- *One supplier* temporarily suspended its ESS battery plant in Arizona to limit its investments in times of declining revenues amid weak EV demand growth; also announced the suspension of its battery plant in Michigan in partnership with General Motors (Ultium Cells)
- *One supplier* is considering termination mass production of 4680 cells at its Texas factory, according to South Korea-based Businesspost. ***(One supplier's 2024 capacity is updated from 10 GWh to 4.81 GWh as it only manufactures cells in its Austin factory. In Fremont, it currently has a pilot production line for 4680 cells.)***

Europe's 2025 domestic planned cell capacity declined by *XX%* Q-o-Q

Weak EV demand growth pushing suppliers to reduce their planned production targets

Europe LIB cell manufacturing capacity, supplier (GWh)



Suppliers continue to adjust their planned production targets

- *One supplier* cancelled its plans to expand the capacity of its German battery plant due to end of EV subsidies and high electricity and labor costs in Germany
- *One supplier* halted the work on its factories in Germany and Italy… it would confirm its industrial and construction timeline in late 2024 or early 2025.. currently ramping up production at its first factory in northern France
- Porsche hesitates to build a battery factory in Brandenburg due to sluggish EV demand growth
- BMW cancelled its battery supply deal with Northvolt. Cells were supposed to be supplied from its Sweden plant
- *One supplier* cancelled its second German battery plant while the first German plant continues to be delayed

Few suppliers ramped up their planned domestic capacity

- *One supplier* plans to set up 30 GWh *LFP* cell production plant for EV applications in Spain
- *One supplier* plans to add 30 GWh *LFP* cell production capacity at its Poland plant for Renault
- *One supplier's* battery plant is on track to start 1 GWh production by the end of 2024

The energy storage ecosystem spans diverse technologies

CEA's analysis focuses on novel electro-chemical and mechanical storage

Electro-Chemical Storage

Stores energy through electron and ion transfer through chemical reactions. Key technologies include:

- Lithium-Ion – including nickel-manganese cobalt (NMC), lithium iron phosphate (LFP), and nickel cobalt aluminum oxides (NCA),
- Flow batteries – most commonly vanadium, iron, and zinc,
- Iron Air,
- Zinc-based chemistries,
- Next-generation lead-acid, and
- Sodium-ion chemistries, generally for shorter (~2 hour or less) applications.

The potential exists for "breakthrough" technologies to compete with lithium-ion.

Mechanical Storage

Stores energy as potential or kinetic energy. Key technologies include:

- Compressed gases, most notably CO_2,
- Liquid-air,
- Modular pumped hydroelectric,
- Flywheels, and
- Gravity-based storage, either through structures or rail-based systems.

Several technologies rely existing geologic formations, most notably pumped hydroelectric power and compressed air using underground caverns. CEA classifies these technologies as **geologic energy storage**, and due to their reliance on pre-existing structures they are not considered a meaningful competitor for lithium-ion.

Thermal Storage

Stores energy as heat, with higher temperatures leading to more efficient storage. Key technologies include:

- Firebricks, ceramics, and concrete,
- Molten salts,
- High temperature aluminum, and
- Molten metals.

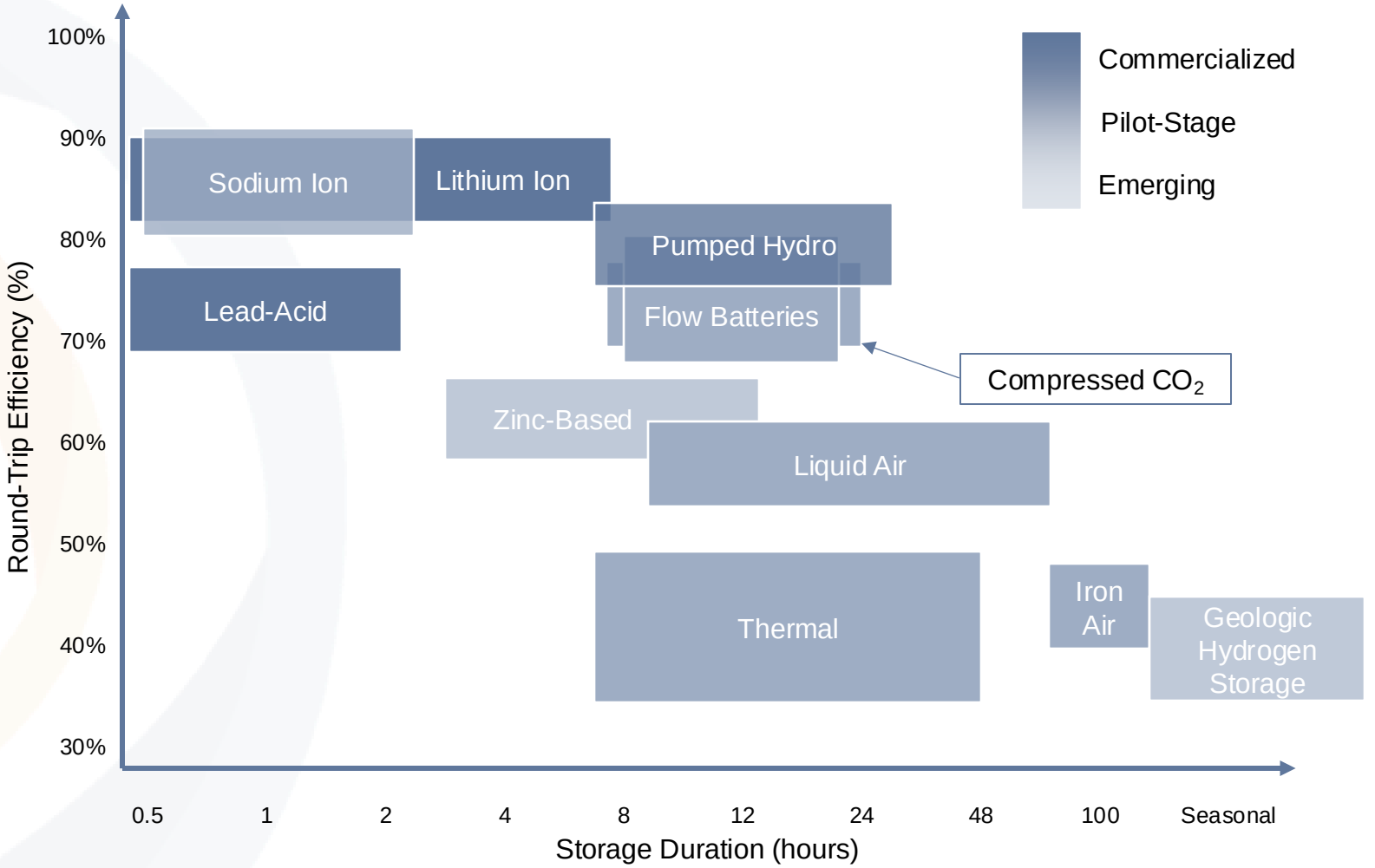
Using thermal energy storage as electricity-in electricity-out for most commercial technologies requires integration with a steam generator, creating prohibitive costs unless retrofitting an existing system to provide additional efficiencies. As a result CEA anticipates thermal storage to more directly impact the decarbonization of high-temperature industrial processes rather than acting as storage on the grid.

Energy storage technologies target a range of potential durations

The niche for 8-12 hour storage is crowded with no clear leader

The potential success of competing energy storage technologies will require finding a favorable application niche where lithium-ion's poor scaling with duration allows for cost-competitiveness.

- Scale remains a key challenge to competing on cost, as lithium-ion was able to leverage the learning curve of EV batteries to dramatically reduce costs. Most competing technologies have no such parallel application to drive down costs.
- Emerging technologies, particularly next-generation batteries, have the greatest potential for cost declines as production scales up. Most mechanical storage systems use existing technologies (pumps, storage tanks, compressors, etc.) which are well-understood with little potential for iterative cost declines.
- The 8-12 hour duration niche, generally considered the beginning of "long-duration" applications, is crowded with many technologies seeking to out-compete lithium-ion, although economic and policy demand for storage of this duration is still low.
- Round-trip efficiency becomes a critical differentiator when supply is constrained.



Sources: Pacific Northwest National Lab (PNNL), National Renewable Energy Lab (NREL), California Energy Commission, individual technology scientific papers, stated company metrics and targets.

Implications of the EU elections for energy storage

Far-right influence could slow policy deployment, yet support for Green Deal remains

In June 2024, the EU elections took place, showing a clear growth in far-right influence within the EU Parliament.
Despite this, the majority is still held by the previous “grand coalition”, therefore support for the Green Deal remains certain

Positives	
Majority in decision making remains in the same hands	**The centre-led majority remains the strongest political force in the European Parliament.** Their upcoming mandate will continue to focus on existing Green Deal ambitions. The strength and volume of new *environmental* regulations may be reduced. However, energy security, competitiveness, trade, and industrial issues concerning the battery sector will likely continue to garner support across all political parties.
Industry support expected	Prioritization for industrial policy in the upcoming mandate could offer potential financial support to attract further investment **E.g**., EU Commission President Ursula Von der Leyen’s New Green Industrial Deal coupled with a new Competitiveness Fund expected to come within 100 days of the next regulatory cycle (beginning Nov, 2024).

Note: Critical regulation for the battery sector has already been approved and therefore is not impacted by the new parliamentary rule: EU Batteries Regulation, Electricity Market Design, Critical Raw Materials Act, Net Zero Industry Act

Negatives	
Right-wing influence (National and regional)	**EU level:** Right-wing groups have voiced intentions to challenge Green Deal policies, such as the internal engine combustion ban; if the regulation is pulled back, it could impact battery demand in the EU. **National:** The biggest threat may come from the national level. As seen in the Netherlands, the PVV has openly favoured nuclear energy instead of wind and solar growth in decarbonization efforts. In France, the far-right group called for a halt in wind energy installations if they were to be in power. Holding back on renewable generation could lead to declining demand for energy storage. National right-wing governments may also intentionally delay or limit the transposition of EU legislation into national laws, leading to uncertainty across the sector.
Possible impacts on other key policies	The EU’s Critical Raw Materials Act and Net Zero Industry Act, both adopted in May 2024, may suffer as a more right-wing government could push through mining and/or permitting rules that reduce environmental safeguards for projects. Undermining the sensitivity and trust building necessary for these projects to succeed. Public acceptance is particularly crucial for the CRMA. Harmonization across Europe in the permitting process will also be essential for attracting investments into domestic industry.

U.S. Domestic Content guidance provides alternative for qualification

Treasury's new N-24-41 guidance creates simpler method for determining compliance

Overview

- On May 16, 2024, the U.S. Treasury issued new guidance (N-24-41) for the Domestic Content Bonus (DCB) to the Section 48/48E ITC

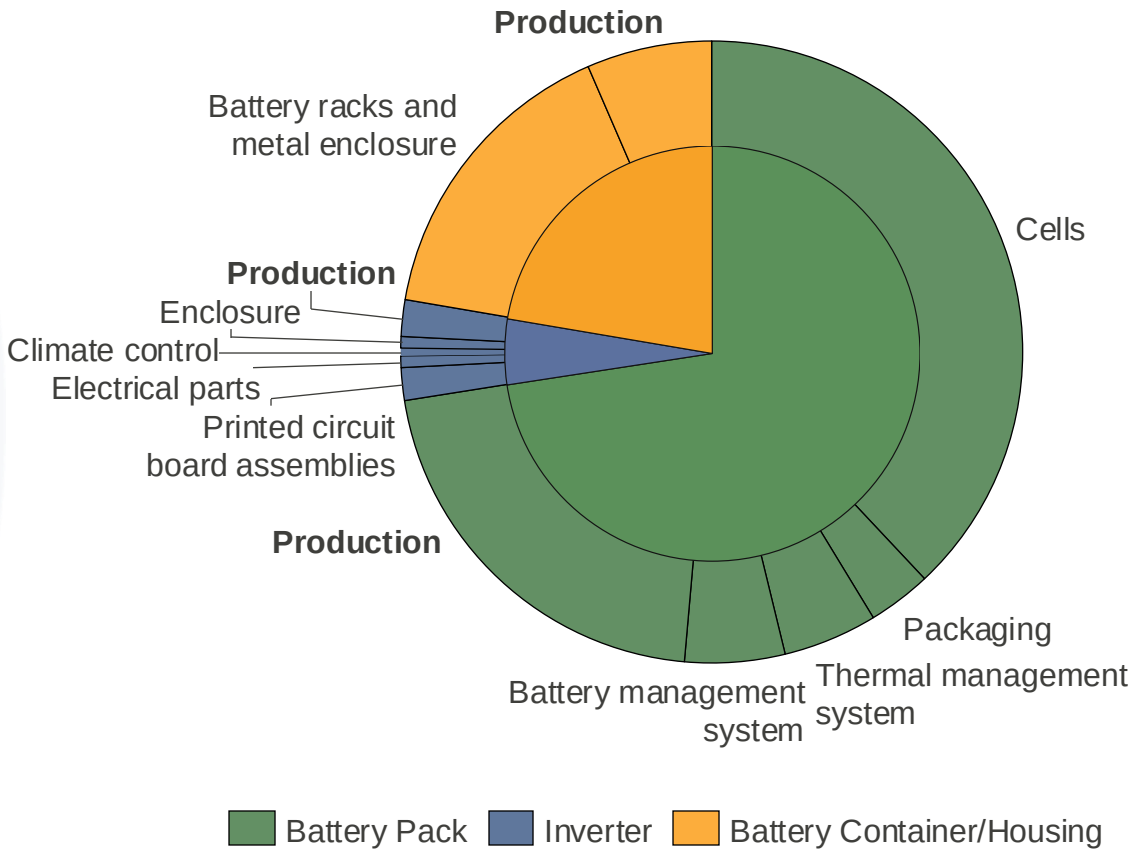
New method

- The guidance features a new, simpler method for calculating the minimum portion of domestic Manufactured Products to qualify for the DCB
- The guidance provides exhaustive tables of Applicable Project Components (APC) and Manufactured Project Components (MPC) as well as assigning a set portion of project costs to each MPC, for both grid-scale and distributed BESS
- The new method **does not** require project owners to obtain direct cost information from suppliers

No mixing and matching

- Project owners must commit to using either the method in N-24-41 or the original method in N-23-38 and cannot use elements of both

Manufactured product components and values for grid-scale BESS under N-24-41



Report Contents: 63 Pages of In-Depth Reporting

CEA's **Supply, Technology, and Policy Report** applies a systems level thinking approach to provide comprehensive industry analysis. We report on current trends and have a pulse on the latest solar, energy storage and green hydrogen technologies set to disrupt the clean energy landscape.

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