Navigating Changing Dynamics in U.S. Module Supply

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1. PV Market Overview
2. AD/CVD Risk
3. Adapting to Changing Circumstances
4. Risk Mitigation for Warehoused Modules

PV Market Overview

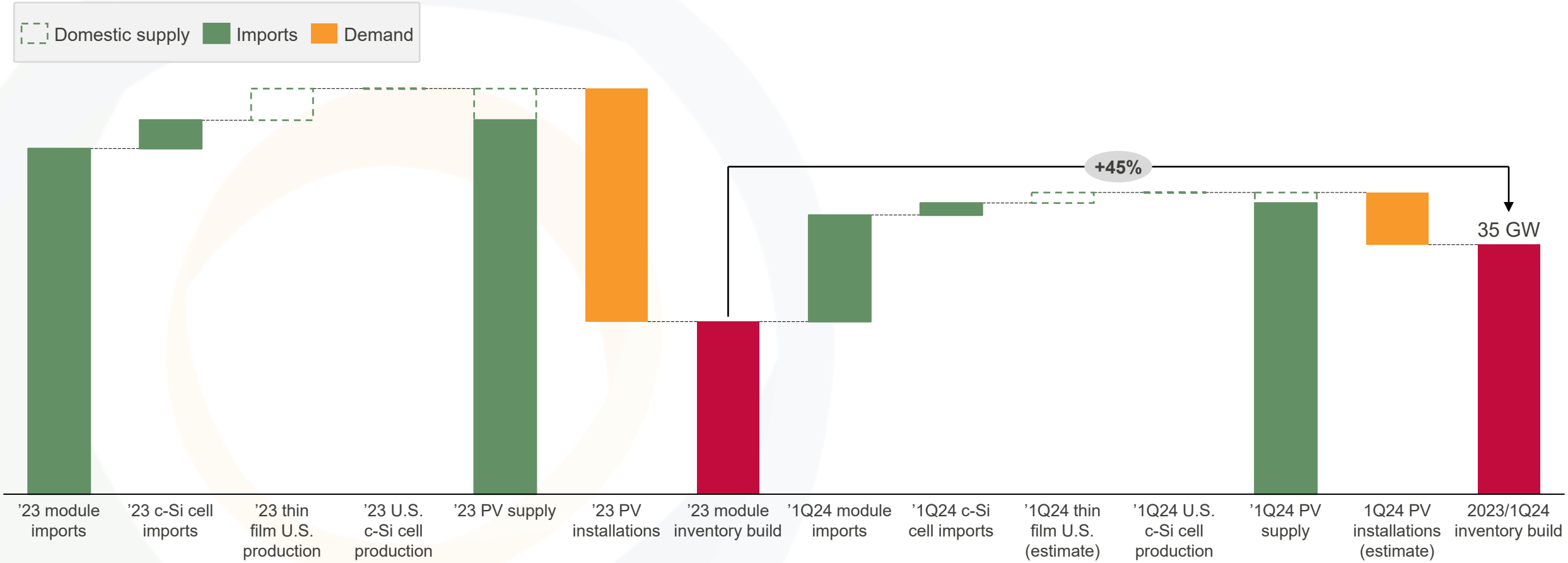
Current Market Status Related To Oversupply

1. Overcapacity in China that exceeds global demand growth, leading to depressed global prices.
2. U.S. trade and human rights policies that restrict the portion of supply able to access the U.S. market, creating higher prices in this market.
3. Increased production capacity in SE Asia, India and other regions serving the U.S. market that exceeds demand growth.
4. Rise of domestic manufacturing in the United States.
5. Clean Energy Associates' unique view of the market from both buyers and sellers.

U.S. Module Inventories Grew 45% over the course of 1Q24

This added inventory alone brings new inventory build near 35 GW

United States PV Module Inventory Build, 2023 (GW)



Notes | 2023 module import data were reported as of December 31 by Datamyne. Cell imports by USITC. Installations reported by SEIA. First Solar's U.S. thin film production from First Solar's Q4 2023 earnings call.

Growing Non-China Supply Is Pushing U.S. Pricing Downward

China-made modules are finding a price bottom with all suppliers pricing around costs

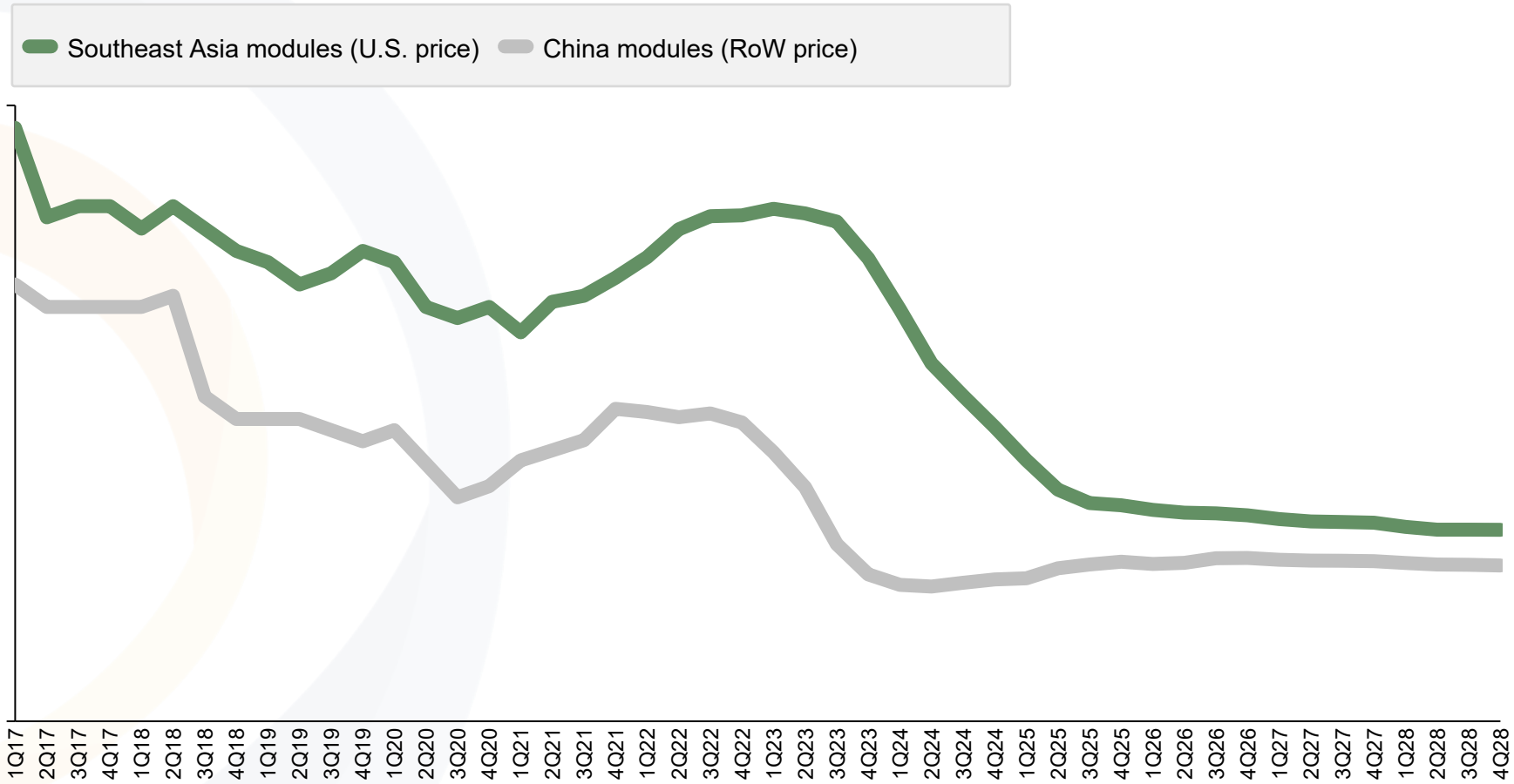
Southeast Asia Made Modules

- Tier 1 module prices from Southeast Asia are falling to record lows
- SEA suppliers need to contend with a market starting to have significant capacity available.

China Made Modules

- China-produced module prices are no longer consistently falling and are selling in a ~4 ¢/W channel around all time lows.
- With the China market reaching a potential bottom, prices will likely trend upward as suppliers actively control inventories to keep some market supply in check.

Module Price Outlook (U.S. ¢/W)

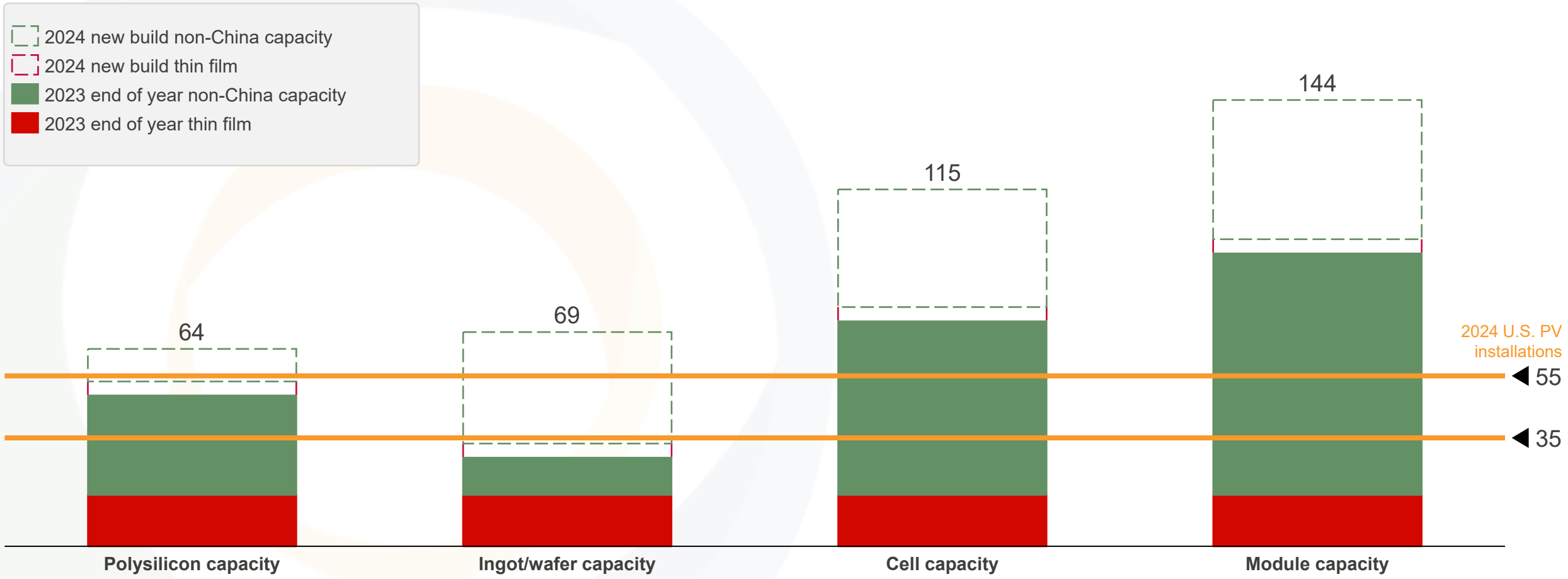


Notes | Pricing from 2015-2020 is a mix of multi and mono products, bifacial PERC modules from 2021 to 2023, and n-TOPCon thereafter. Leading supplier pricing is shown with an assumed procurement volume of 100 MW. U.S. pricing data prior to 2021 were reported by the U.S. Energy Information Agency. RoW price data prior to 2021 reported by spot price groups like Shanghai Metals Market.

Non-China PV Cell & Module Capacity Greatly Exceed U.S. Demand

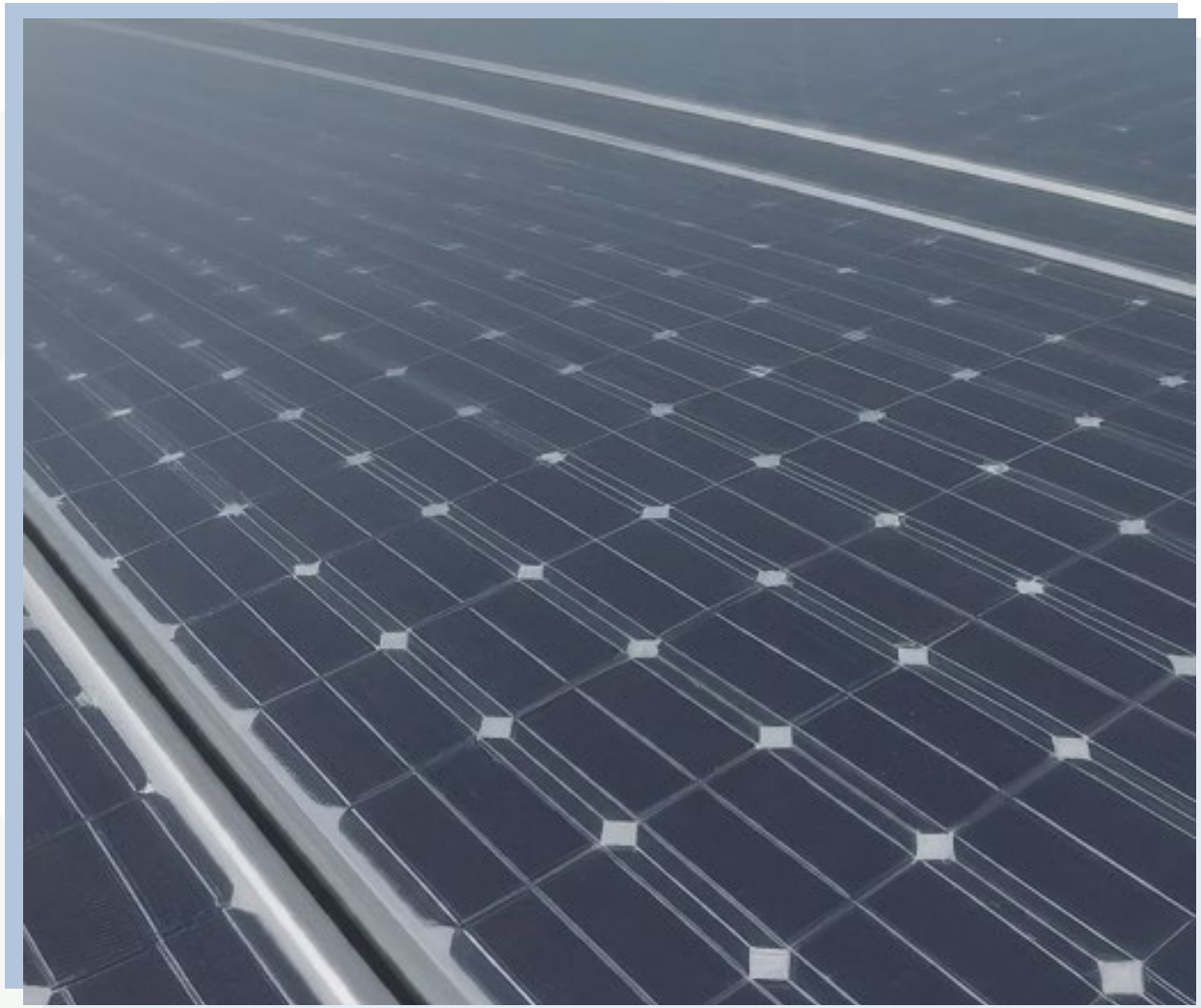
U.S. compliant cell and module capacity already double installation needs

2024 Non-China PV Manufacturing Capacity Vs. Expected U.S. PV Installations (GWDC)



Notes | Capacity data aggregated by CEA accounts for ramp times or other production delays but not utilization, and removes capacity plans CEA deems unlikely to materialize. Tonnes of polysilicon production converted to GW at 2.3 g/W. 35 GW projected by SEIA-Wood (bear case, Solar Market Insight Report, 2023), 55 GW projected by EIA (IN-BRIEF ANALYSIS utility, January 2024 + SEIA DG outlook).

Technological Shifts Introduce New Buyer Considerations



- Transition from PERC technology to newer, more efficient options like TOPCon and HJT.

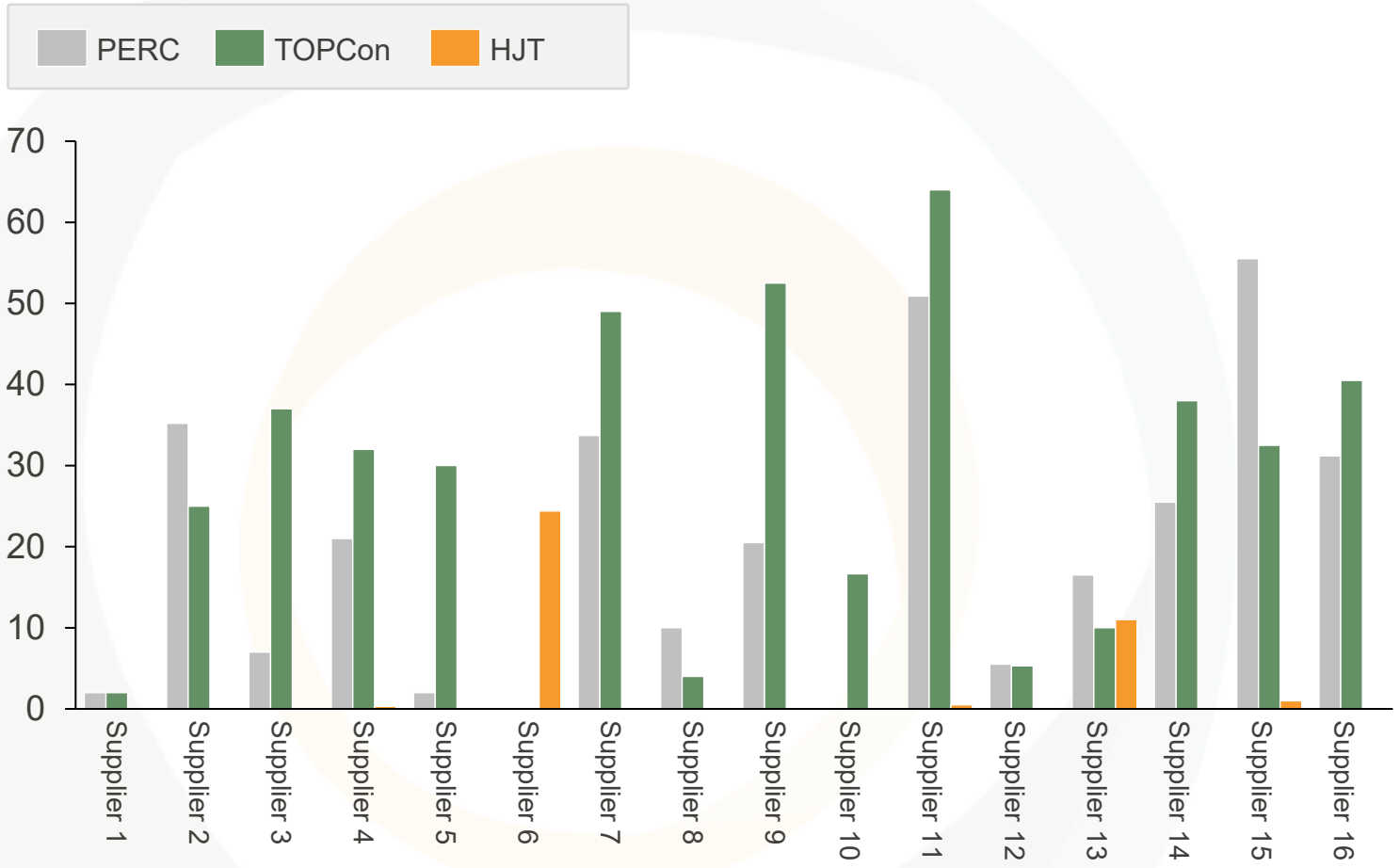
- Impact on supply agreements and risk assessment due to this news and due to changing technology.

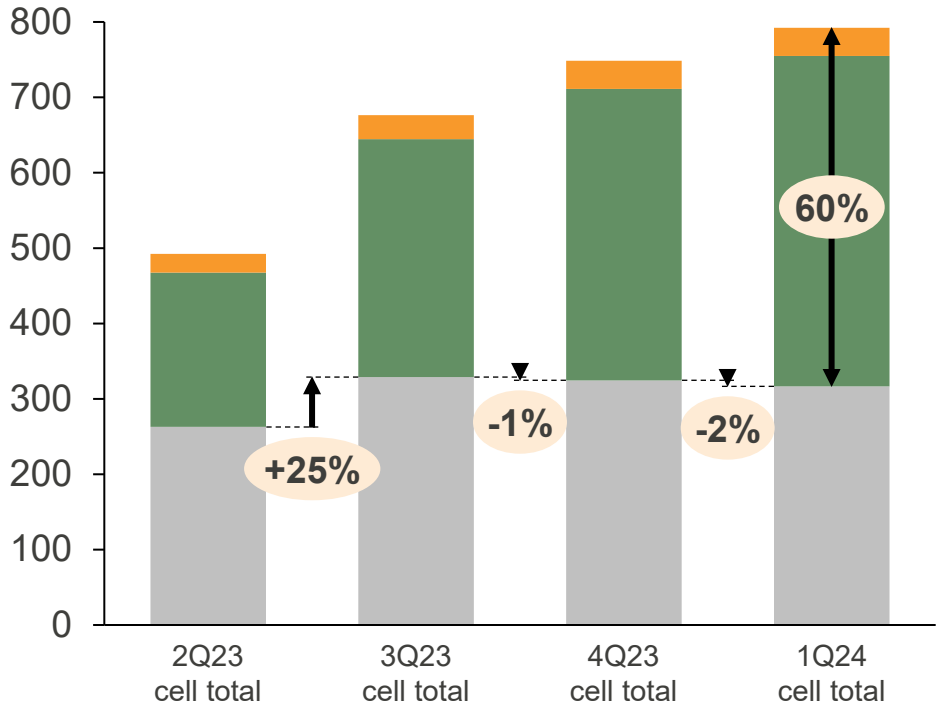
- Advancements in weather resilience technology for solar modules.

Most Suppliers Have Shifted Their Capacity To Majority Topcon

N-type makes up 60% of surveyed fleets; PERC capacity phase out not really started

In-house Cell Capacity And Totals By Technology As Of Q1 2024, Select Surveyed Suppliers (GW)





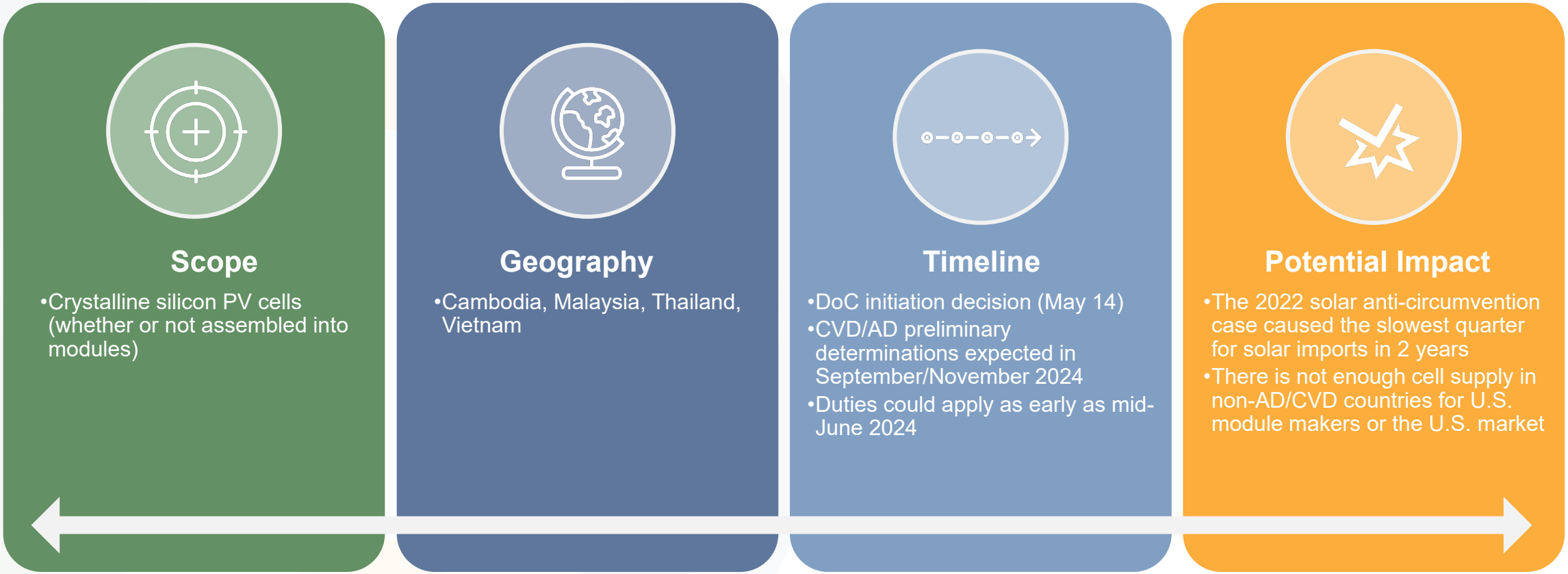
Notes | Figures represent annual production capacities in gigawatts (GW) at the end of the reported quarter. Capacities reported for Passive Emitter and Rear Contact cell (PERC), Tunnel Oxide Passivated Contact cell (TOPCon), and Heterojunction cell (HJT). Suppliers surveyed as part of CEA's Supplier Market Intelligence Program. Some TOPCon capacity currently based on a p-TOPCon format.

AD/CVD Risk

Potential Solar AD/CVD Case

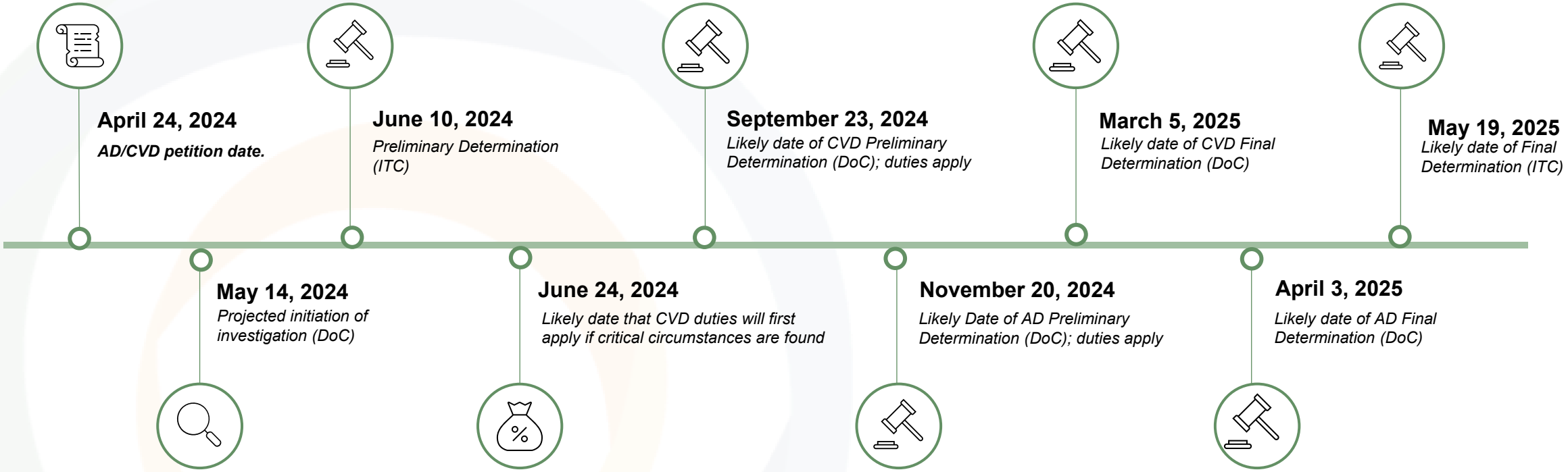
The initiation of an AD/CVD case on PV cells & modules could freeze U.S. imports

On April 24, 2024, four U.S. solar manufacturers filed a petition asking the U.S. Department of Commerce (DoC) to impose **antidumping (AD)** and **countervailing (CVD)** duties on imports of solar cells and modules.



Likely Timeline Of Solar AD/CVD Investigation

With critical circumstances, duties can apply from June 2024



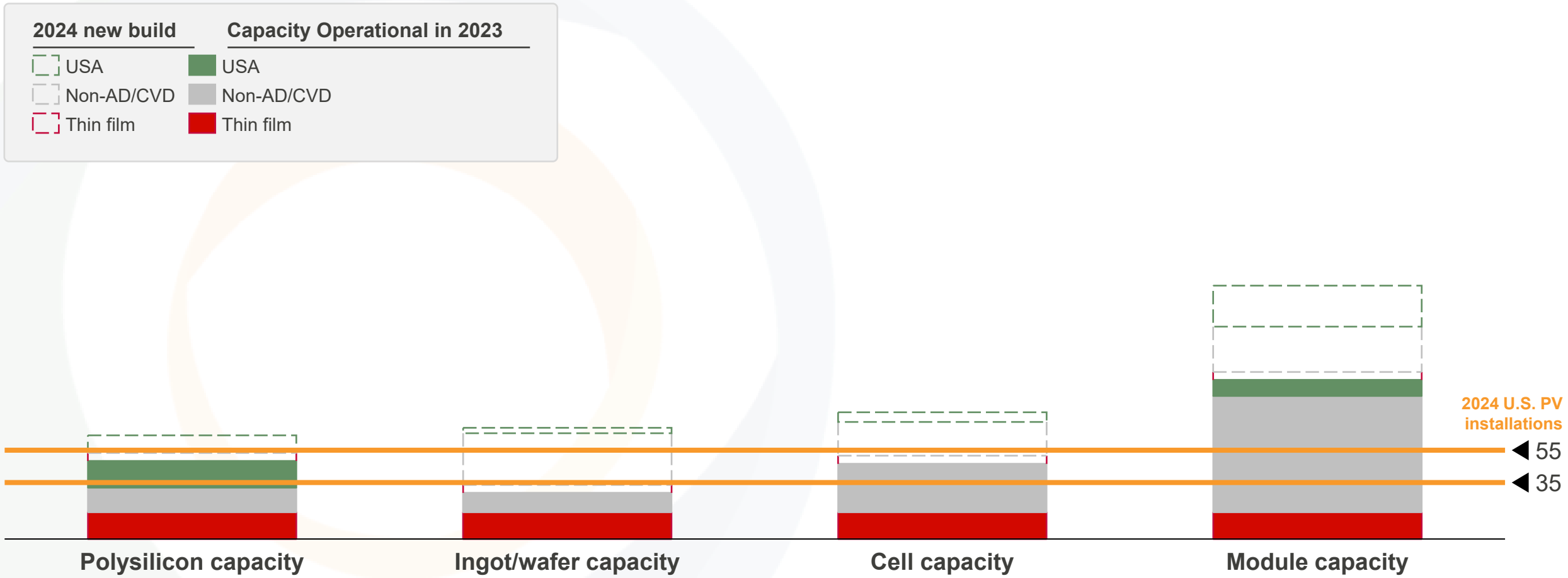
DoC Process:
Determines sale at less than fair market value (AD) and illegal subsidies (CVD). Determinations form the basis for duties to be imposed.

ITC process:
Determines injury (or not) to domestic industry: affirmative findings are necessary for the investigation to proceed.

U.S. Supply Base Strained If An AD/CVD Affects SEA Production Hubs

Suitable cell capacity will be the biggest bottleneck and could limit U.S. installations

2024 Non-ad/CVD Implicated PV Manufacturing Capacity Vs. Expected U.S. PV Installations (Gwdc)



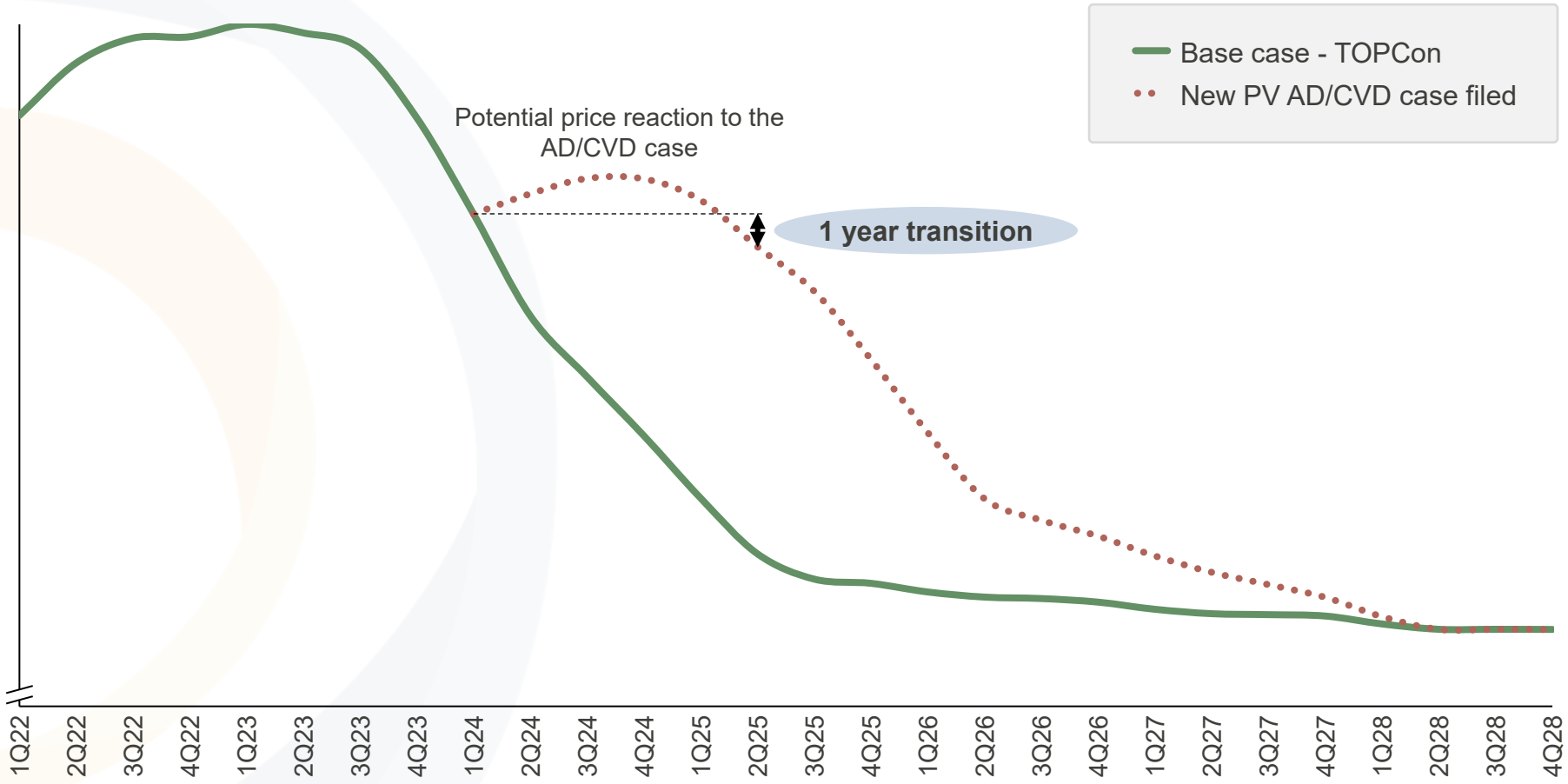
Notes | Capacity data aggregated by CEA accounts for ramp times or other production delays but not utilization. Countries in AD/CVD or potential AD/CVD scope include China, Cambodia, Thailand, Malaysia, Vietnam, and India. Polysilicon and ingot/wafer capacity outside of China (even in AD/CVD implicated countries) is included as "Non-AD/CVD," given it will likely be out of scope.

Upside Price Risks For U.S. Market Are All Linked To Emerging Policy

Policy risks include higher duties and further supply restrictions

- Rumors of a new AD/CVD case could create a scramble for non-impacted supply; impacted countries are unknown.
- Impacts are likely to be severe but limited to a ~1-year window as suppliers adjust.
- New capacity in non-covered countries like Indonesia and Laos is already planned, although the AD/CVD scope could expand to cover more countries.
- U.S. options are still growing, which will create new alternatives, although if cell imports are affected, then U.S. module capacity may not matter.

Bifacial Module Price, DDP U.S. West Coast Port (U.S. ¢/W)



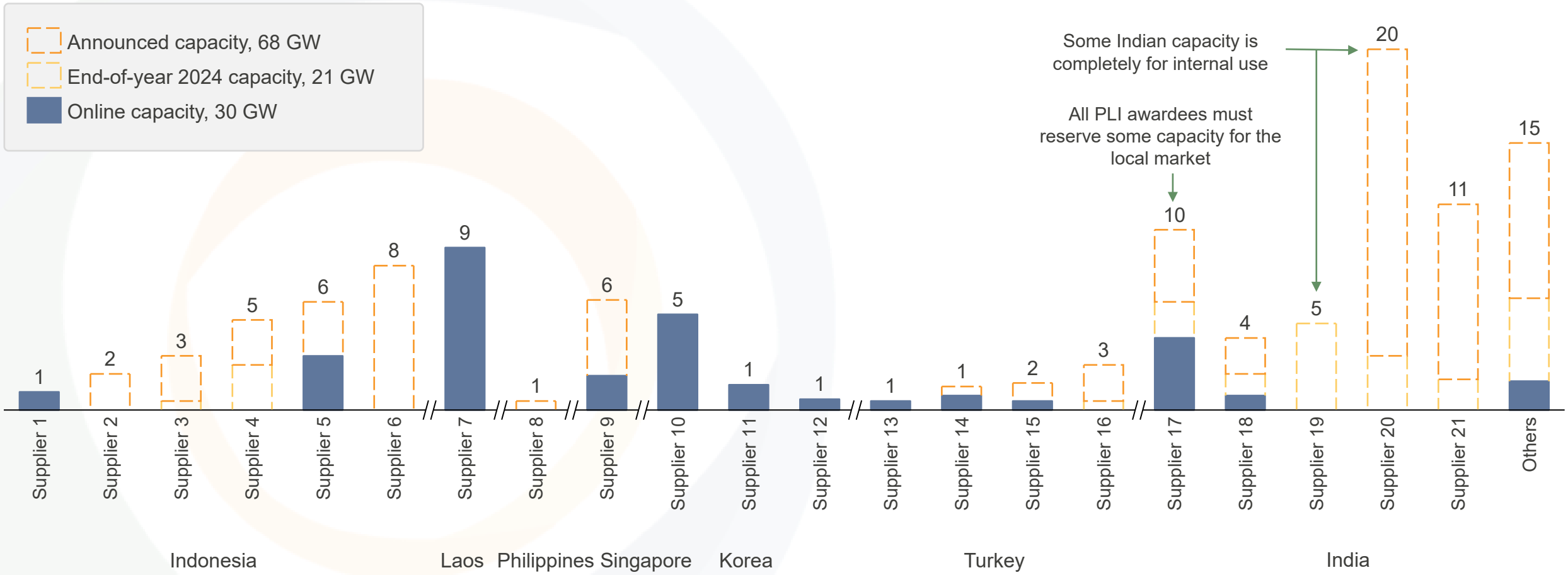
Notes | Scenarios are based on known information or projections from current market conditions and are subject to change at any time. A Section 201 removal for bifacial is not yet certain, a new PV AD/CVD investigation has not yet been initiated, China-owed U.S. factories currently have access to 45x credits, and U.S. capacity development is slowing down - combinations of scenarios not considered.

How To Adapt To Changing Circumstances

Cell Capacity Outside Of AD/CVD Implicated Nations ~30 GW

~90 GW of expansion plans exist, but most unlikely to be online by the end of 2024

Crystalline Silicon Cell Capacity Outside Potential AD/CVD Scope (GW)



Notes | Capacity data aggregated by CEA accounts for ramp times and production delays but not utilization. Countries in the AD/CVD scope include China, Cambodia, Thailand, Malaysia, and Vietnam. Some cell capacity exists in other countries (i.e., Meyer Burger in Germany) and from small suppliers but it is discounted as it is assumed not to be fully utilized or not necessarily available to the U.S. market.

According to the data source used in the petition, ~80% of the volume of C-Si cell and module imports to the US from March 2023 through February 2024 came from the four main Southeast Asia countries, with the most from Vietnam.

March 2023- February 2024	
Cambodia	13.3%
Malaysia	14.4%
Thailand	24.4%
Vietnam	28%
Others	19.8%

According to the data source used in the petition, ~$15.8bn of total imports came in from March 2023 through February 2024, with ~80% from the four Southeast Asia countries.

March 2023- February 2024	
Cambodia	$2,273,737
Malaysia	$1,932,057
Thailand	$4,063,547
Vietnam	$4,463,460
Others	$3,113,241

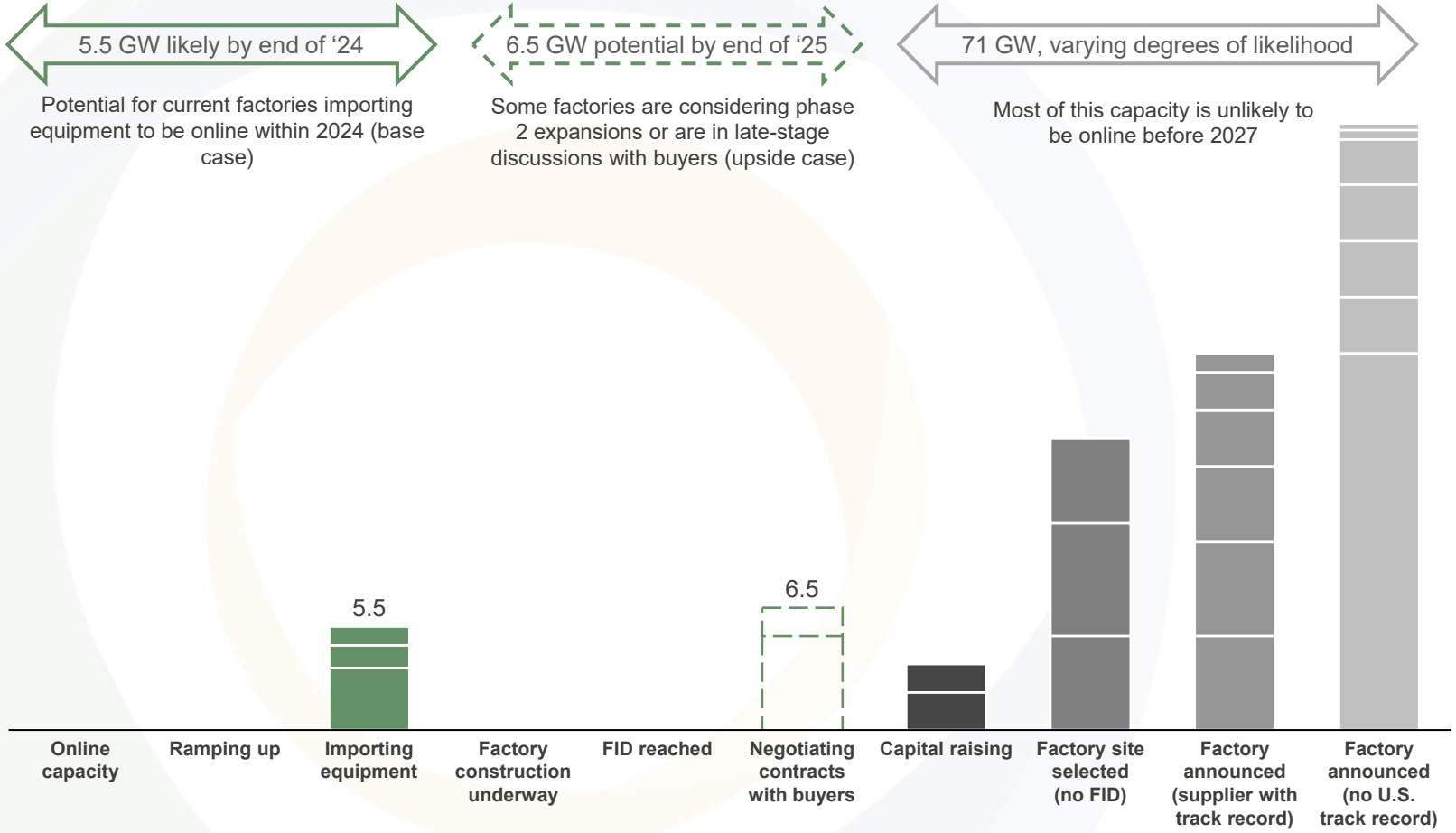
Risks Associated With Constricted Supply Due To New AD/CVD Petition

- U.S. trade and human rights policies that restrict the portion of supply able to access the U.S. market, creating higher prices in this market
- Module pricing is expected to go up again due to AD/CVD petition
- Cell capacity is not keeping pace with module production
  - Contract language around cell sourcing requirements can help mitigate risk
- Buying modules assembled in the U.S. vs. non-U.S. – what is a better financial strategy?
- Quality risks associated with lower tier suppliers
- Quality risks associated with existing warehoused modules

U.S. C-si Cell Capacity Expected To Reach 5.5 GW By Year End 2024

Potential for an additional 6.5 GW cell capacity by year end 2025

U.S. C-si Cell Capacity By Estimated Factory Stage (GW)



- No U.S. crystalline silicon cell manufacturing is currently online.
- Longer equipment lead times, more stringent permitting requirements, the need for more extensive training, and new investment in this production stage for many suppliers lead to more extended construction and ramp cycles.
- Three suppliers are already importing equipment for cell factories.
- These factories are expected to be operational in 2024.
- Over 85% of cell capacity announcements are considered unlikely to become operational until 2026 at the soonest, with many at significant risk of not moving forward at all.

Notes | Data aggregated by CEA based on company announcements, disclosures, and monitoring of equipment and BoM imports. FID tracks a supplier's final investment decision and is back-checked against buyers able to lock in purchase agreements with these suppliers. Some factory announcements have not made forward progress since the initial announcement and have been removed. YE (year end).

A Diverging Landscape: Global Dynamics In The PV Industry

- Pricing disparities between Europe and the United States
- Sensitivity analysis of AD/CVD on cells vs modules (tariff on cells only against transfer cost of the entire module)
- Impact of the Uyghur Forced Labor Prevention Act (UFLPA) on U.S. supply chain continues
- Emergence of differentiated North American supply chains and US assemblers
- Challenges posed by regulatory uncertainty
- Implications for supply and production levels
- Project planning considerations (timeline and schedule)

Supply Contract Terms and Conditions

Sellers market again?

Contract terms that are critical to consider:

- Tariff Risk
- Rights to 3rd party QA
- Sufficient time to inspect solar panels upon delivery before acceptance and transfer of title
- Serial Defect clause
- Testing requirements for commodities
- Traceability & BOM visibility
- Importer of Record and responsible party for new Import Duties
- Minimizing payment milestones
- Warranty Clause and Terms to consider
- Ensuring final payment milestone occurs after customs clearance

Mitigation of Risk for Warehoused Modules

Warehouse Handling Risks Damage To Modules

Each time pallets are handled there is a risk of damage to the modules if they are not moved with care

- In extended warehousing pallets may be moved multiple times

The risks associated with storing modules in a warehouse can be mitigated

- Contractual terms can be negotiated to specify storage and handling requirements that reduce the risk
- Inspection of the warehouse during storage to verify that the storage conditions are acceptable
- Inspection of the modules prior or shipment to validate that they remain in good condition

Purchasing Modules Which Have Been Stored In A Warehouse

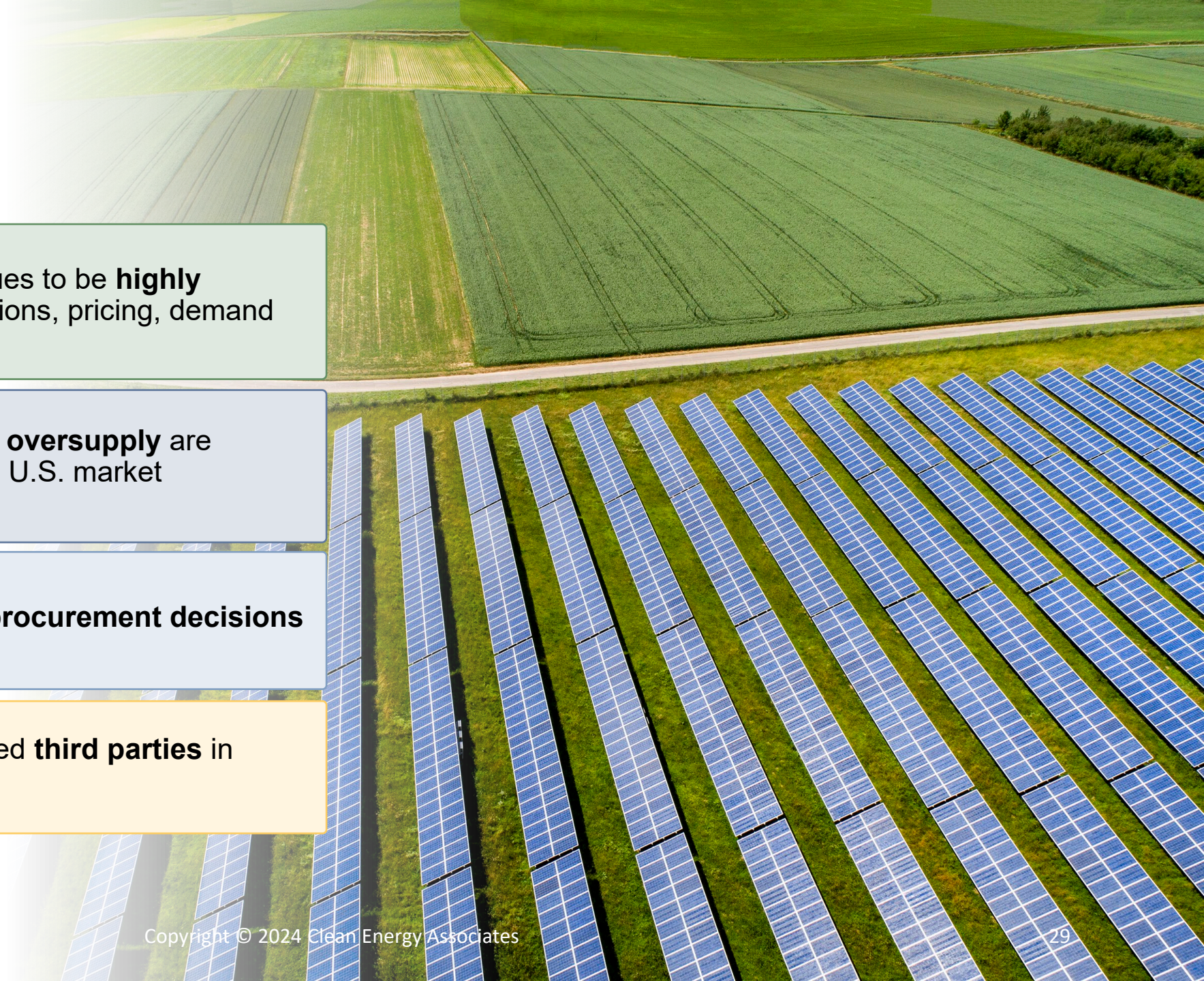
- Supply chain conditions can create the opportunity to purchase modules which have been stored in a warehouse for some time by the original purchaser

- In addition to the risks associated with module storage there are additional risks associated with purchasing modules in this situation
  - Manufacturing quality for these modules may be unknown as there may not have been third-party quality assurance performed

- Reports from third-party factory quality assurance should be reviewed (if available)

- If factory quality assurance reports are not available or are not satisfactory, a detailed inspection of the modules to evaluate manufacturing quality and look for handling damage is recommended prior to purchasing the modules

Conclusion



- The U.S. solar market continues to be **highly dynamic:** technology, regulations, pricing, demand

- Module **pricing declines** and **oversupply** are **no longer** on the table for the U.S. market

- Caution against **rushing** into **procurement decisions**

- Importance of leveraging trusted **third parties** in the procurement process

Thank You

Clean Energy Associates

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