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The Solar Module Market Playbook: managing pricing, risks, and other procurement challenges

28 January 2026

2:00 pm – 3:30 pm GMT, London
3:00 pm – 4:30 pm CET, Berlin
9:00 am – 10:30 am EST, New York City

Emiliano Bellini
News Director
pv magazine

Karen Tang
Editorial Director
OPIS

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FAS Renewables

Amiram Roth-Deblon
Chief Operating Officer
Blueleaf Energy

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Do you have any questions? ❓ 🙋

Ask them via the Q&A tab. 👉 We will try to answer as many as possible!

Who else is here?

Use the open chat to discuss with other participants.

We are recording this webinar today. 📹

We will email you where to find the recording and slides, so you can watch them again at your leisure. 👀 💡

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Hanwei Wu
Editorial Director
OPIS

Summer Zhang
Senior Analyst, Solar Supply Chain
OPIS

Jun Won Lee
Solar Analyst
OPIS

Global Solar Markets: What's Ahead on the Horizon

Hanwei Wu, Director

Summer Zhang Yunmeng, Senior Analyst,

Jun Won Lee, Analyst

Jan, 2026

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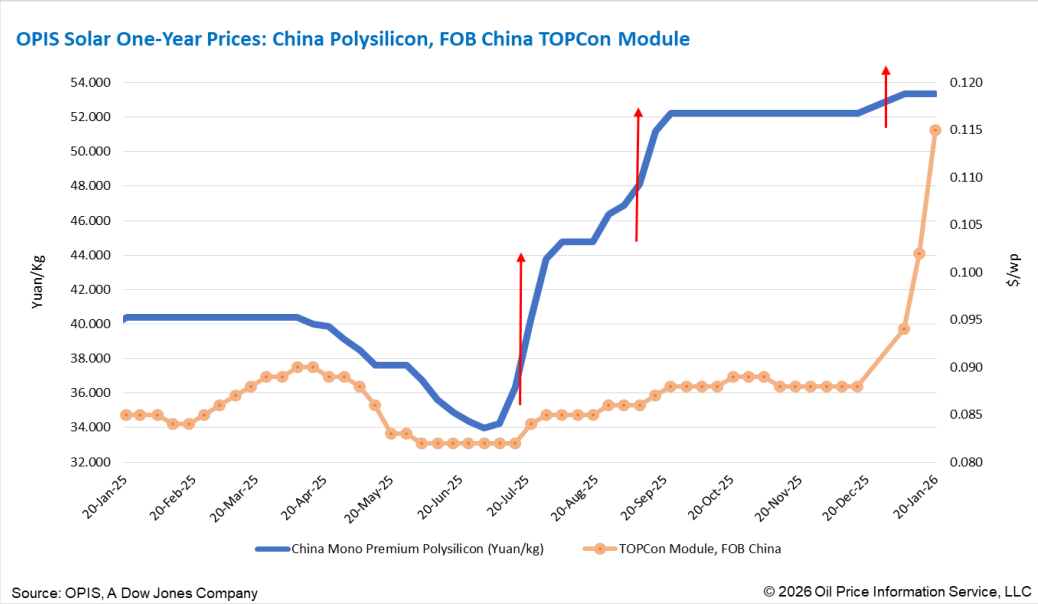
Polysilicon

China’s Policy Reset & Price Divergence in the Global Market

Chinese Polysilicon: Overcapacity, High Inventories, and Reset in Policy-Led Rebalancing



Jul. 1, 2025
- The 6th Meeting of the Central Financial and Economic Commission: curbing disorderly competition, enhancing product quality, and accelerating the orderly exit of outdated capacity.

Jul. 3, 2025
- MIIT：A symposium with 14 leading PV manufacturers signaled tighter macro guidance and oversight, efforts to curb low-price disorderly competition, and phase out outdated capacity.

Aug. 19, 2025
- MIIT, 5 other government bodies, associations, manufacturers, SOE developers: Stronger Regulation; Quality enforcement; Industry self-discipline.

Oct. 9, 2025
- NDRC, SAMR: Governance of disorderly price competition.

Nov. 24, 2025
- NDRC: Symposium on Cost Identification in the Context of Disorderly Price Competition.

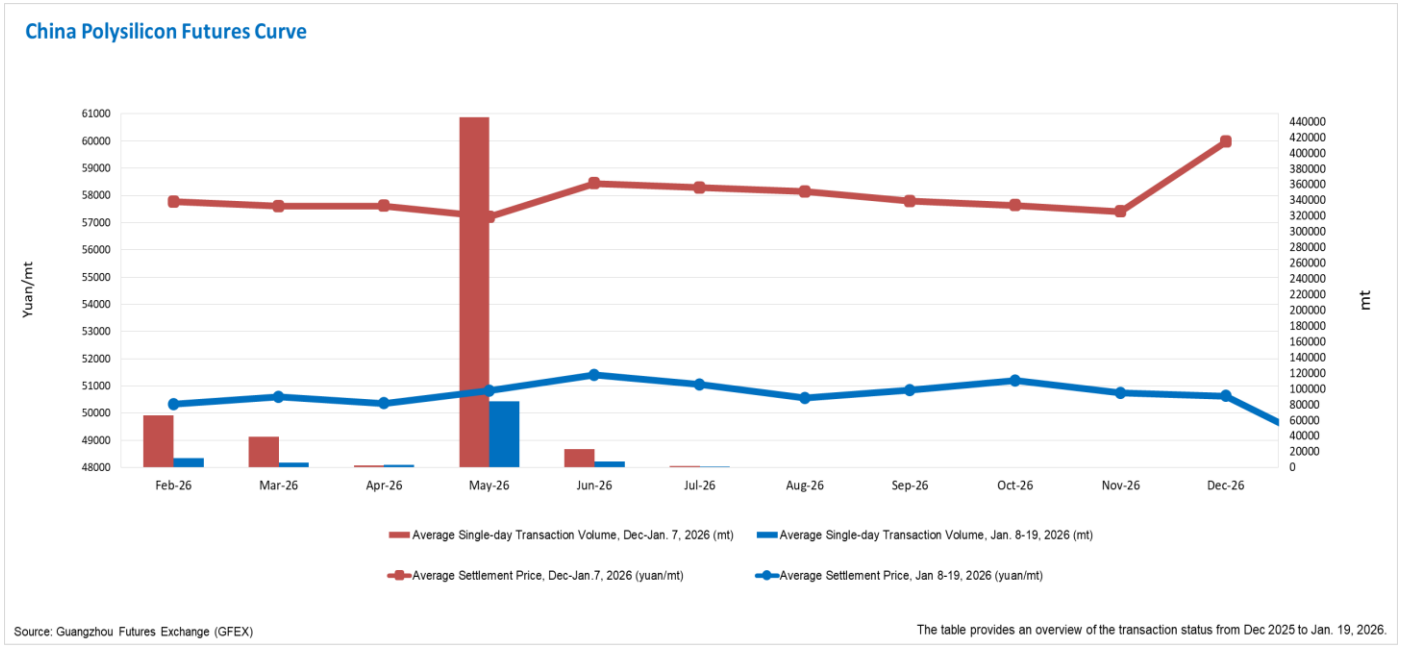
Dec. 9, 2025
- The platform company, backed by CPIA and leading producers, formally established to acquire and permanently retire capacity.

- China's polysilicon prices were lifted above cost levels by 2025 driven by policy measures; certain manufacturers started reporting profits in Q3 2025:
  - Coordinated controls involving production, sales, and pricing;
  - Consolidation plan.

- According to the Silicon Branch of the China Nonferrous Metals Industry Association, China's polysilicon output in 2025 is forecast at approximately 1.33 million mt, down 27.8% YoY:
  - implying an average industry operating rate of about 40%;
  - ~550,000 mt inventory carried in to 2026

- Policy reset underway as the SAMR suspends existing plans and orders rectification:
  - No agreement on production, utilization rates, sales volume, or pricing;
  - No output allocation or profit distribution be conducted in any form based on capital contribution;
  - No coordination involving sensitive information, including prices, costs, and production or sales volumes between industry associations and manufacturers.

China Polysilicon: How to Implement Market Regulation within a Legally Compliant Framework

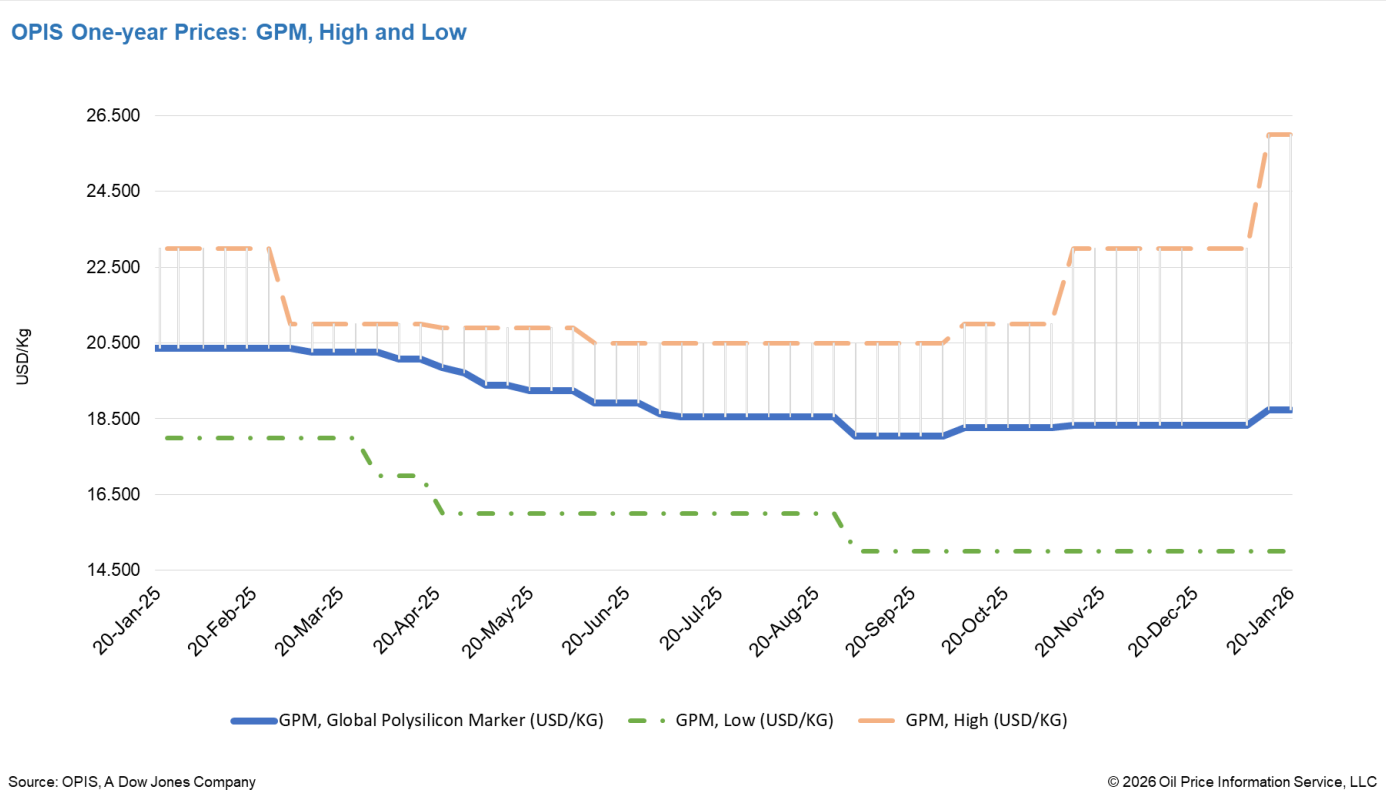


Source: Guangzhou Futures Exchange (GFEX)

The table provides an overview of the transaction status from Dec 2025 to Jan. 19, 2026.

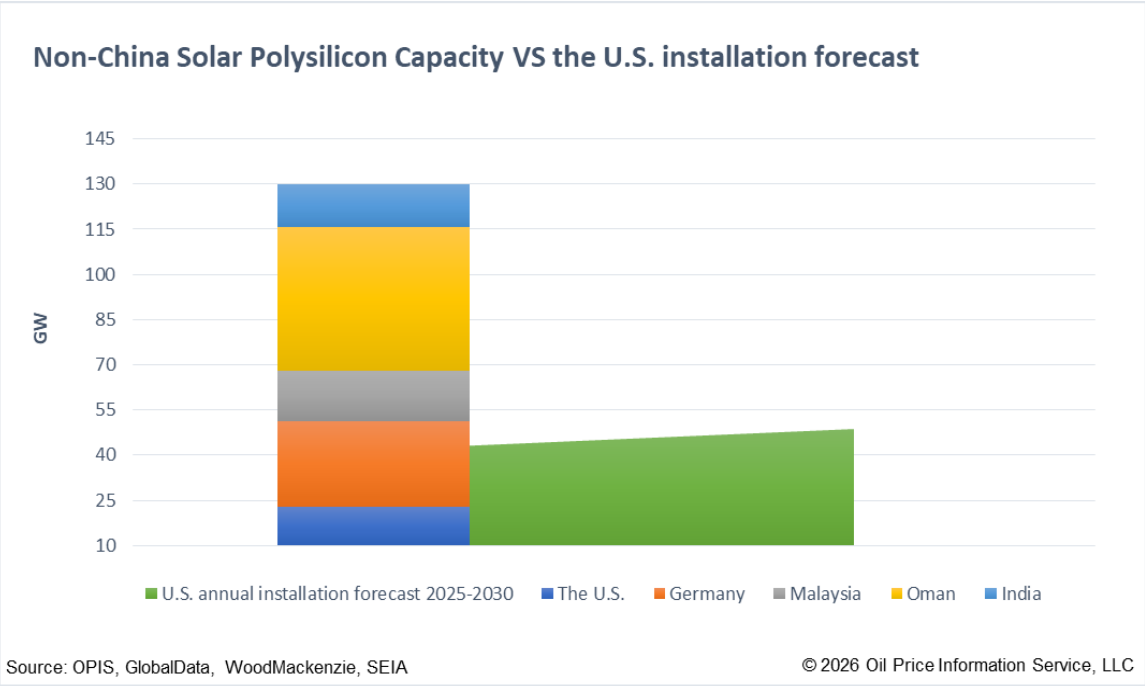
- China Polysilicon Futures Prices: Data from the Guangzhou Futures Exchange (GFEX) on Jan. 19 showed that settlement prices for polysilicon futures contracts covering February to January 2027 ranged from 48.690 yuan/kg to 50.600 yuan/kg.
- Market liberation (~30 yuan/kg), or continued policy intervention (~45 yuan/kg)?
- Tighten technical and environmental standards
  - Energy and water consumption
  - Carbon emission
- Price Law prohibits sales below cost
  - Tongwei: 2024, 40.5 yuan/kg
  - Daqo: 2024, 44.01 yuan/kg
  - Xinte: 2025 Q1, 43 yuan/kg
  - GCL: 2024, 33.76 yuan/kg

Global Polysilicon Marker (GPM): Price Divergence amid Trade Policies Shifts



- **Punitive tariffs** disrupt SEA downstream production and raw material procurement:
  - Section 301
  - AD/CVD
- **Protectionist policy** widens price differentials:
  - Section 201
  - Section 232: Price divergence as high as $11/kg
  - Reciprocal tariffs
- **Homegrown incentive regulations** restrict the sourcing of modules and other critical raw materials:
  - FEOC
  - Increasing restrictions on products associated with Chinese content

Global Polysilicon Capacity Expansion and Production Diversification



Source: OPIS, GlobalData, WoodMackenzie, SEIA

- **Supply** Encounters Emerging Challenges
  - Will the U.S. be the application market for the end products of the Middle East polysilicon?
  - Does U.S. annual installation demand align with the growth in global polysilicon capacity?

- **Business model:**
  - Transitioning from LTA to spot trading

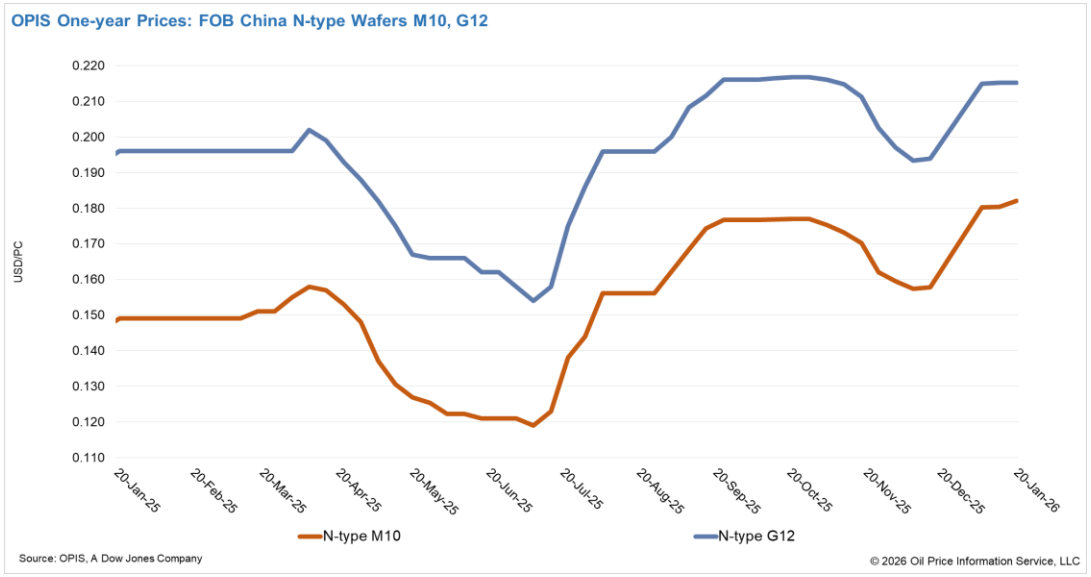
- **GPM customers** are increasingly shifting toward suppliers with cell production capacity or secured supply contracts in the Middle East, Turkey, Africa, etc.

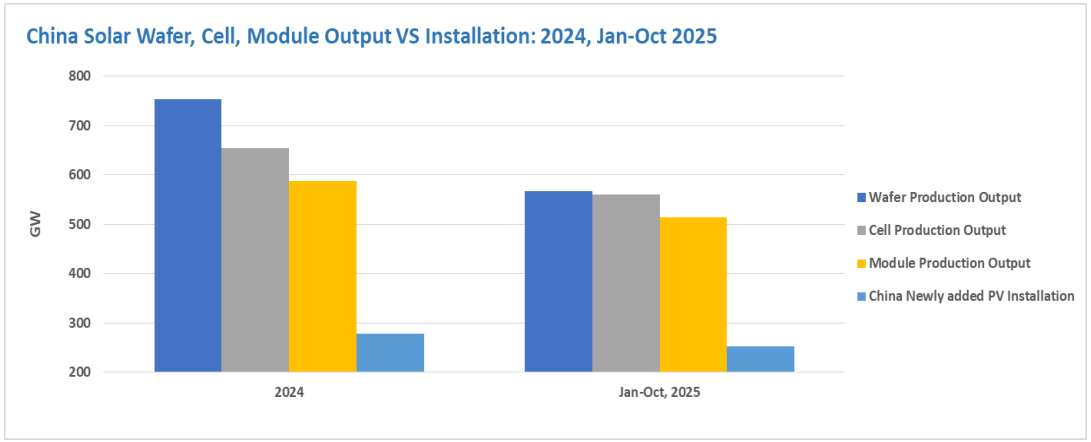
- Going forward, the global polysilicon **pricing and supply system** may further diverge, with one track shaped by U.S. policy requirements and another serving markets with localization mandates or import restrictions on photovoltaic products.

Wafer

China Market Imbalance & Limited Global Wafer Expansion

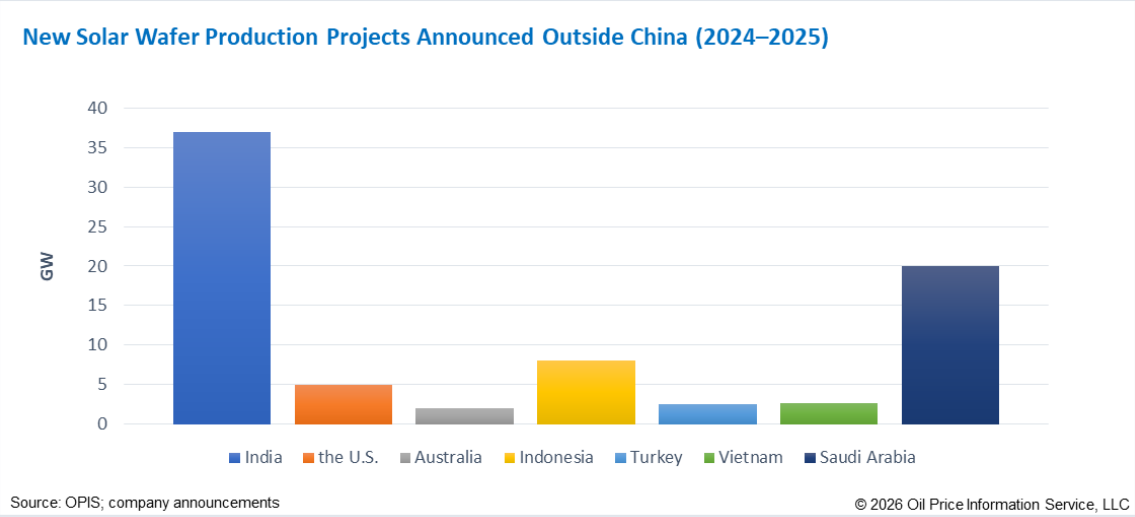
China’s Wafer Market: Domestic Imbalance and Rising Price Pressure





- China’s wafer market faces overcapacity, with manufacturers cutting production to sustain operations.
  - Average annual operating rate in 2025 stands at roughly 56%
- If polysilicon prices fall to break-even of nearly 45 yuan/kg, domestic N-type 183+mm wafers in China are expected to decline to approximately 1.1-1.2 yuan/pc (~$0.162/pc).
- Cancellation of 9% export tax rebate from April 1, 2026.
  - Wafer export prices may increase;
  - uncertainty over customers’ ability to absorb the additional 9% cost.
- Wafer size trends differ between markets:
  - 210*182 mm (210R) dominates in China;
  - 183+ mm is mainstream overseas; however, 210R is gaining traction internationally.
- Wafer production is expanding outside China, notably in the U.S., India, Indonesia, Turkey, and the Middle East.

The Non-China Wafer Markets: Capacity Expanding but Limited by High Costs and Tech Barriers



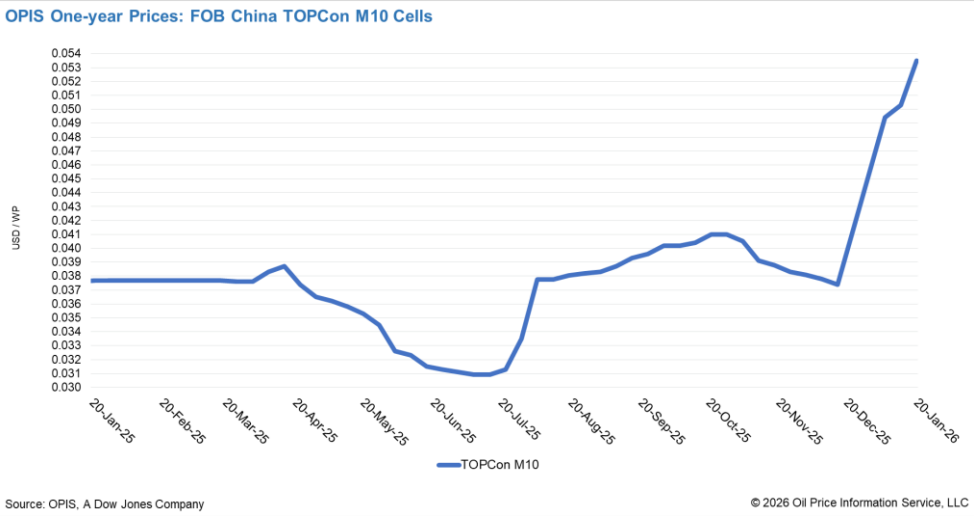
- Wafer expansion outside China is concentrated in only a few countries：
  - due to its complex process, long construction timelines, and high capital requirements；
  - Most announced wafer projects are yet to become operational, leaving SEA still being the largest wafer producer outside China.

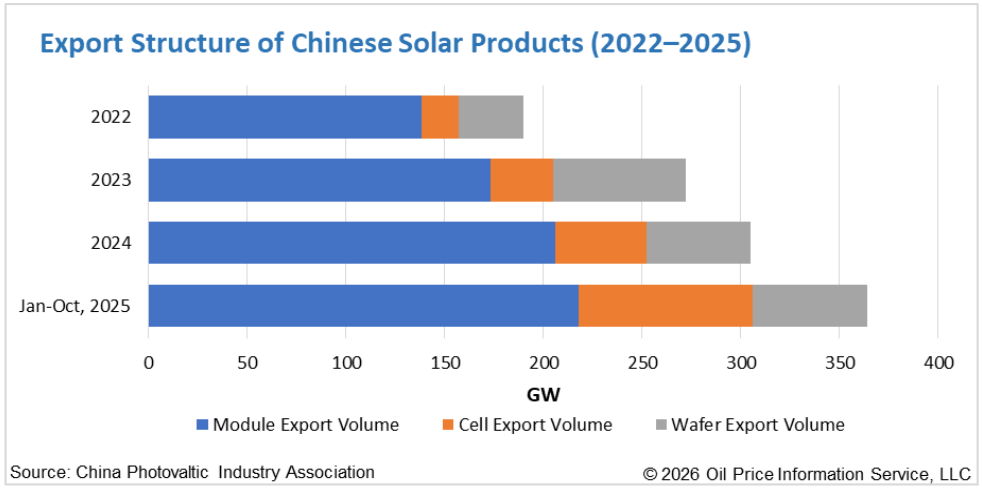
The U.S.	India	Indonesia	Saudi Arabia
• **Section 201**: Global, 14.25% • **Section 301**: China, 50% • **Section 232**: polysilicon and its derivatives • **Reciprocal tariffs:** 10%-41% • **IRA**: $12/m²	• **ALMM List-III**: June, 2028 • **PLI:** ₹24,000 crore ($2.88 billion) • **DCR:** non-diffused wafers are required in domestic cell production	• Excluded from the first round of AD/CVD investigations among the four SEA countries, providing a brief window for production expansion; • It is now subject to a second round of investigations alongside Laos and India.	• Among countries with U.S. reciprocal tariffs, it has a low rate of 10%; • Supported by Vision 2030; • Strong demand and large-scale national tenders

Cell

China’s Export Surge & Global Trade Diversification

China’s Cell Market: Cost Shifts and Export Policies Provide Price Support





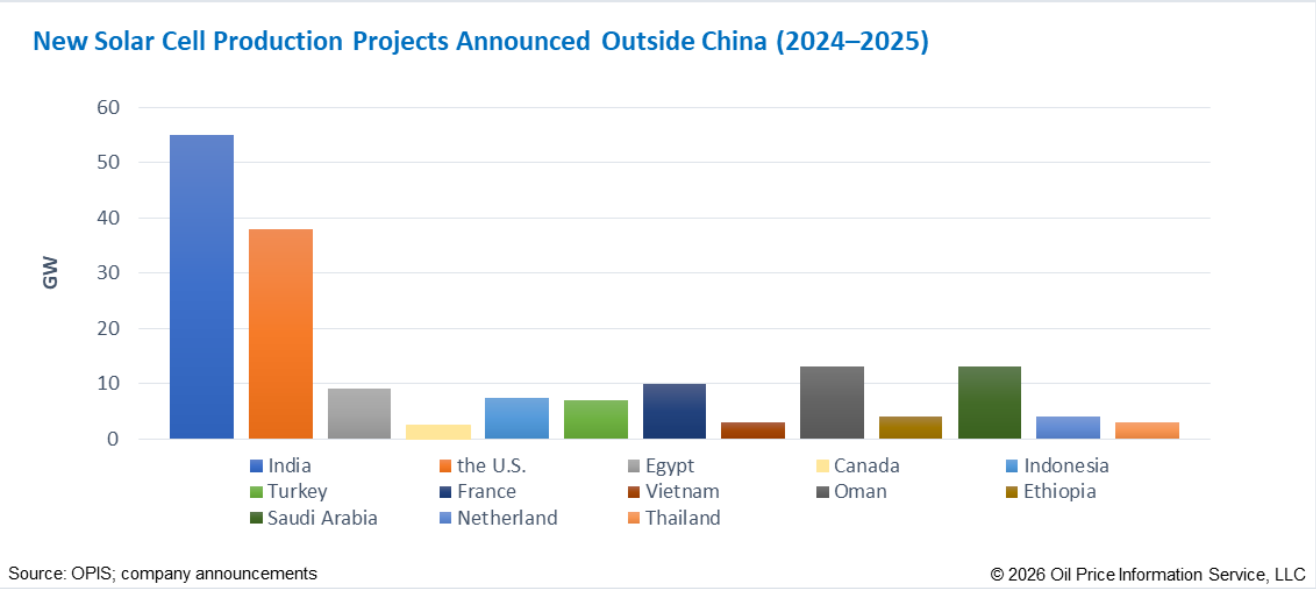
- Overcapacity persists, amid capacity rationalization and manufacturer exits. Such as:
  - Eging, Bangjie, Lingda Group, Shine Earth, etc.;
  - An estimated 50GW exiting the market.

- Driving factors for price increases:
  - market-based electricity pricing mechanism (March-April 2025);
  - Favorable policies interventions (Jul-Oct, 2025);
  - Price surge in **silver paste**;
  - **Cancellation of 9% export tax rebate from April 1, 2026.**

- Speeding advancement of cost-reduction and efficiency-enhancing technologies
  - Silver-Reduction and Silver-Free Solutions;
  - 0-busbar.

- Overseas expansion of PV manufacturing capacity has reshaped China’s export structure, with exports increasingly tilted upstream:
  - Jan-Oct 2025, China’s solar cell **export value** rose 65% YoY, and **export volumes** up 91%, outperformed other segments;
  - New export destinations merging, Africa, Middle East, Turkey, etc.

The Non-China Cell Markets: Capacity Expansion and Diversifying Trade Flows



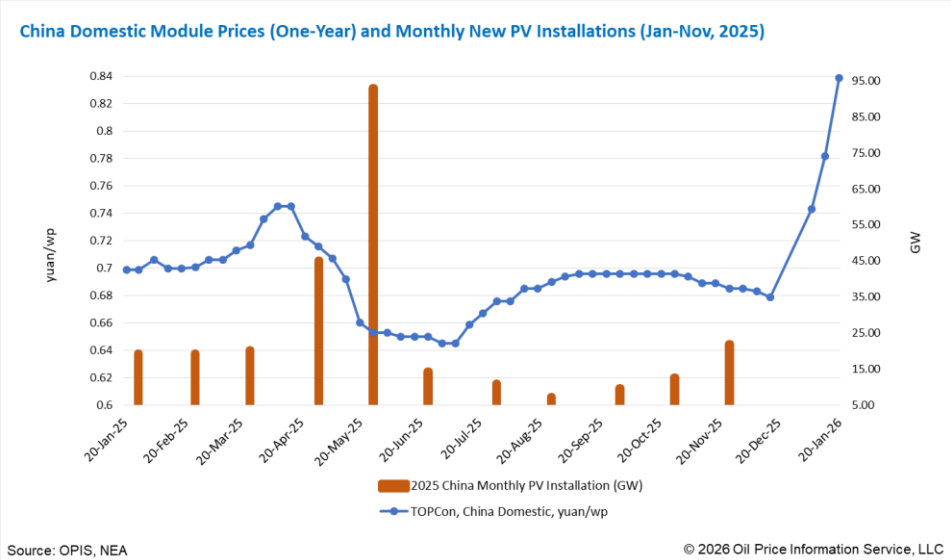
- The expansion of cell production outside China is larger in scale and more geographically dispersed than wafer production:
  - Cell manufacturing being less complex, quicker to construct, requiring lower investment;
  - and facing smaller technical barriers compared to upstream manufacturing.

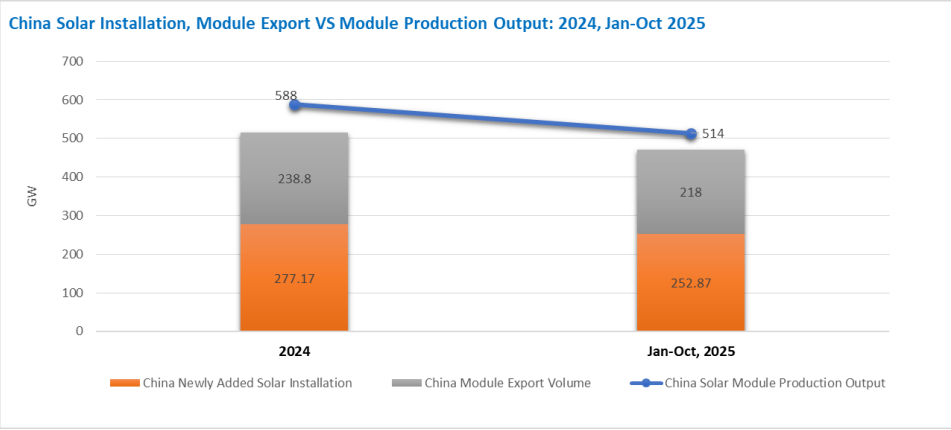
The U.S.	India	Africa	Middle East
• **AD/CVD:** SEA, 0%-271.28%; 14.64%-3403.96% • **Section 201**: Global, 14.25% • **Section 301**: China, 10% • **Section 232**: polysilicon and its derivatives • **Reciprocal tariffs:** 10%-41% • **IRA:** $0.04/wp • **FEOC:** Restrict tax credits for projects using China-linked components.	• **AD** (proposed): China, 0%-30% • **BCD:** Global, 25% • **ALMM List-II:** June 2026 • **PLI:** ₹24,000 crore ($2.88 billion) • **DCR:** Non-diffused wafers are required to use in domestic cell production	• Low local cost and high potential energy demand • Has been the emerging module exporter for the U.S. market.	• Among countries with U.S. reciprocal tariffs, it has a low rate of 10%; • Supported by Vision 2030; • Strong demand and large-scale national tenders

Module

Global Price Volatility & Rising Cost Pressure in Procurement and Manufacturing

Chinese Module Market: Domestic Module Prices Volatile Amid Overcapacity Persists



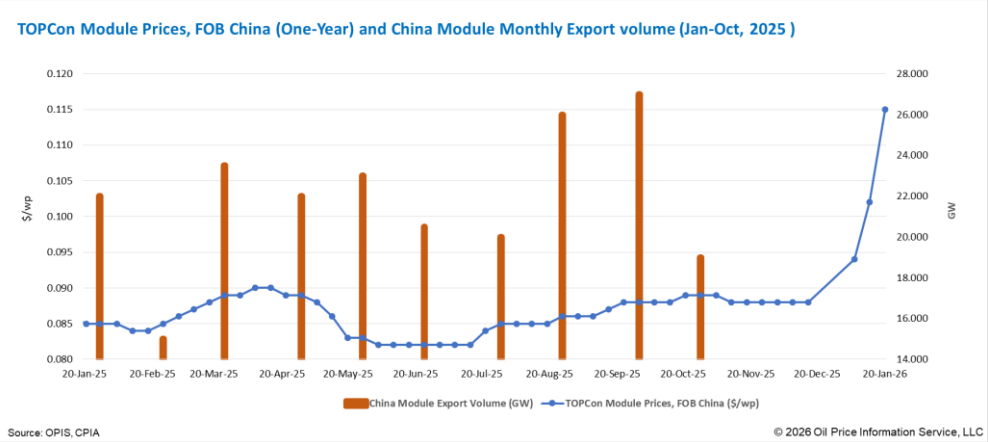


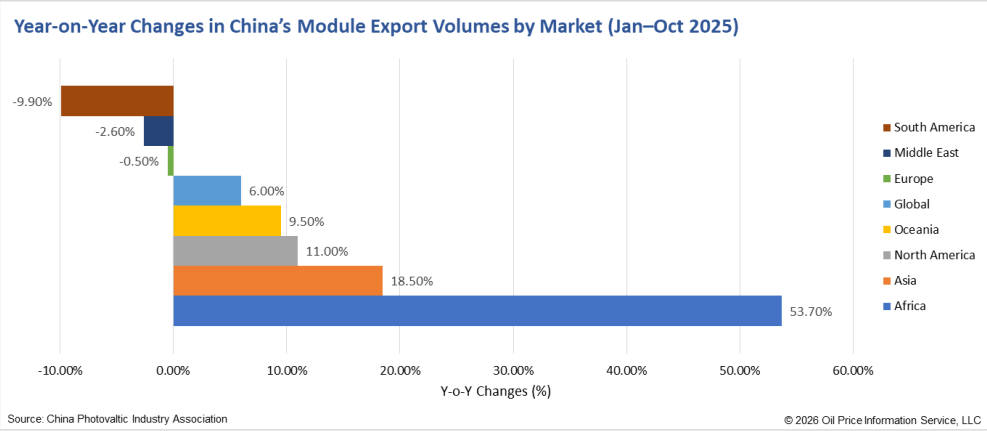
- Overcapacity persists, while price increases are driven by intermittent demand recovery:
  - market-based electricity pricing mechanism (Mar-Apr, 2025);
  - supportive policy interventions (Jul-Sep, 2025).

- Short-term price expectations remain firm into 2026:
  - An increase of 28.57% since end-2025;
  - Rising silver paste prices have pushed up solar cell costs;
  - The **cancellation of the 9% export tax rebate** from April 1, 2026, has accelerated exports in Q1, potentially tightening near-term supply.

- Manufacturers are pursuing differentiated production strategies:
  - Greater emphasis on technological pathways and cost reduction to enhance efficiency;
  - Focus areas include performance, cost competitiveness, energy efficiency, and product aesthetics.

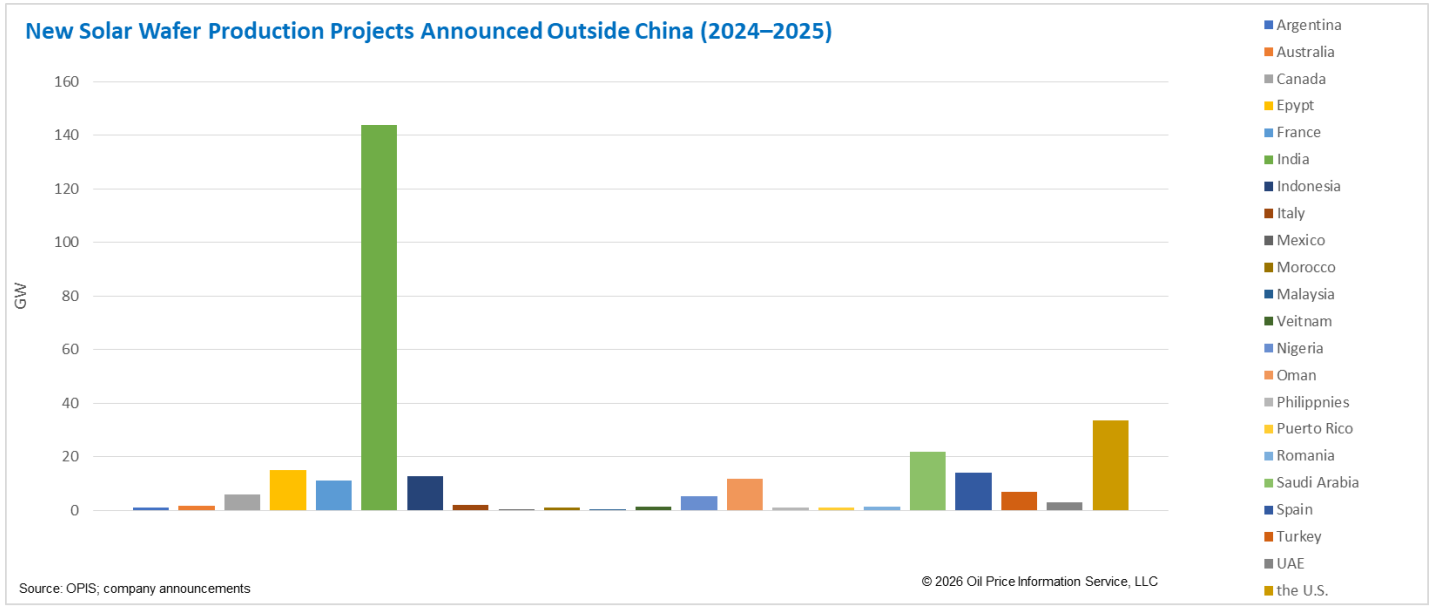
Chinese Module Market: Trade Policies Impact Export Volume





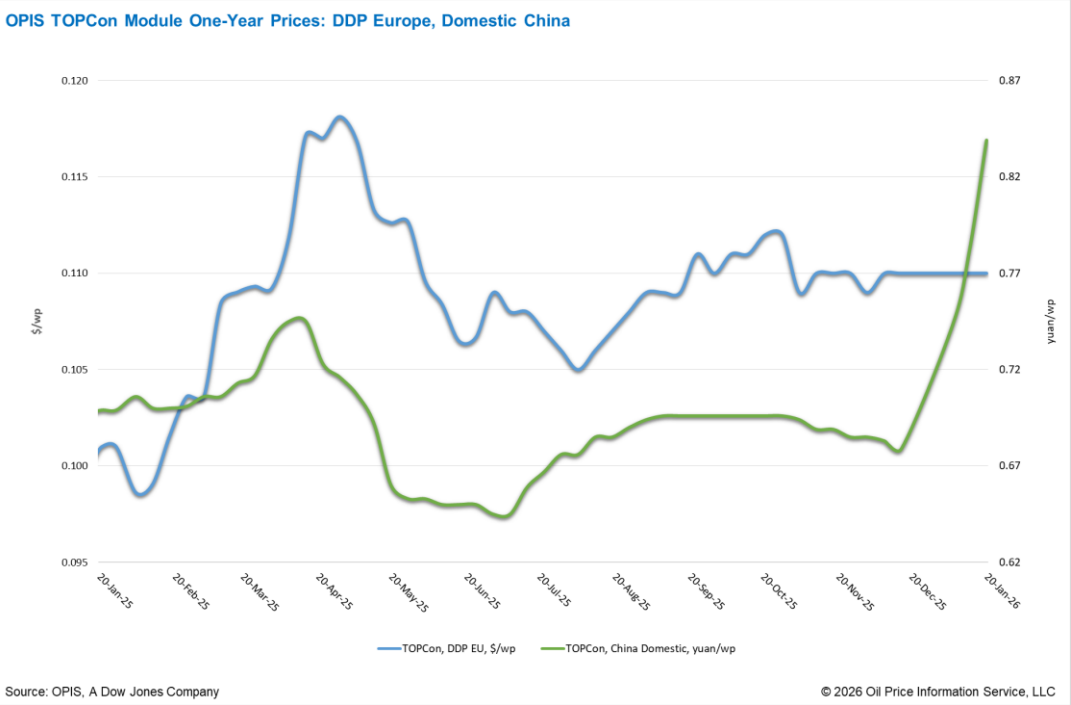
- Trade resistance and protectionist policies in key markets have hindered China's module exports, increasing market access challenges.
  - Europe
  - India
  - Brazil
- Performance of export markets:
  - Traditional markets such as Europe show declining export volumes;
  - Emerging markets, particularly in Africa, show stronger growth
- China's cancellation of the 9% export tax rebate for components is expected to push export prices higher from April, but H2 bullish price outlook limited:
  - establish structural support for a price floor;
  - H2 demand could soften, limiting further upside for module prices later in the year.
- Export structure shift:
  - Stronger emphasis on solar cell segment;
  - Overseas module expansions, including those built by Chinese companies, may limit the growth potential of Chinese module exports.

Module Supply Shift: From China-Centric to Global Distribution



- The relatively simple and direct production process has enabled faster and broader global expansion of module manufacturing.
- Outside India, Australia and some European countries, new module production capacity is largely aimed at supplying the U.S. market.
- Implementing local use for new module projects requires prioritizing cost reduction, as importing modules from China remains the most cost-effective approach currently.

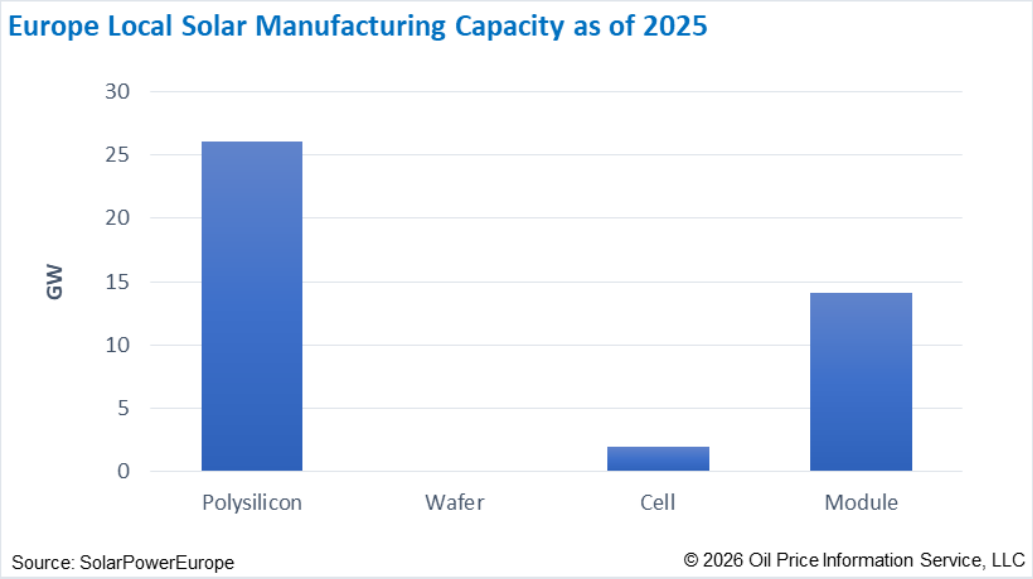
European Module Market: Import Price Outlook and Procurement Challenges Ahead



- Import price uncertainties in the near term:
  - Cancellation of 9% export tax rebate from April 1, 2026;
  - 30-40GW modules inventory in Europe warehouse

- Procurement challenges in the long run:
  - **NIZA**: Strict procurement evaluation standards;
  - **FLR**: Mandatory supply chain traceability;
  - **Solar Stewardship Initiative (SSI)**: mandatory sourcing targets, strict ESG compliance and full supply-chain traceability;
  - **CBAM**: importers are required to purchase and surrender CBAM certificates; aluminum frames used in module production have already been affected by this mechanism, and sources expect the entire module to be brought into scope in the future;
  - Chinese manufacturers are facing sustained losses, casting uncertainty over their **long-term viability**.

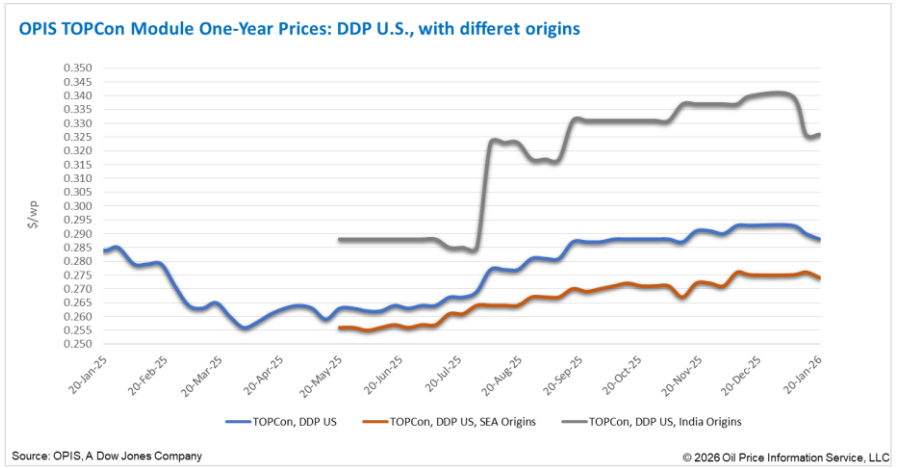
European Module Market: Local Manufacturing Opportunities and Challenges

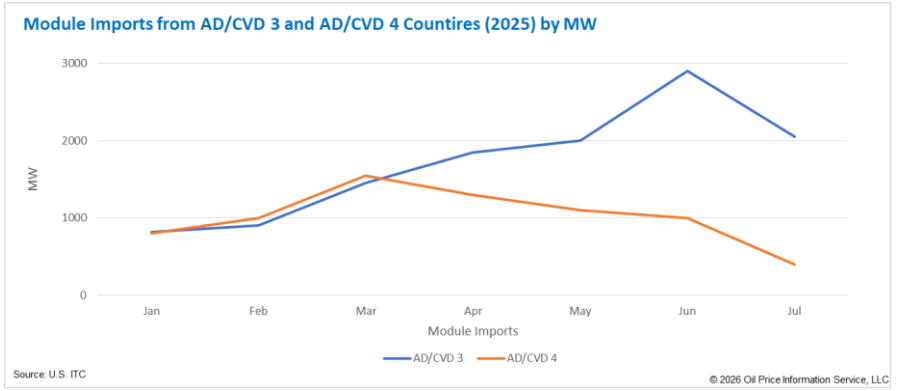


- Challenges:
  - **High** local labor and electricity **costs**;
  - **Technical barriers**, especially in upstream sections;
  - China stricter **controls on silver exports**, increasing raw material costs for European local manufacturing.
  - Possible **weakening of local demand**: New solar installations in the EU are estimated at 65.1 GW in 2025, slightly below 65.6 GW in 2024, marking the first year-on-year decline in a decade (reduction of residential PV subsidies, grid congestion, etc.)

- Opportunities:
  - The price **gap** may **narrow**: China's efforts to rebalance supply and demand, together with the removal of export tax rebates, are likely to push export prices higher.
  - Pursue **differentiated production strategies** by developing manufacturing bases focused on resilience, quality, high efficiency, and advanced technologies such as HJT and BC products.

The U.S. Module Market: Import Price Outlook and Procurement Challenges Ahead

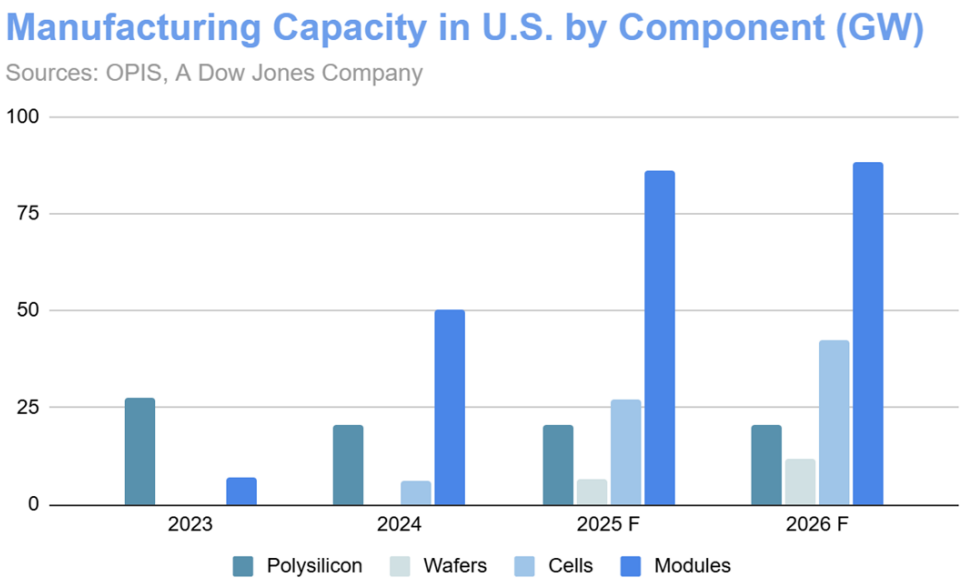




- Import dynamics in the near term:
  - U.S. tariff investigations could **push module prices higher** in 2026, regardless of origin
  - The **sources** of module imports are becoming increasingly **diversified**: supplies from SEA declining further while imports from the Middle East and Africa to rise:

- Procurement challenges in the long run:
  - **Unstable product supplies**: possible module supply disruptions caused by trade policies
  - **Uncertainness** in subsidy eligibility: how to guarantee **project economy**;
  - Supply chain traceability requirements add **complexity to procurement** processes and increase associated costs;
  - Difficulties of **locking in forward orders** increase

The U.S. Module Market: Local Manufacturing Opportunities and Challenges



- Challenges:
  - **High** local labor and electricity **costs**;
  - Lagging development of **upstream** manufacturing segments;
  - **Energy policies** subject to frequent adjustments due to political transitions
  - Persistent **labor shortages**
  - Geopolitical risks affecting **raw material supply** and international collaboration

- Opportunities:
  - **Policy support** through subsidy and incentive mechanisms (e.g., IRA, PTC)
  - An established foundation covering the **full PV value chain**
  - Significant potential for **advanced technologies**, including CdTe thin-film.

Module Manufacturing

How price and policy changes are affecting module manufacturers

Falling module prices and narrowing spreads put solar industry in the red

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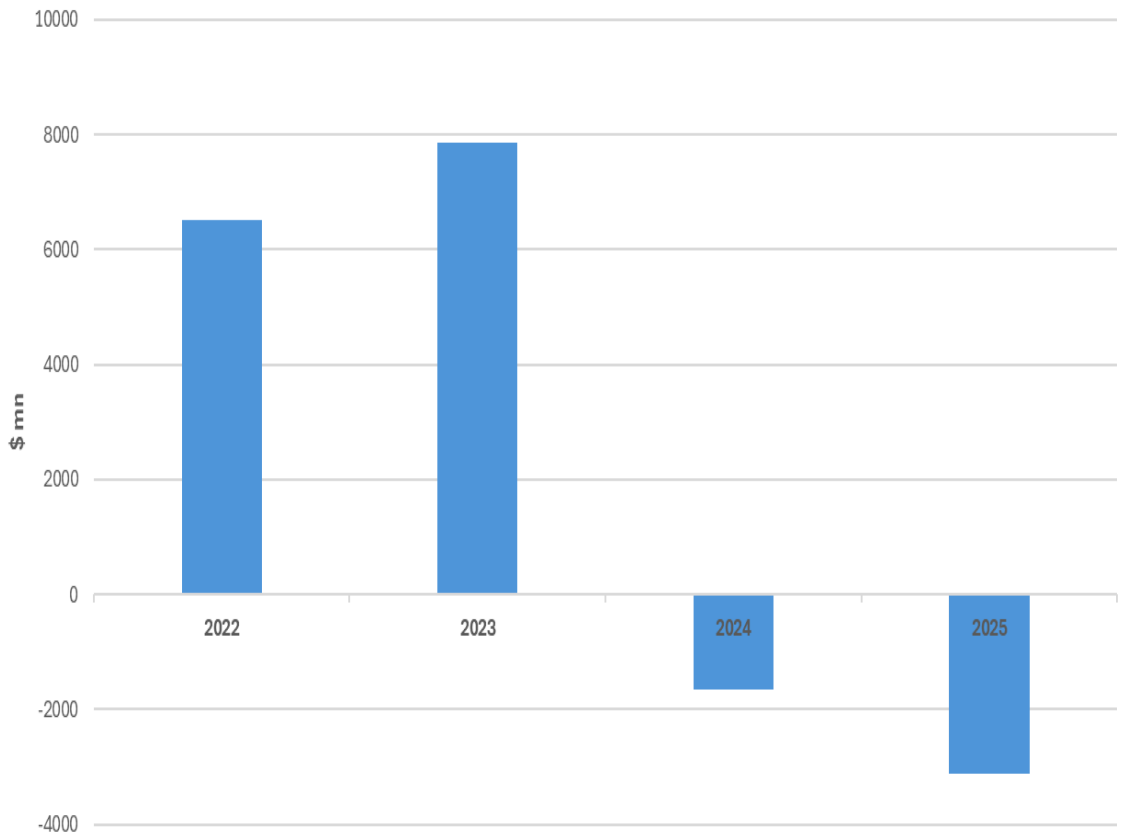
Solar manufacturers reporting net losses since 2024

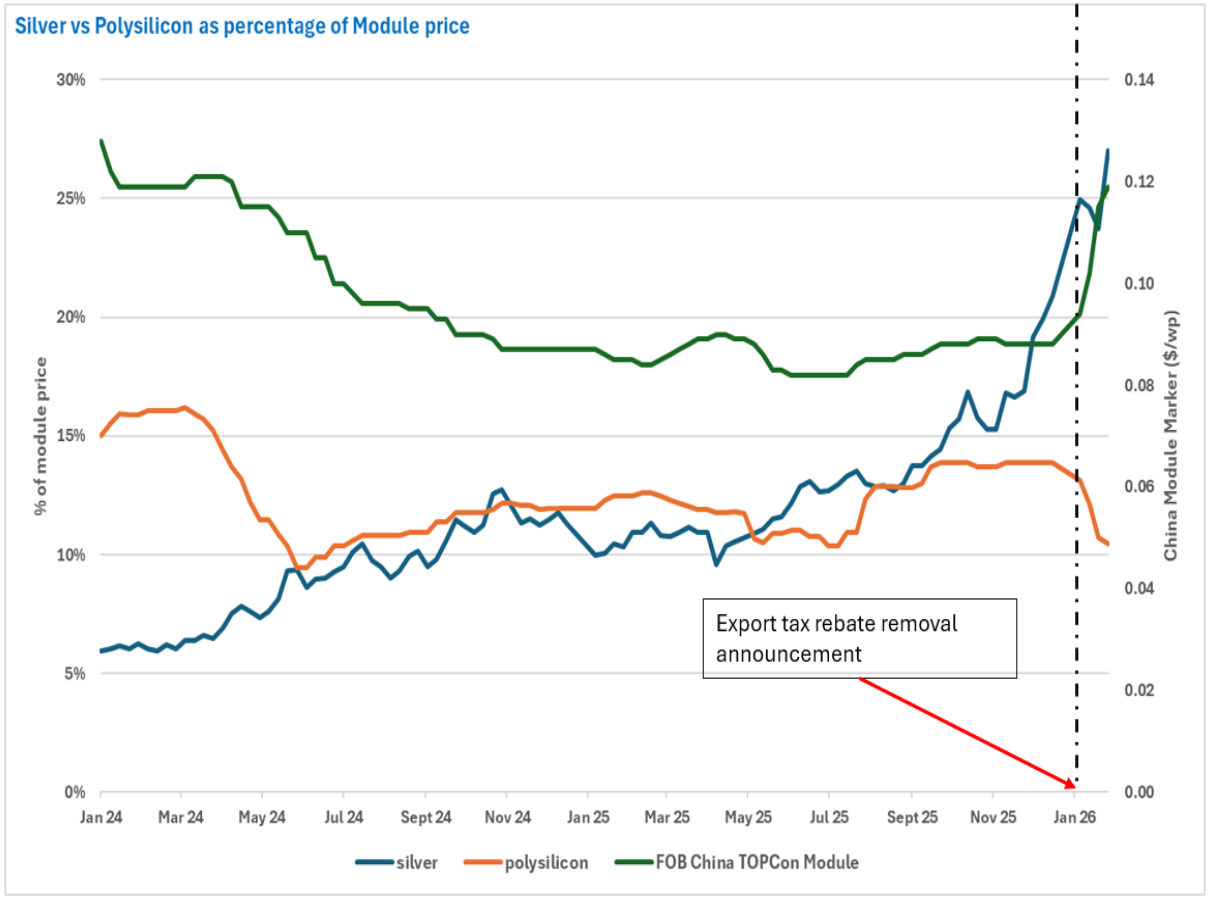


Source: OPIS; company announcements

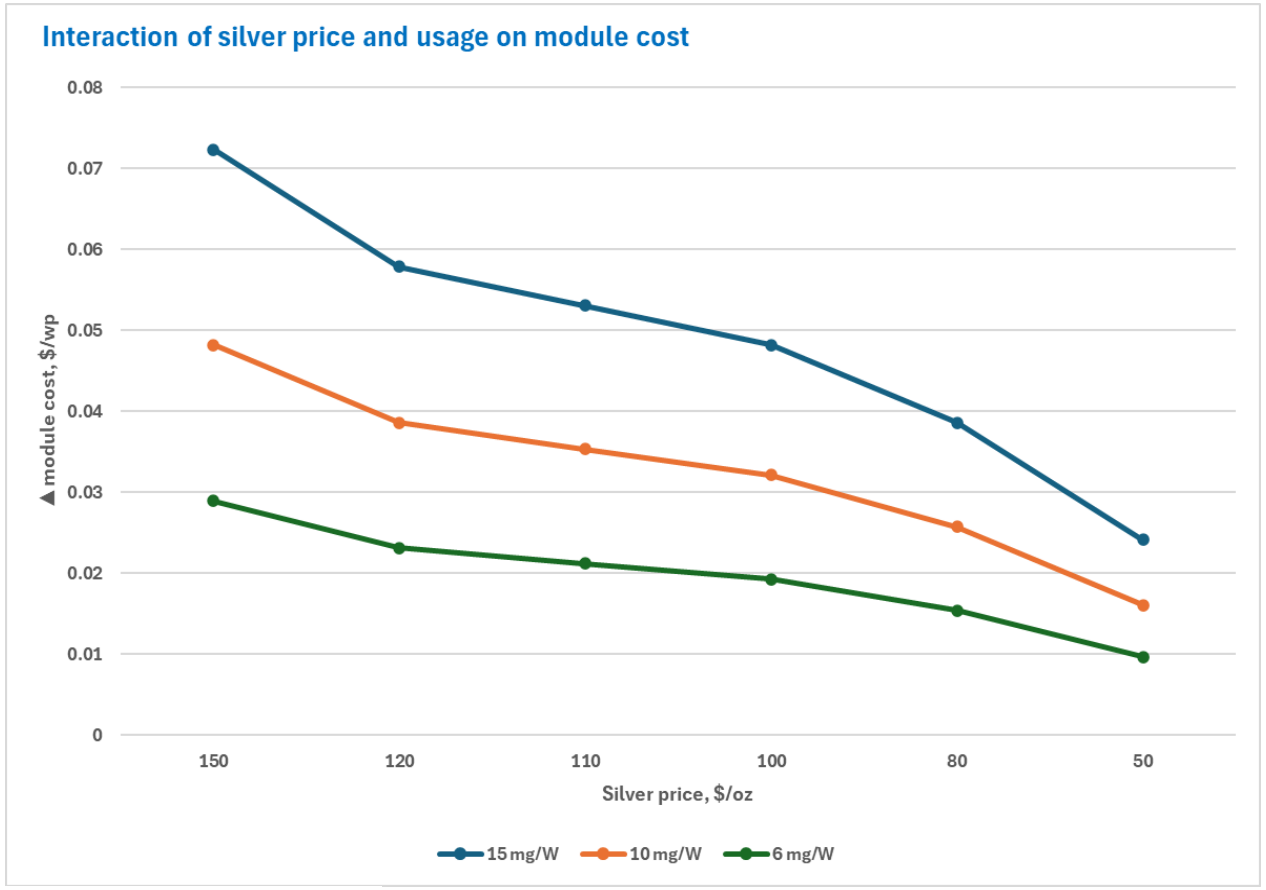
Solar spreads volatility picks up in 2025

Source: OPIS, A Dow Jones Company

Surging silver prices a wildcard factor in module pricing



Source: OPIS, A Dow Jones Company
LBMA Silver Price



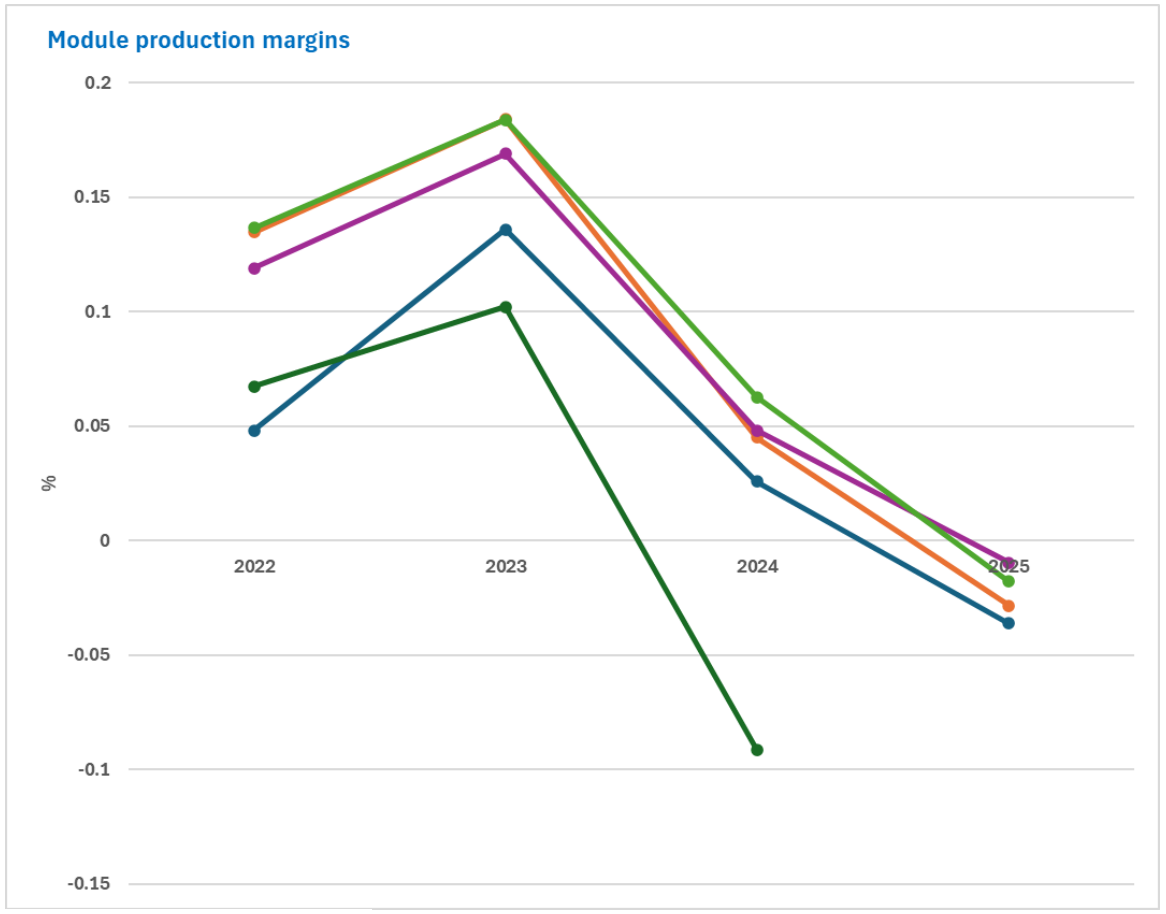
Source: OPIS, A Dow Jones Company
LBMA Silver Price

Impact of export tax rebate removal depends on several factors

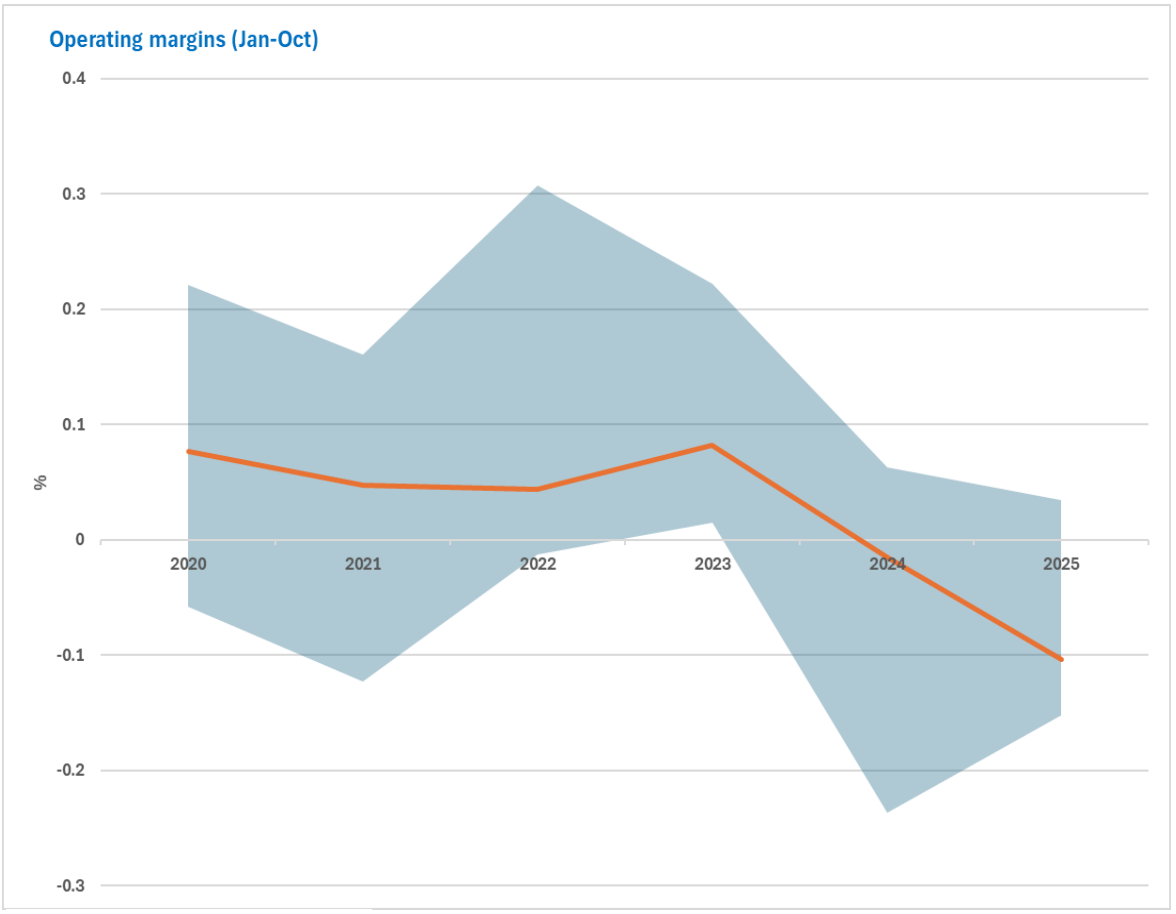
	Scenario 1	Scenario 2	Scenario 3
VAT rate	13.0%	13.0%	13.0%
Export refund rate (current)	9.0%	9.0%	9.0%
Export refund rate (after change)	0.0%	0.0%	0.0%
FX rate (RMB per USD)	7.000	7.000	7.000
Total production (GW)	10.000	10.000	10.000
Domestic sales volume (GW)	6.000	5.000	4.000
Export sales volume (GW)	4.000	5.000	6.000
Domestic price (ex-VAT) (RMB/W)	0.800	0.800	0.800
Export FOB price (USD/W)	0.089	0.089	0.089
Raw material cost (ex-VAT) (RMB/W)	0.700	0.700	0.700
Lost cash refund only per exported W (Current refund / export W) (RMB/W)	**0.0466**	**0.0531**	**0.0561**

Source: OPIS, A Dow Jones Company

Operating margins at solar manufacturers in the red before module margins turned negative



Source: OPIS; company announcements



Source: OPIS; company announcements

Falling module prices are creating financial stresses in different places

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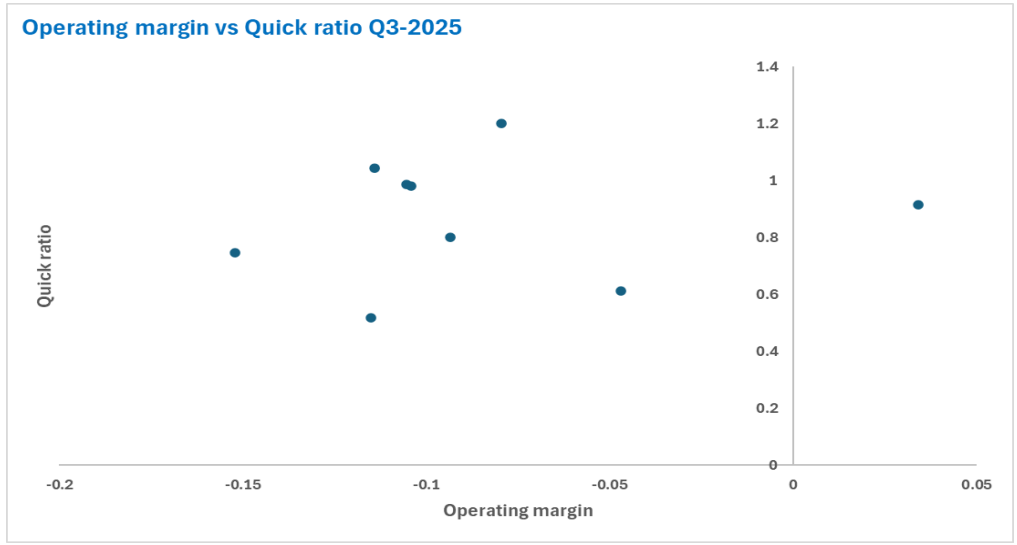
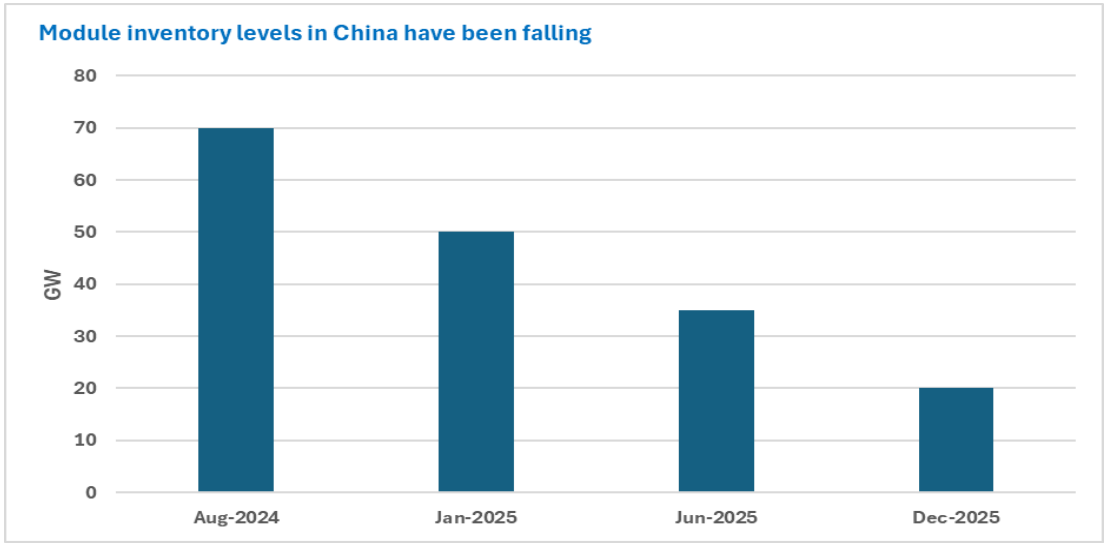
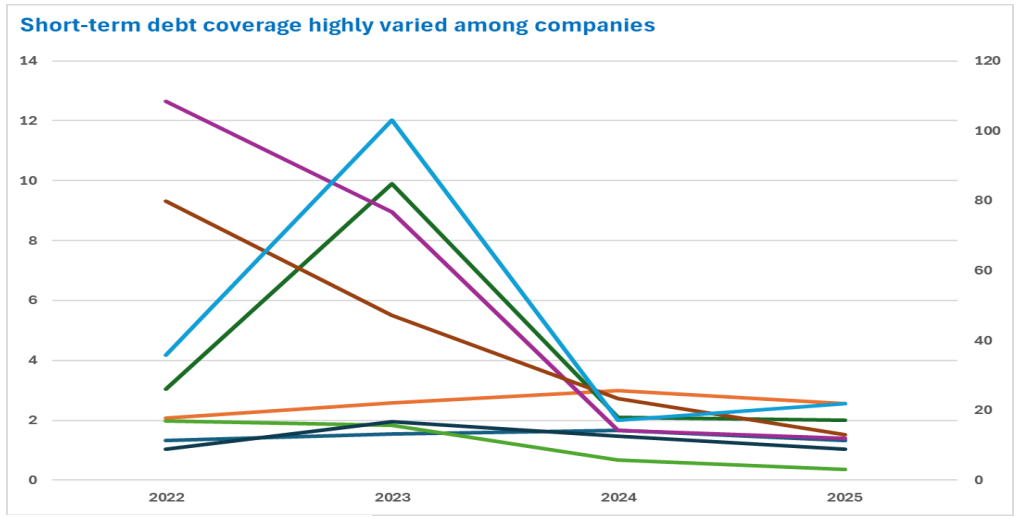
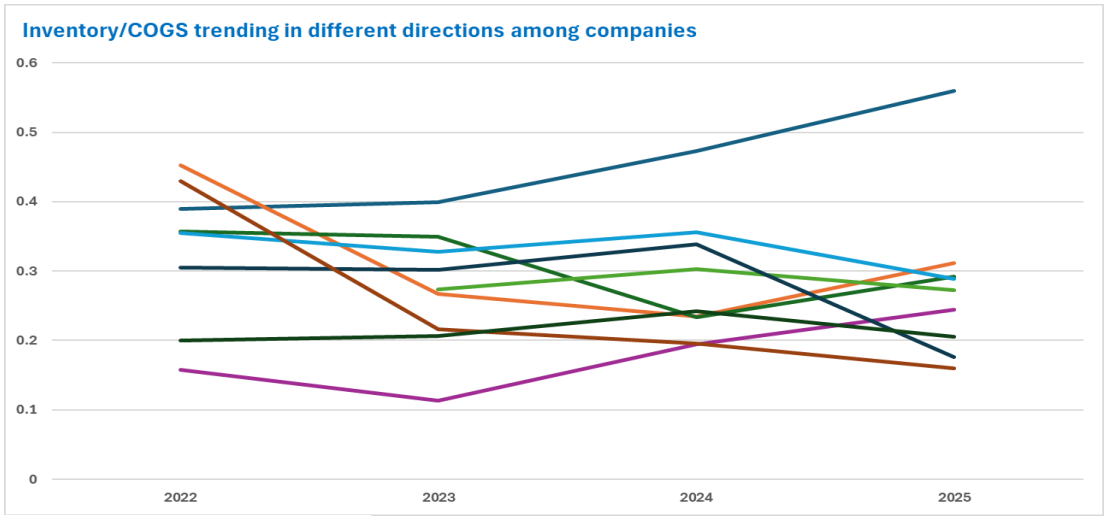




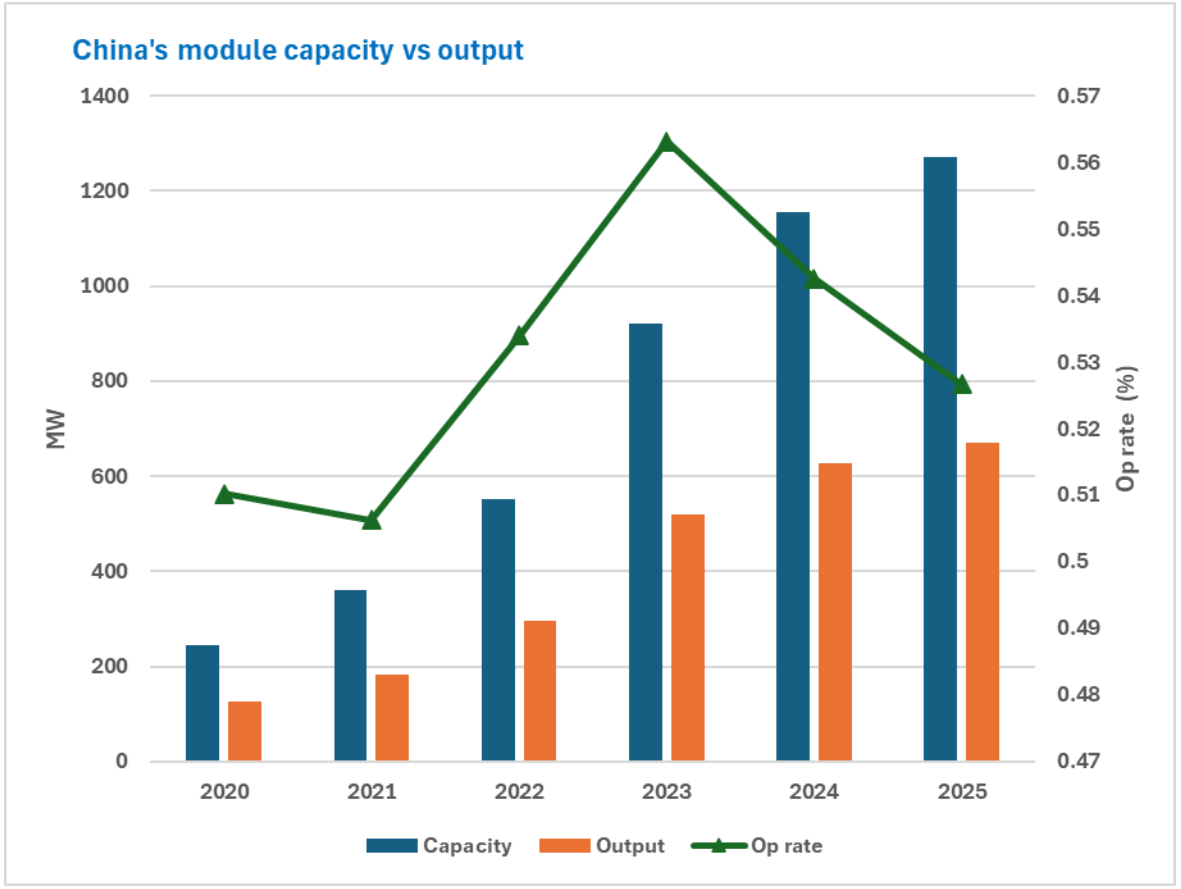


Source: OPIS; company announcements

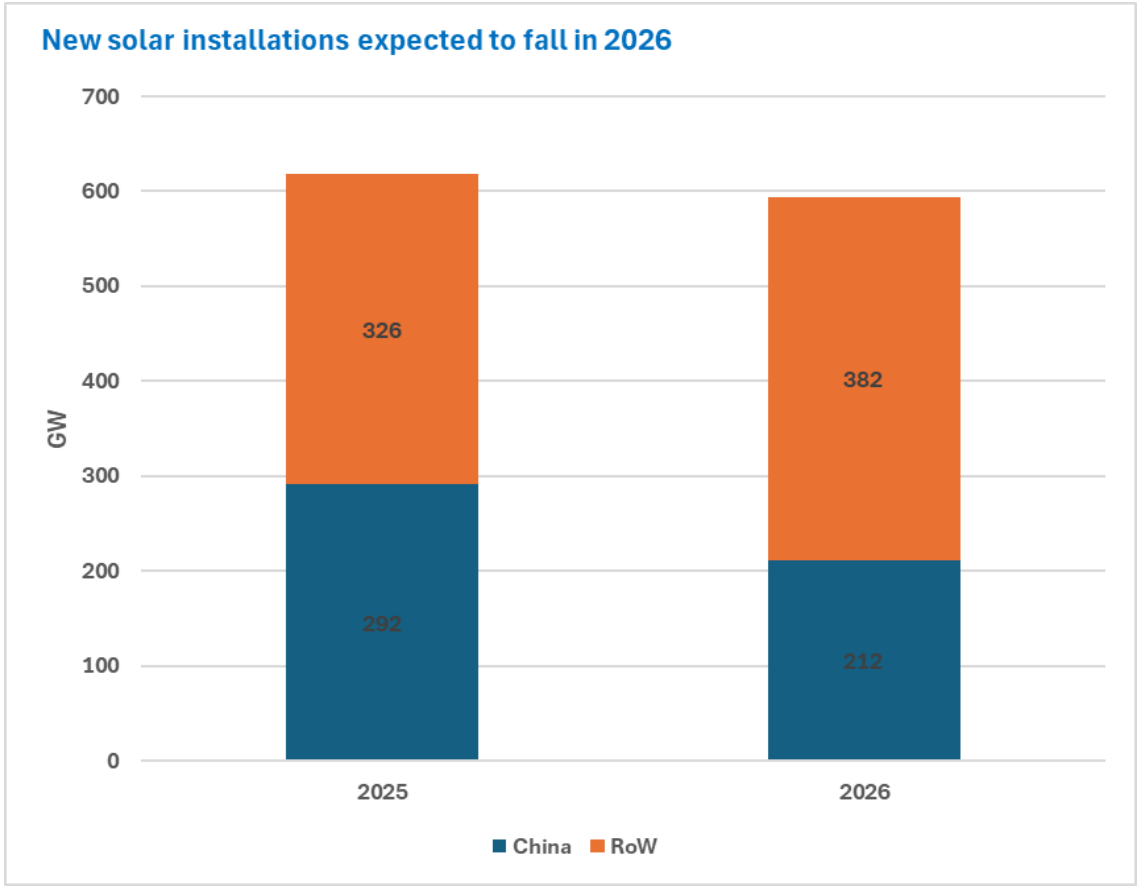


Source: OPIS; company announcements

Subdued market outlook a persistent headwind for module makers



Source: OPIS, A Dow Jones Company



Source: OPIS, A Dow Jones Company

Supplier screening takes on new dimensions in times of industry stress

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Character

Transparency, compliance record, warranty fulfilment

Capacity

Execution capacity, shipping times, stable BOM, traceability documentation

Capital

Liquidity + survival runway through downturns

Collateral

Contractual guarantees, warranty terms, substitution plan

Conditions

Trade / compliance exposure & policy

Overcapacity to resolve with policy changes and time

	Steel (2015-)	Cement (2023-)	Solar PV (2023-)
Phase 1: Policy signaling (Yr 0-2)	Supply-side structural reform frames excess capacity as a national priority; "national champions" narrative.	Weak demand + pollution/air-quality goals elevate need to manage supply and optimize capacity.	Overcapacity + price war becomes "disorderly competition" problem; "emphasis on high-quality development" and orderly exit.
Phase 2: Administrative action (Yr 2-5)	Capacity replacement/swap regime; tighter environmental compliance; action against illegal capacity; local approval tightened.	Seasonal/region output curbs; stricter capacity replacement + project approval scrutiny.	Stricter new-project approvals, energy/carbon/quality standards, financing discipline, and antitrust scrutiny.
Phase 3: Enforcement & integration (Yr 5-10)	Integration + further restructuring; stronger compliance enforcement; fewer, larger groups exert more pricing discipline.	Enforcement via inspections, compliance-driven shutdowns, and ongoing replacement requirements; gradual regional concentration.	**?**

PV Technology

How TOPCon, BC, and HJT coexist in a multi-year margin-compressed market

Agenda

1. **TOPCon's Inflection: Why the PERC Era Ended**

   What enabled TOPCon's rapid scale-up and displacement of PERC?

   Which structural advantages are keeping TOPCon in the lead today?

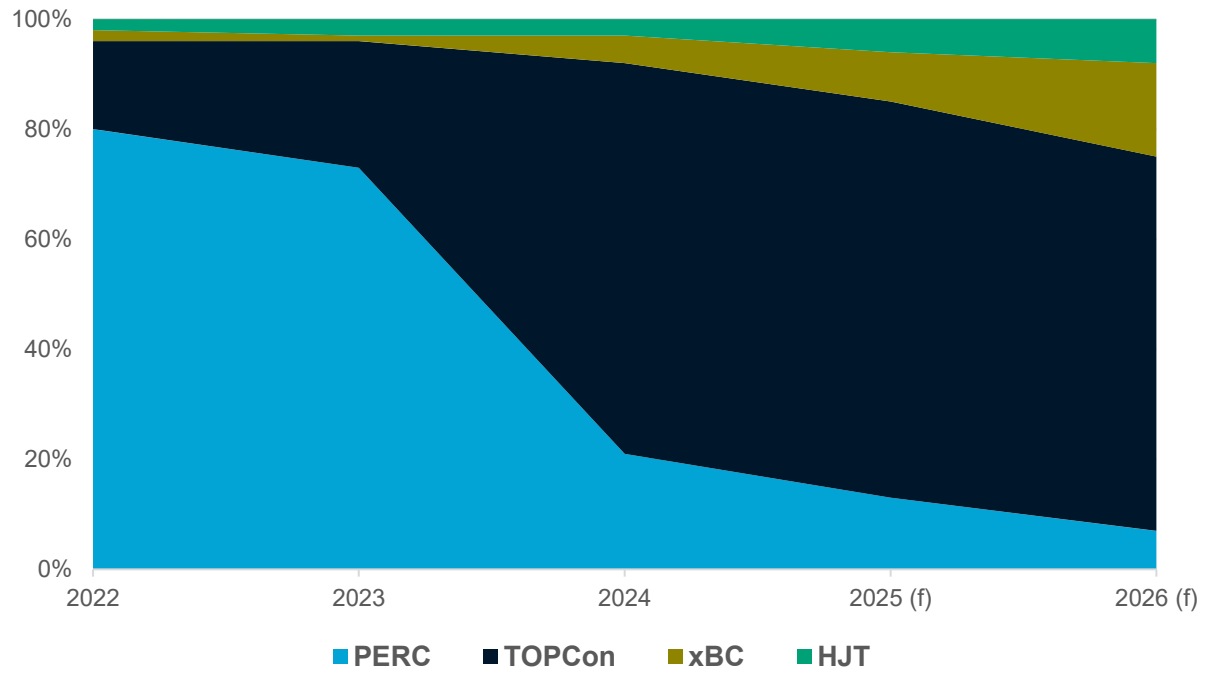
2. **Beyond TOPCon: What Would Trigger a Technology Reset**

   Under what conditions could BC or HJT credibly overtake TOPCon?

An Unusual Market Structure: Three Viable N-Type Paths

- **TOPCon leads by volume**, but BC and HJT continue to hold defensible segments even in a margin-compressed market
- **All three are bounded by the same single-junction silicon efficiency** ceiling (theoretical cell limit ~29%)
- **Trajectory remains uncertain ahead of Si–perovskite tandem** (theoretical cell limit ~43%)
- Relative costs, upgrade paths, and CAPEX intensity are moving targets differing by technology; Industry shows mixed prediction for the interim

Market Share of PV Cell Technology



Source: Averaged estimates based on CPIA, VDMA ITRPV forecasts, OPIS

How TOPCon Overtook PERC: Performance, Economics, and Timing

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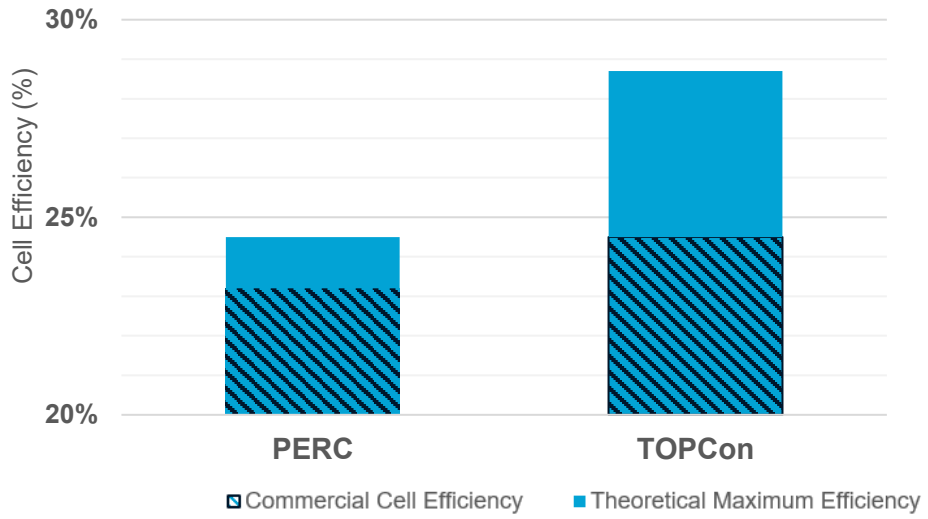
2022-2023 Snapshot: PERC vs TOPCon (Theoretical, commercial cell Efficiencies)



Year: ’22-’23	PERC	TOPCon
Equipment Investment Cost (CNY mn/ GW)	124	142
Market Share	80%	20%

Source: Company Data Sheets, CPIA 2025 Roadmap Estimate

PERC’s Diminishing returns:

- Approached its theoretical efficiency ceiling, reducing incentive for further investment

TOPCon: Future-proof Clear Project-Level Upside

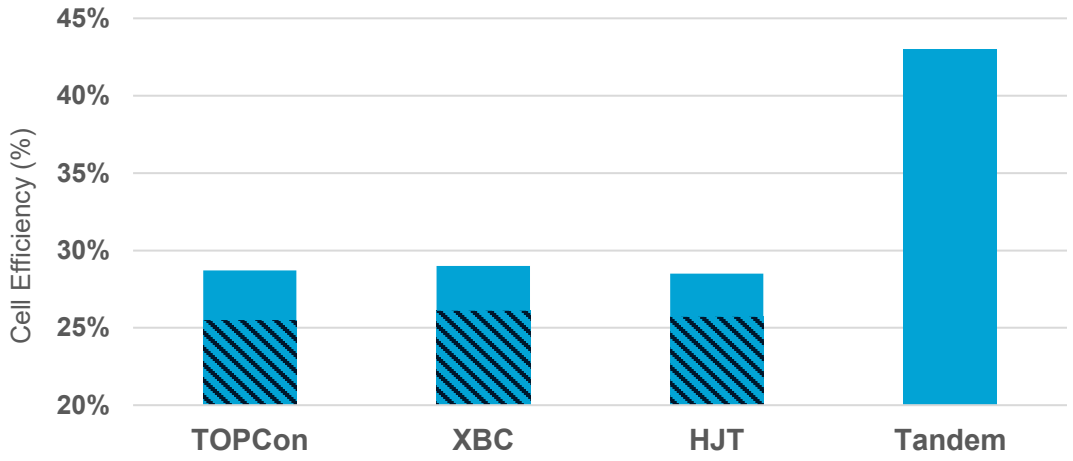
- Delivered measurable advantages via higher efficiency and stronger bifaciality
- Higher theoretical max. efficiency offered clearer upgrade path

PERC-to-TOPCon retrofits enabled scale

- The polysilicon price collapse compressed cost differentials and compressed the “N-type premium”

BC Efficiency Lead Has Not Yet Translated Into Mainstream Share

2024-2025 Snapshot: TOPCon, XBC, HJT (Theoretical, commercial cell Efficiencies)



Source: CPIA 2025 Roadmap, Company announcements

TOPCon to TOPCon+ Upgrade

	Standard TOPCon (2024)	TOPCon+ (2026/27)
Module Power	580-600W	**650-670W**
Module Efficiency	22.5%	**24.8%**

Source: Company announcements

Single-junction Si efficiency lead:

- Best-in-class BC cell reported at 27.3%; module efficiency ~24.8%

TOPCon is compressing BC's edge:

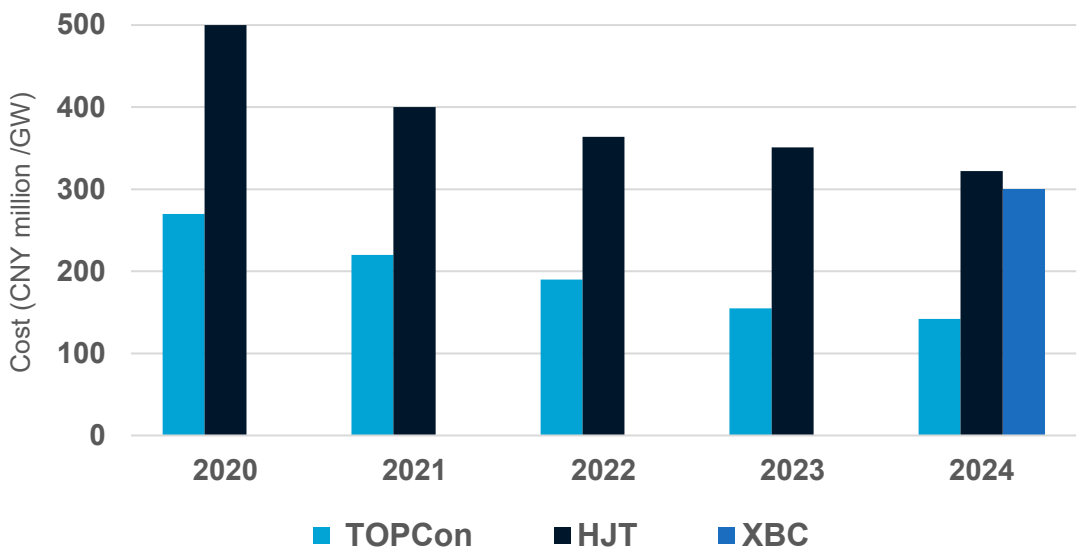
- Incremental TOPCon upgrades have compounded, with "TOPCon 2.0/TOPCon+" already commercialising
- "TOPCon+" upgrade possible via retrofit (~PERC → TOPCon)
- BC requires entirely new heavy asset investment

Future-proofing risk: weak tandem compatibility

- Many industrial tandem pathways appear more plug-in for TOPCon/HJT-type bottom cells

HJT: Highly automatable and Tandem-Ready, But Economics Still Tight

Cell Equipment cost



Source: CPIA, VDMA ITRPV, OPIS

High Tandem Potential

- Preferred bottom cell for perovskite-silicon tandem stacks.
- Efficiencies (lab) exceeding 32%–34% for HJT-perovskite tandems getting ready for mass production

Lower IP exposure

- Foundational patents are largely expired, reducing IP risk vs TOPCon/BC's case

CAPEX remains the structural barrier to scaling

- Reported cell-line investment cost is roughly 2.5x TOPCon

Operational economics can be attractive in high labour-cost ESG-driven regions like EU

- Shorter process flow improves labour productivity
- Lower utilities intensity supports reduced electricity/water footprint and decarbonisation

Silver volatility may force the next wave of tech transition

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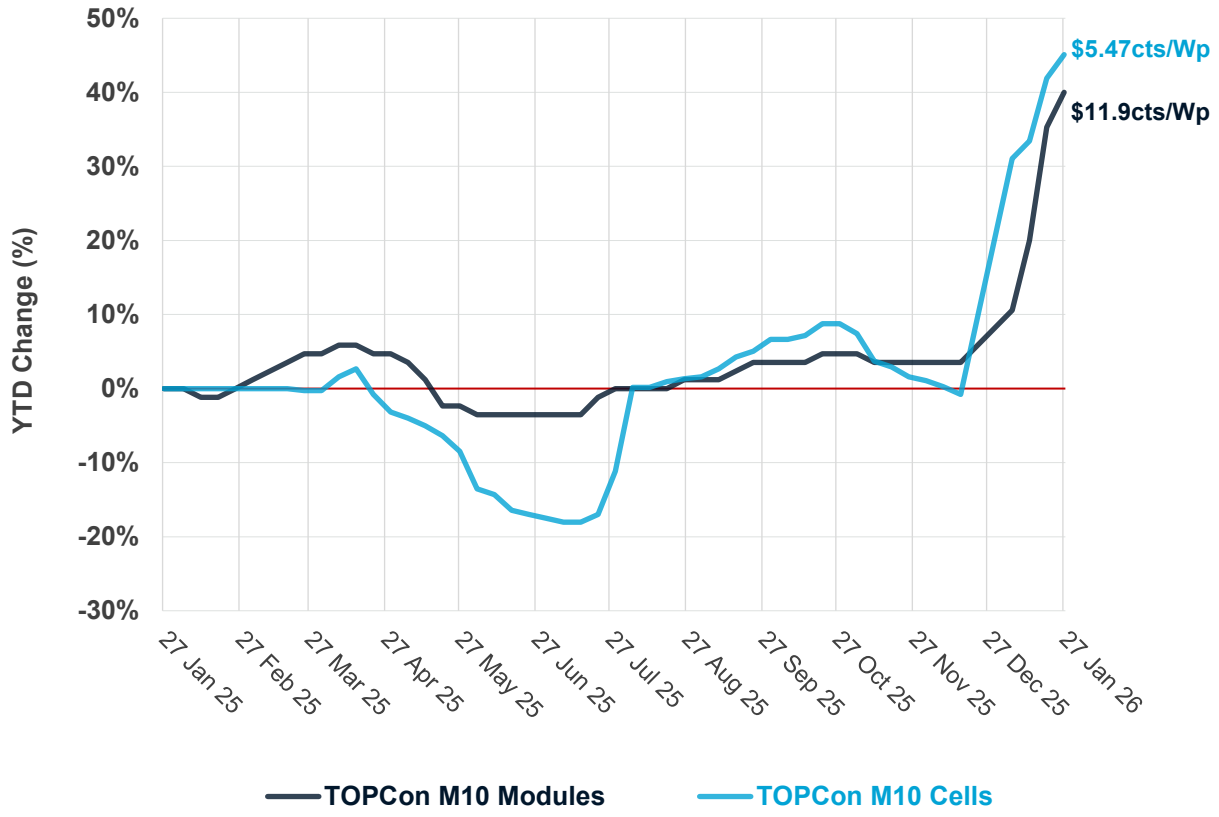
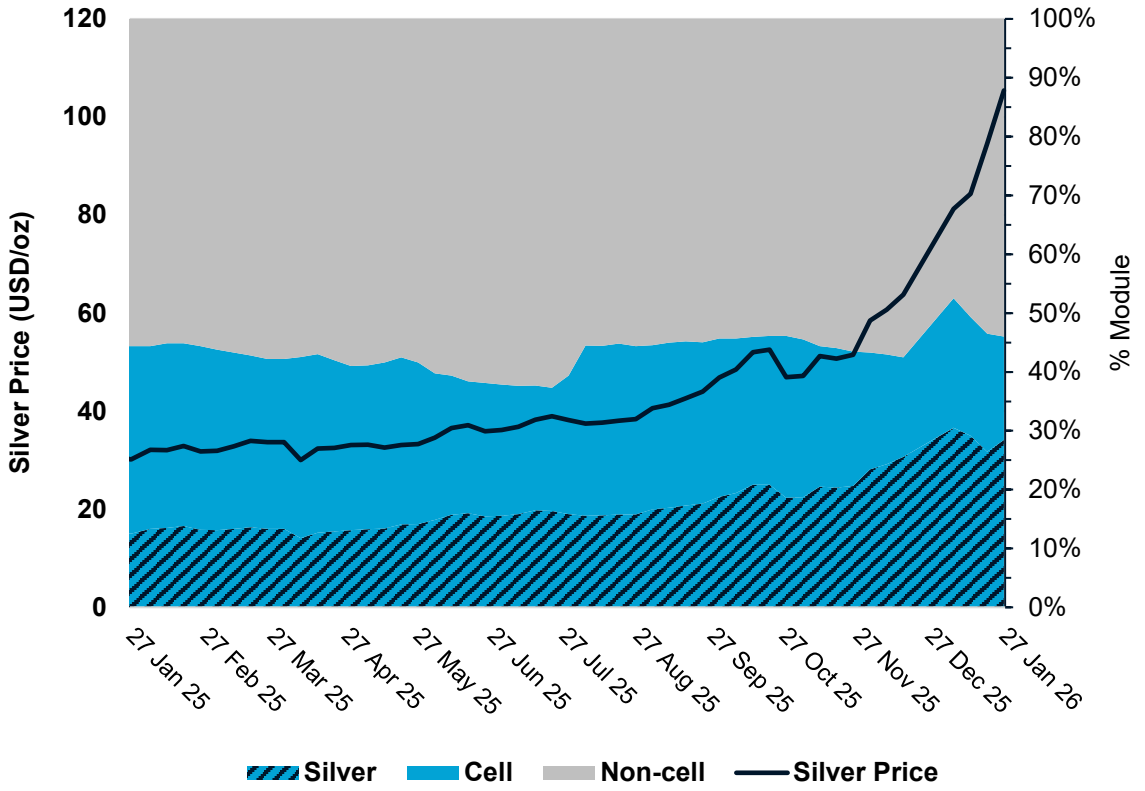
YTD % change: TOPCon M10 Cells and Modules, FOB China



Source: OPIS, A Dow Jones Company

Estimated* Silver & Cell Share of Module Price (%of Module)

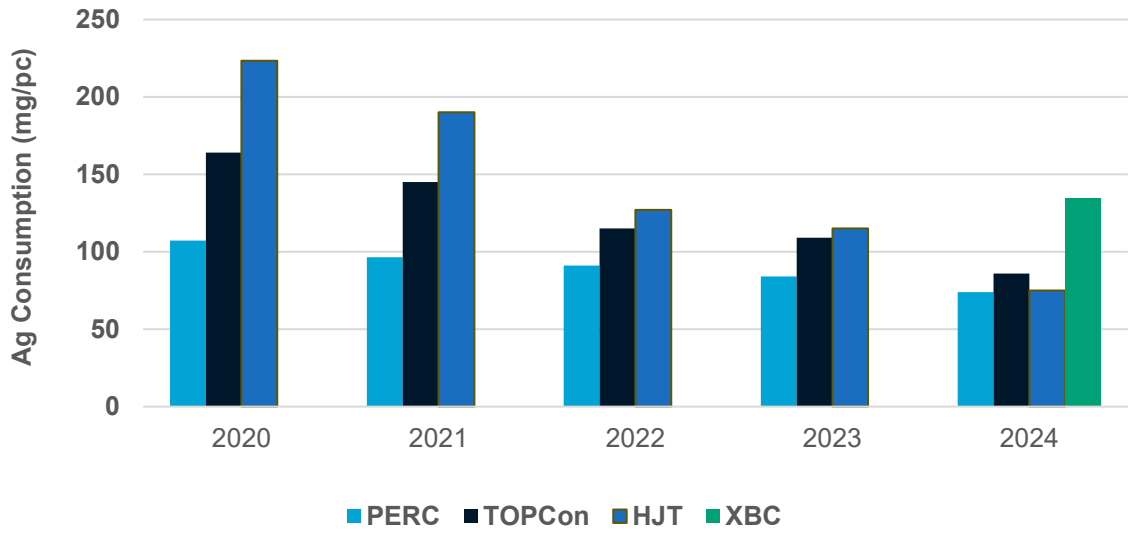


Source: LBMA Silver Price (USD/oz)
OPIS, A Dow Jones Company

*Assumption: TOPCon M10 Module using 10mg/w silver.
Silver only used in cells

Beyond TOPCon: What Would Trigger a Technology Reset?

HJT has decreased its silver usage considerably, now below TOPCon



Source: CPIA Announcement, OPIS, A Dow Jones Company

Silver Volatility Exposure:

- Recent silver spikes highlight silver as the largest variable risk in the cell BOM, while polysilicon is commoditised

Different Metallisation Roadmaps:

- Each cell platform has a defined low-silver metallization roadmap

Cell technology: beyond race of cost / efficiency; strategic hedge against BOM volatility?

Thank you

Hanwei Wu, Director
hwu@opisnet.com

Summer Zhang Yunmeng, Senior Analyst
szhang@opisnet.com

Jun Won Lee, Analyst
jlee1@opisnet.com

Customer Service
energycs@opisnet.com
North America: +1 888.301.2645 (toll-free within the U.S.)
https://www.opisnet.com/contact/contact-us/

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Wednesday, 4 February 2026

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3:00 pm - 4:00 pm CET, Berlin

How to make the right inspection decisions for solar assets: from the factory to the field

Thursday, 5 February 2026

10:00 am – 11:00 am CET, Berlin

5:00 pm – 6:00 pm AWST, Perth

Utility equipment shakeup: Sigenergy enters the large-scale segment

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