

US Solar Manufacturing: A global success story

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Company & Speaker - Introduction

PV Tech, Solar Media & Informa

- PV Tech is a well-known brand within Solar Media.
- Solar Media has been part of Informa Markets since 2024, a division within Informa PLC.
- Informa PLC is an events, digital services & academic research group, LON:INF, FTSE 100, market cap. ca. \$16.2B*
- PV Tech have been covering bankability of suppliers since 2019 in the PV Space and we released the Battery StorageTech Bankability Ratings Report to do a similar thing in the ESS Space.

* As of 11 Oct. 2026

Moustafa Ramadan, Ph.D.

- Head of Market Research, PV Tech.
- Joined PV Tech in 2025 and worked on the PV Bankability and Manufacturing report.
- Qualified in Energy Engineering (BEng, MEng), Energy Finance (MSc, PhD), Energy Law (LLM).
- Worked in large-scale solar development in the UK and Ireland, consulted on renewable energy projects across Africa and the Middle East.
- Completed Acquisition Due Diligence on over 100 renewable energy projects and portfolios.

Data Source - US Domestic Solar Manufacturing Report

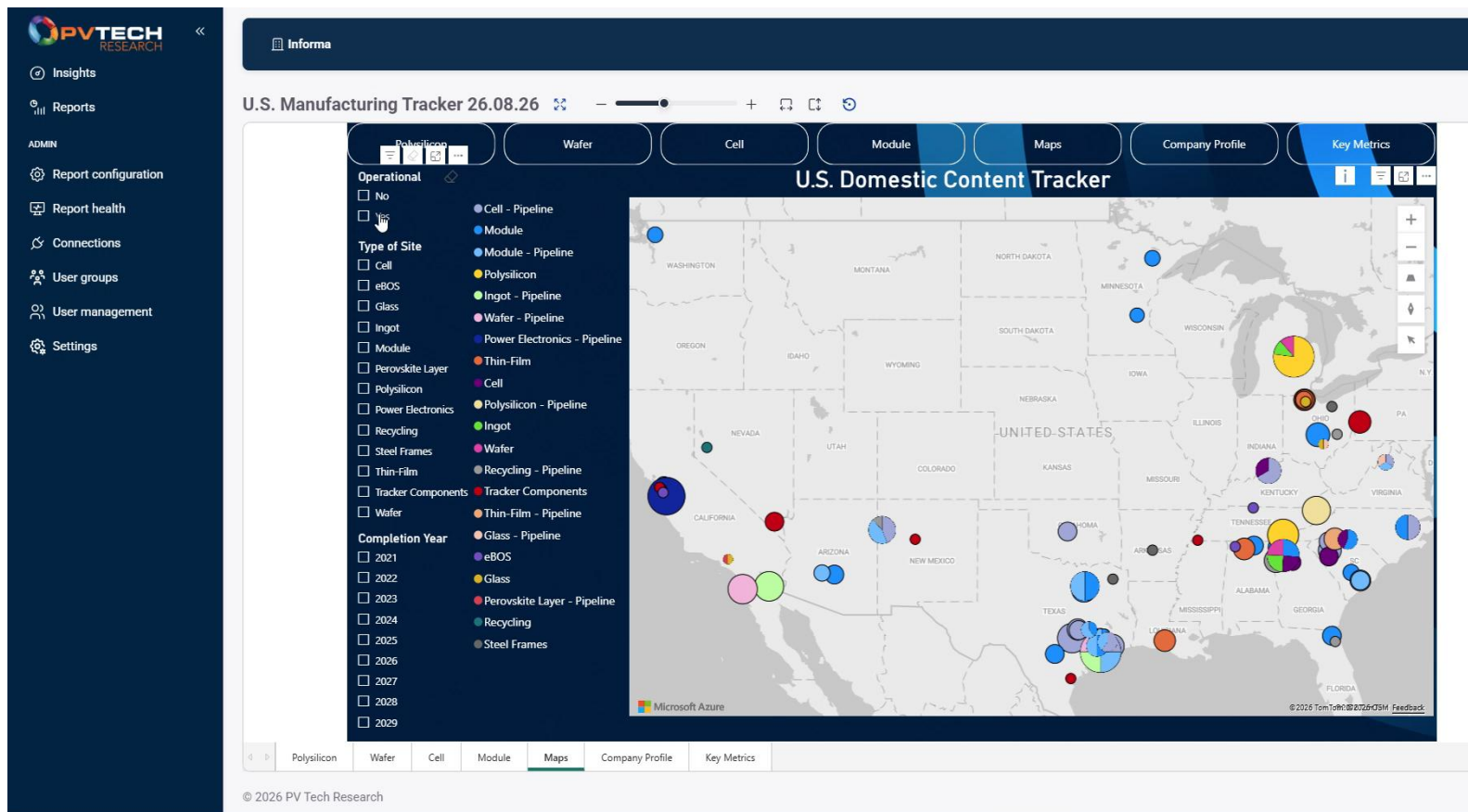


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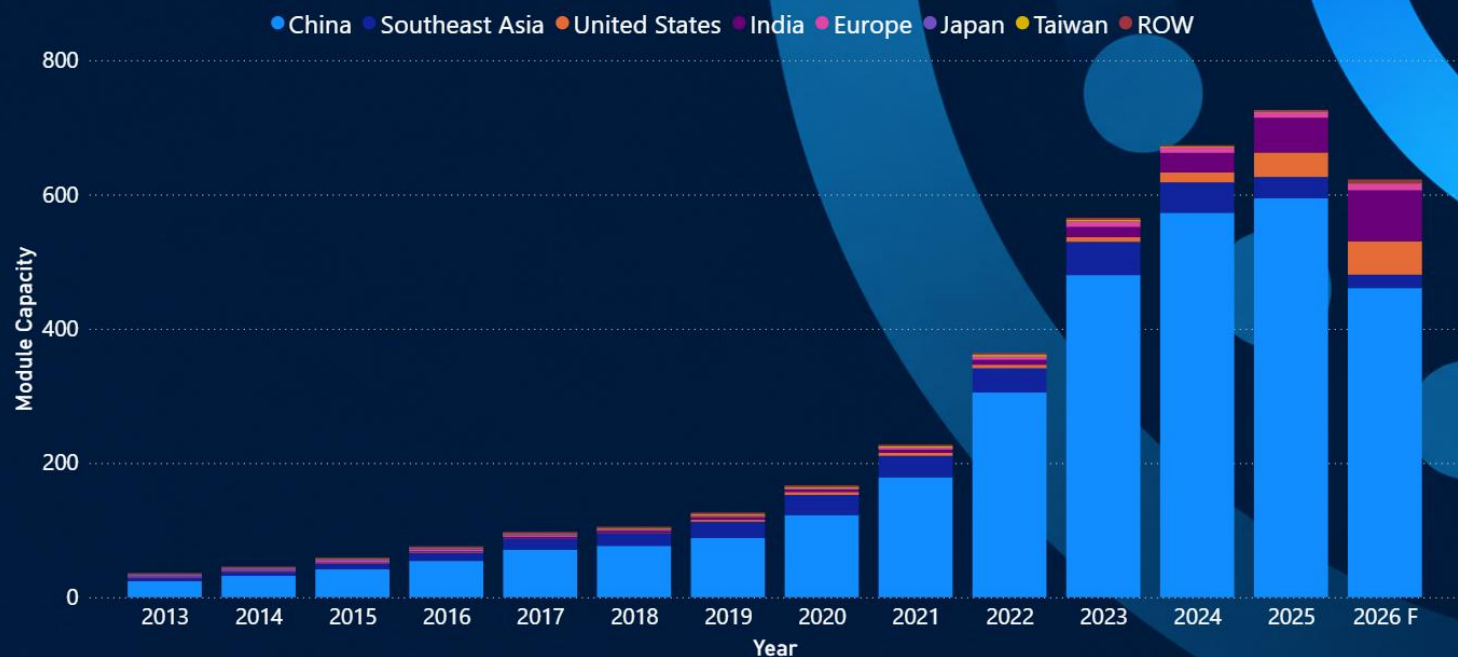
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Global solar update

Global Module Production (GW)



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Source: PV Tech Research: PV Manufacturing & Technology Report; September 2026



Global module production decreasing

Led by China and Southeast Asia, global module production has decreased YOY (with China alone decreasing by more than 100GW)

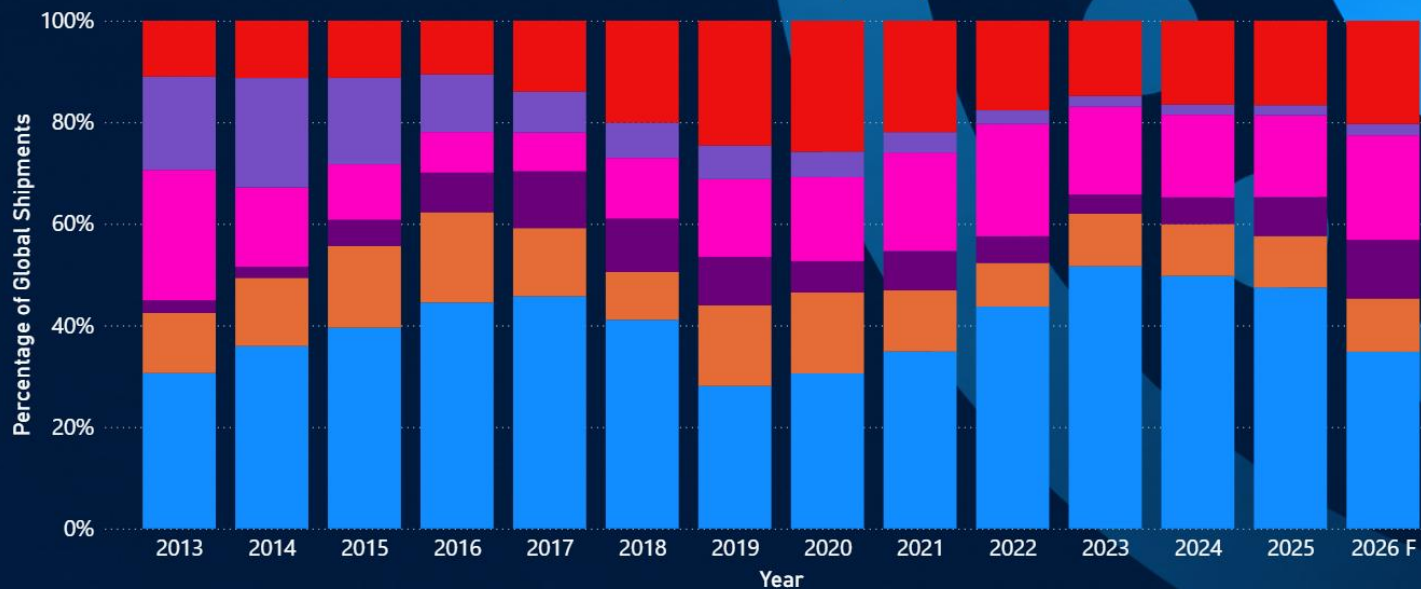
The US and India are the two biggest growth regions

The overall decrease in production is not uniform across all regions, with most regions seeing a slight increase.

Global solar update

Percentage of Module Shipments by Region

● China ● United States ● India ● Europe ● Japan ● RoW



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Source: PV Tech Research: PV Manufacturing & Technology Report; September 2026



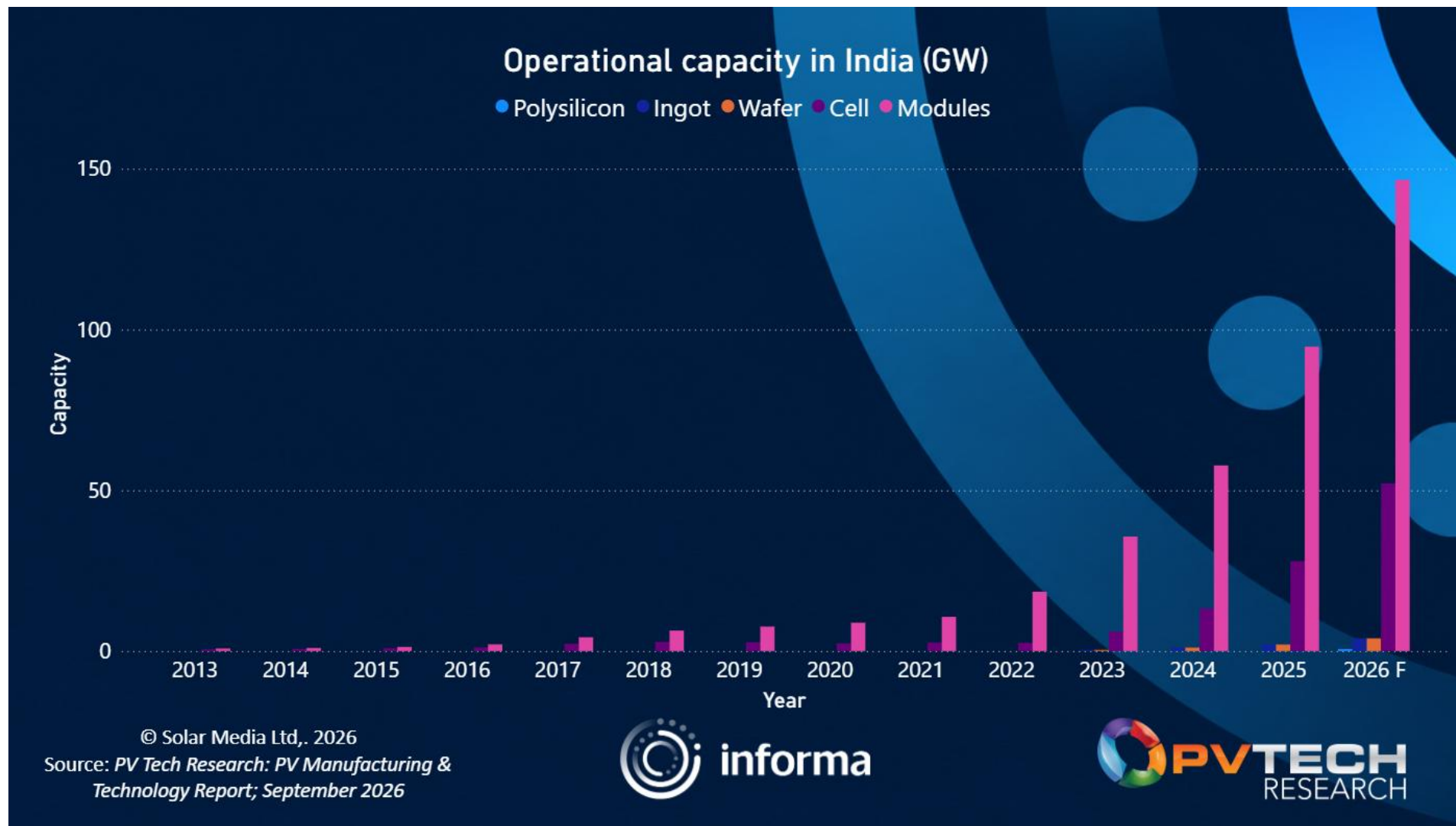
Shipments reflect that decrease

Shipments to China (reflecting demand) are forecast to decrease by nearly 120 GW YOY.

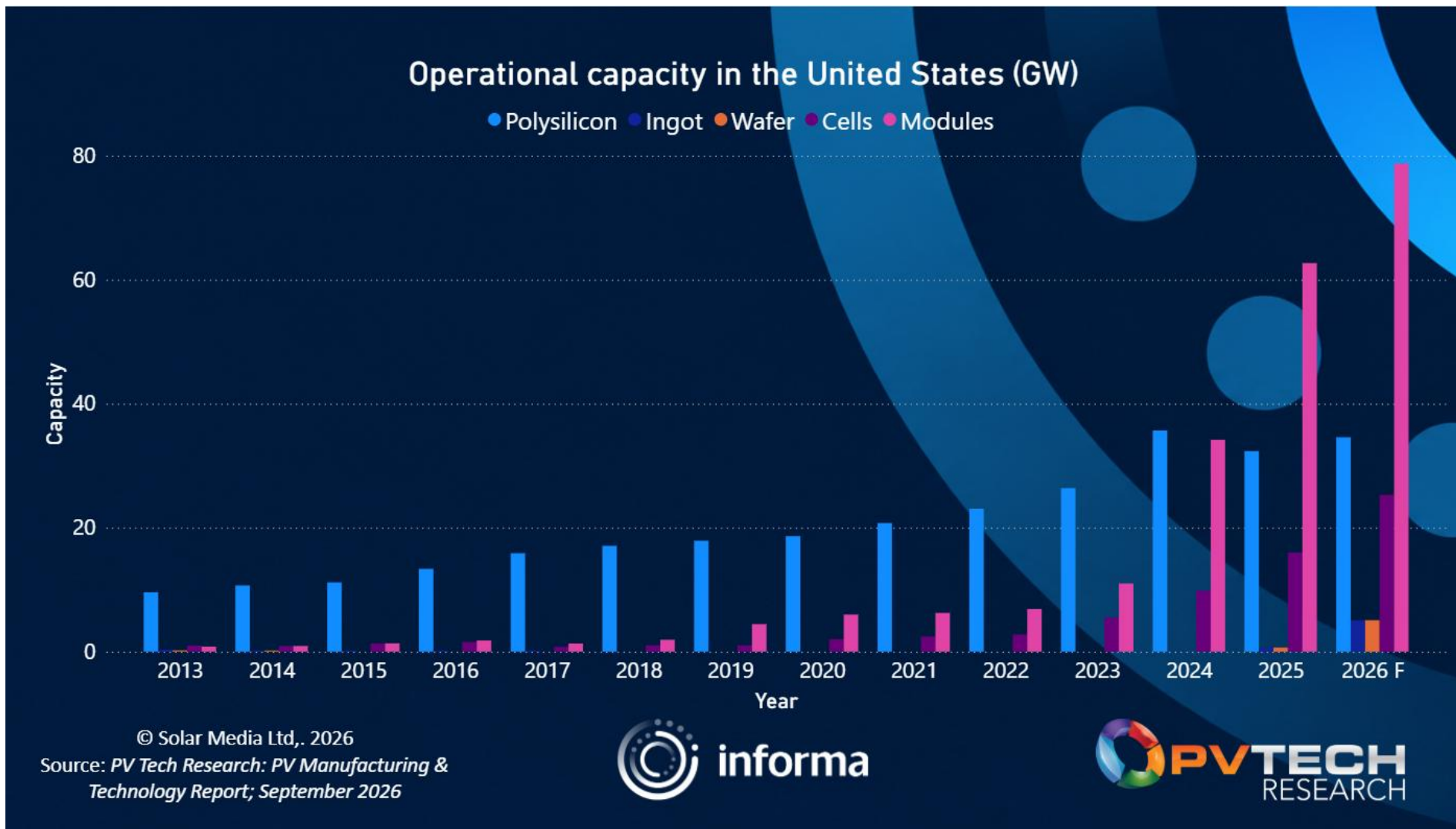
US and India demand are holding steady

Demand in the US and India is holding steady with India experiencing slightly more growth than the US.

India: government-led capacity expansion up the value chain

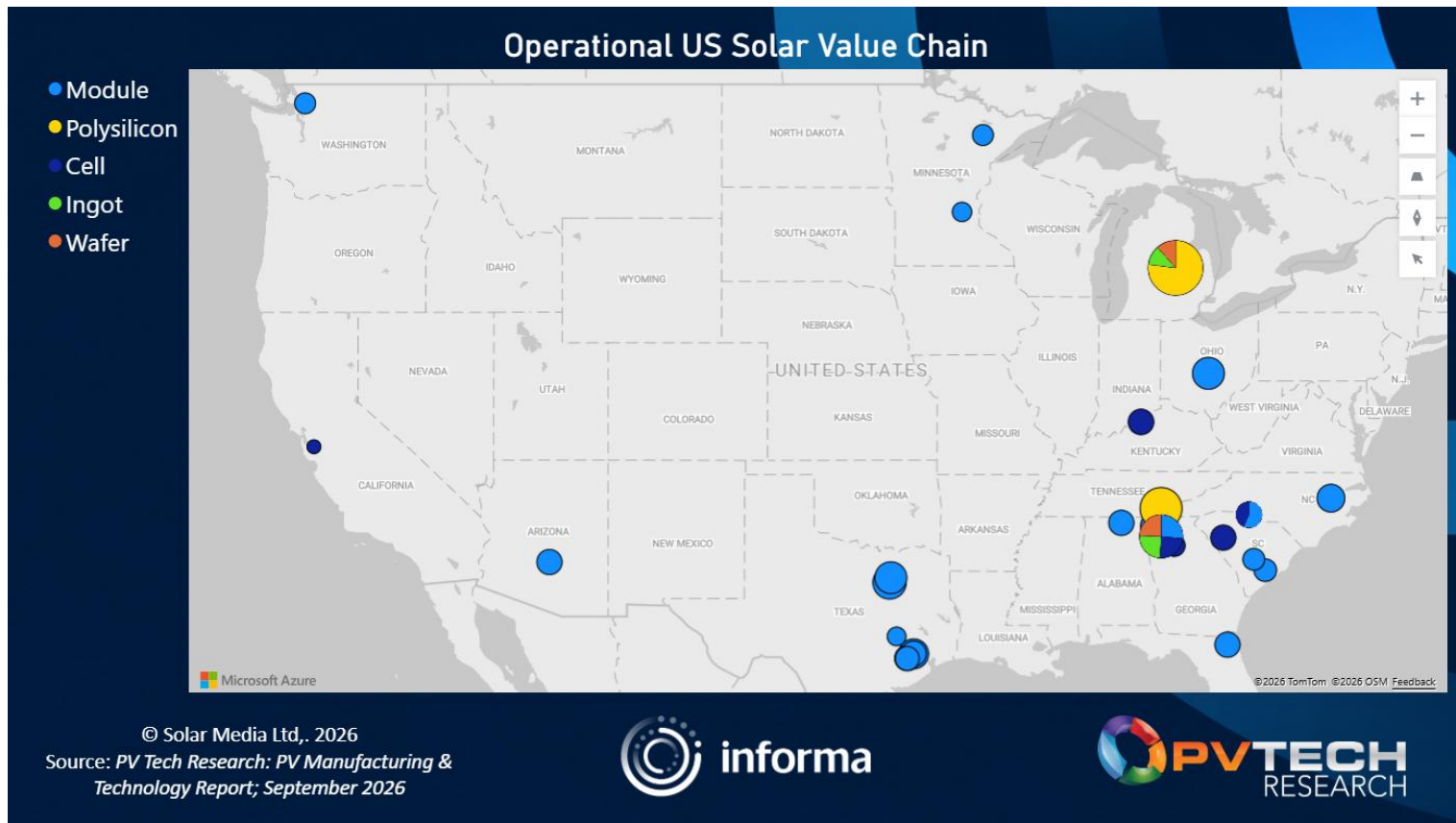


United States: a combination of market and policy



A supply chain built from the outside in

Operational US PV manufacturing facilities, August 2026



The Strongest Link in the Chain - Module

85GW capacity, 46GW production — domestic demand essentially met.

The Weakest Link in the Chain – Ingot & Wafer

5GW capacity — the smallest, most exposed part of the supply chain

Modules: domestic self-sufficiency, achieved

The most mature segment of the US supply chain

85.2GW

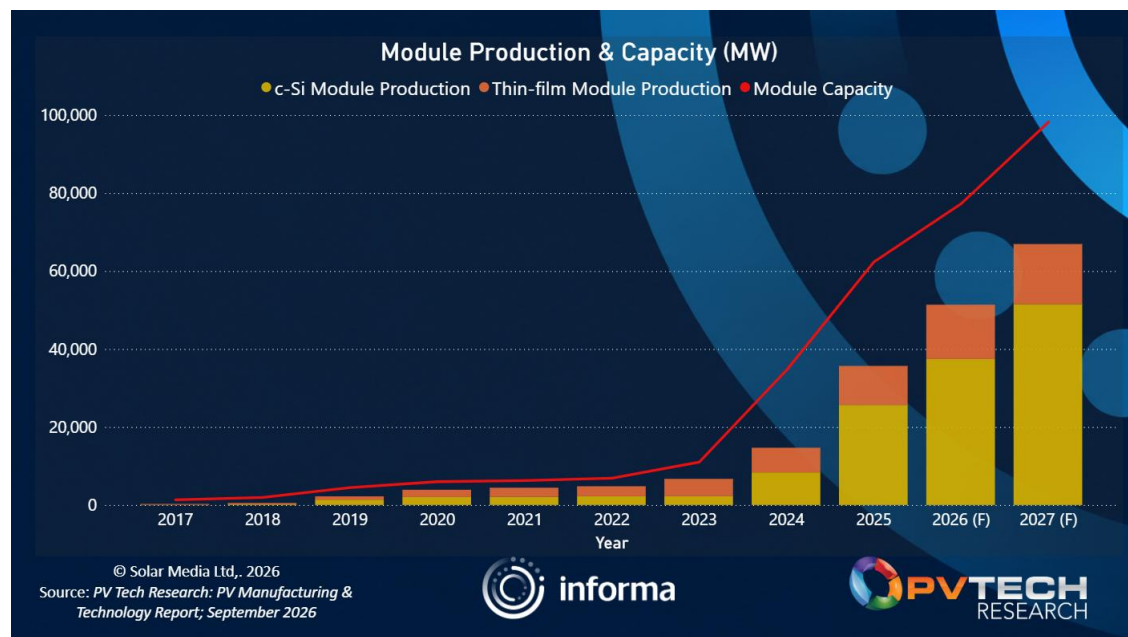
Total forecast Year End capacity (incl. thin film)
— 67% utilization

46.6GW

Total forecast production for 2026

66GW

(excl. thin film) Total forecast Year-end
Crystalline-only capacity, 33GW Total forecast
production for 2026



Current capacity is sufficient to meet total domestic module demand — the ‘Made in USA’ question is largely resolved for developers sourcing modules today.

The critical question now shifts upstream: what feeds these module lines? Modules built domestically still lean heavily on imported cells — the subject of the next two slides.

Cells: a significant capacity shortfall

The module industry's primary input remains substantially import-dependent

30.1GW

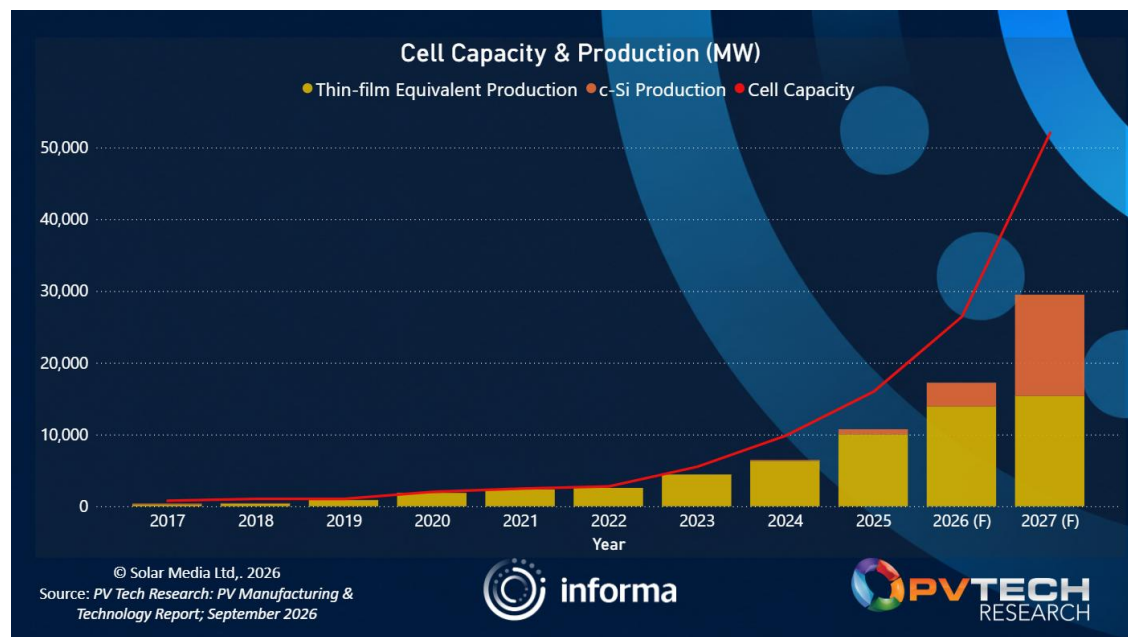
Total year end cell capacity (incl. thin film),
21.6GW production

10.9GW

Year-end, crystalline-only capacity, with a
4.7GW production in 2026

<50%

Of module capacity that domestic cell capacity
can cover



Set against a module capacity of 63–82.5GW, domestic cell capacity covers well under half of what module lines can assemble.

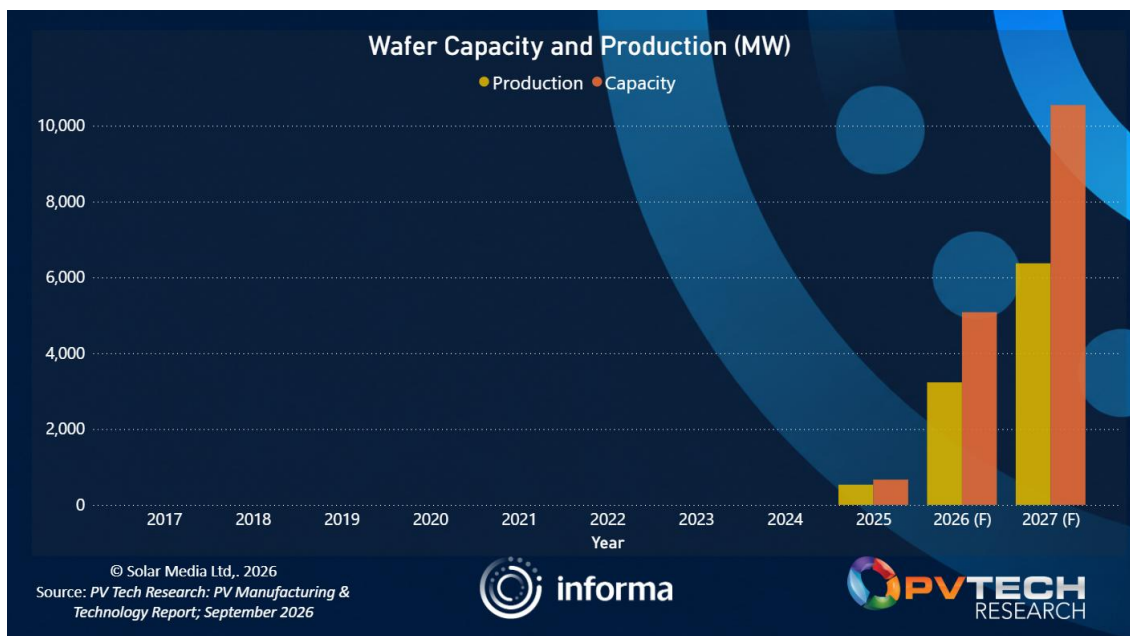
The cell itself, the module industry's primary input, remains substantially import-dependent and will remain so until the 26 GW now under construction converts to shipped product.

The ingot & wafer bottleneck

Domestic polysilicon often still travels abroad to become a US cell



* crystalline-silicon only



Ingot & Wafer production accounts for only ~52% of crystalline cell production and uses just 20% of PV-allocated polysilicon output.

US-made polysilicon is often shipped overseas to be pulled and sliced into wafers, then returned for cell processing — the clearest bottleneck in the domestic chain.

Polysilicon: substantial capacity, persistent shortfall

The segment drawing the most capital — and the most complicated to read

35GW

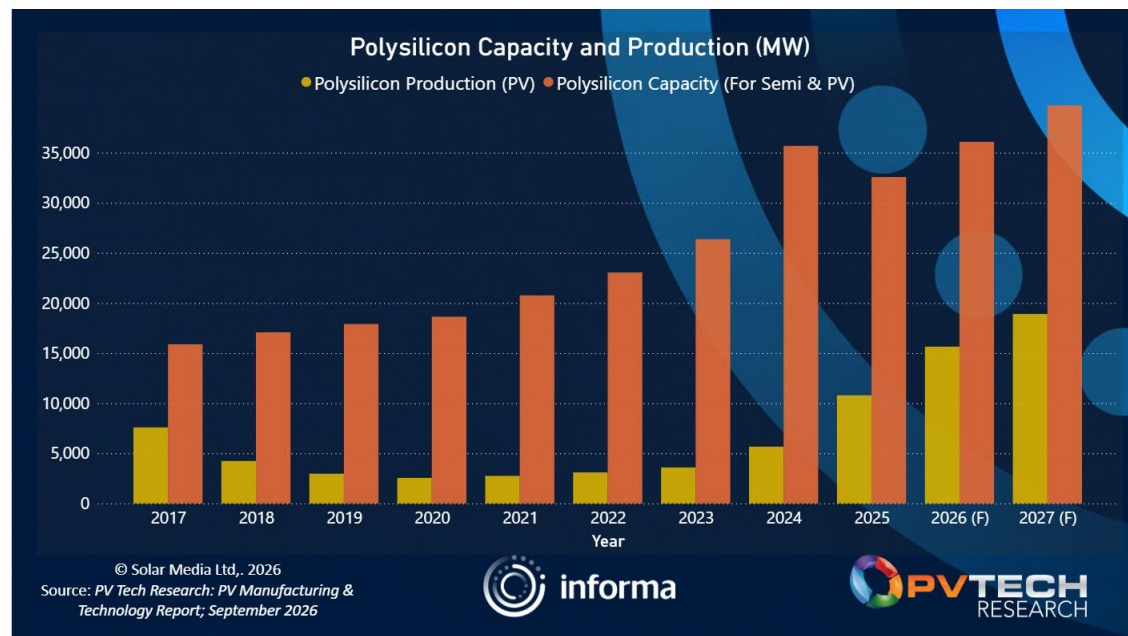
Total polysilicon capacity for PV and Semiconductor

12 GW

PV-allocated production today

~50%

Of capacity shared with semiconductor-grade output



Part of the gap reflects genuine idle capacity; part reflects capacity shared with semiconductor-grade production, which caps how much of the chain can be sourced domestically.

Polysilicon is the one segment where the investment case is clearly being made — the question is whether it converts into PV-allocated capacity fast enough, especially with Section 232's investigation now in play.

Uneven opportunity across the value chain

How the gaps identified above translate for each type of market participant

1

Manufacturers

Module producers operate in a market near domestic saturation; cell and, especially, ingot & wafer producers sit on the least-contested capacity gaps in the industry.

2

Equipment suppliers

Ingot, Wafer and cell represent the clearest near-term demand signal — this is where the largest build-out is still needed.

3

Developers

Import dependency at cell and wafer stages means full supply-chain traceability, and FEOC compliance, remains hard to guarantee in the longer term.

4

Investors

The ingot & wafer stage looks underserved relative to its strategic importance: the smallest in absolute capacity and most exposed to offshore round-tripping.

Flooded with manufacturing capacity announcements



TOYO announces 1.5GW US HJT cell line weeks after AD/CVD hits Ethiopia factory

By Will Norman
June 8, 2026



T1 Energy begins construction at 2.1GW TOPCon cell manufacturing facility in Texas

By JP Casey
December 17, 2025



MSolar to build US\$23.7 million solar glass, cell and module factory in Virginia

By JP Casey
June 8, 2026



Suniva boosts US cell production to 5.5GW with new facility

By Ben Willis
April 15, 2026



Swift Solar acquires Meyer Burger's US HJT manufacturing assets and patents

By JP Casey
March 12, 2026



How Talon PV plans to crack America's TOPCon solar cell challenge

By Ben Willis



Tesla plans US\$10.1 billion vertically integrated solar cell plant in Texas

By Shreeyashi Ojha
August 12, 2026



Canadian Solar begins US HJT solar cell production at 6GW facility

By Will Norman
July 24, 2026

Announcement tracker methodology

Project Status Framework – Used by PV Tech to track projects for over a decade

Announced

1. Announced

2. Feasibility /
Planning

Planning

3. Site Selected

4. Permitting
/Approvals

5. Financing
Secured

Under- Construction

6. Under
Construction

7. Equipment
Installation

Ramping Up

8. Pilot/Trial
Production

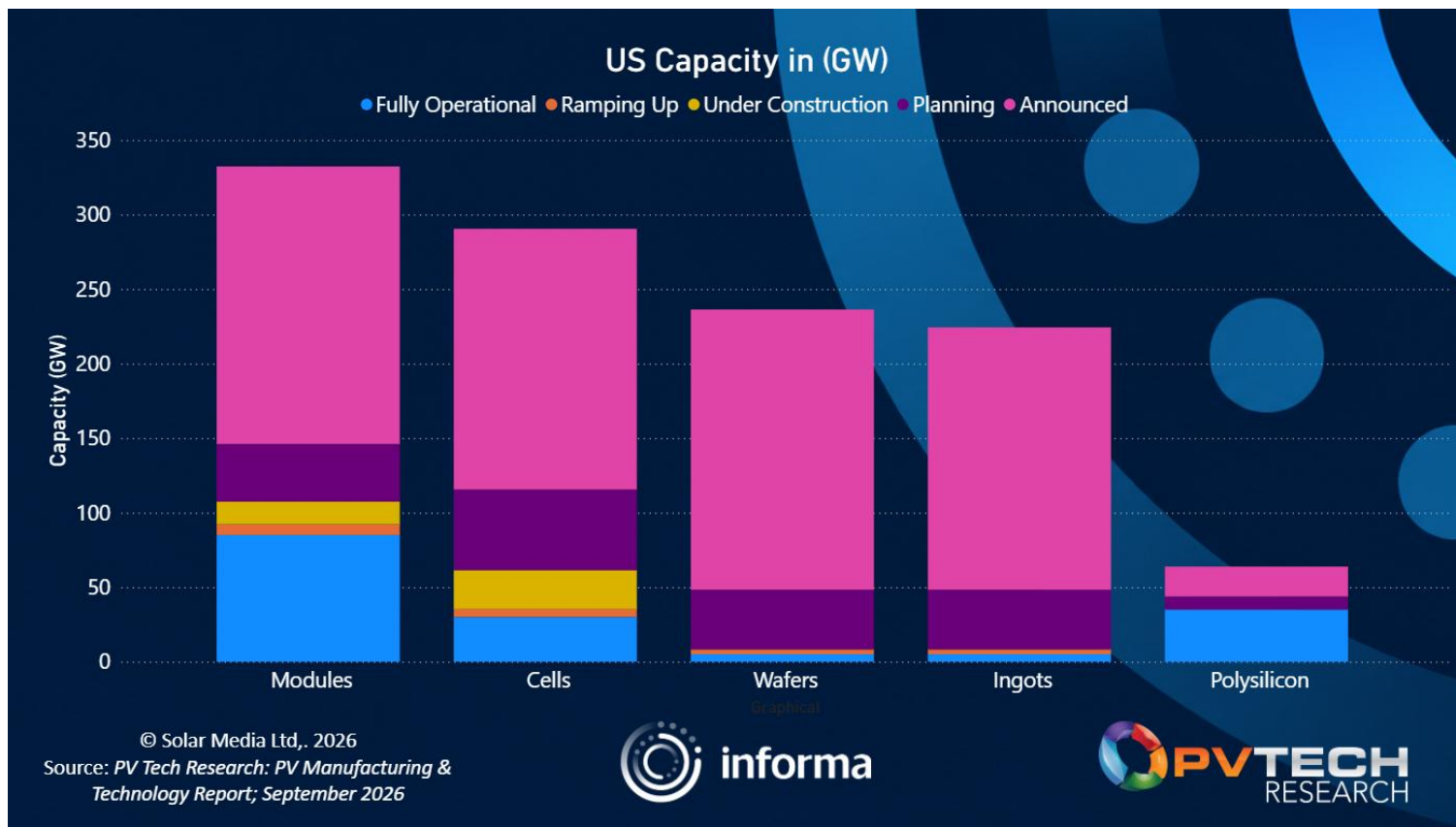
9. Ramping Up

Fully Operational

10. Fully
Operational

All announced capacity pipeline in the US

The value chain pipeline in the US, by segment and stage



Announced and In Planning are the least certain

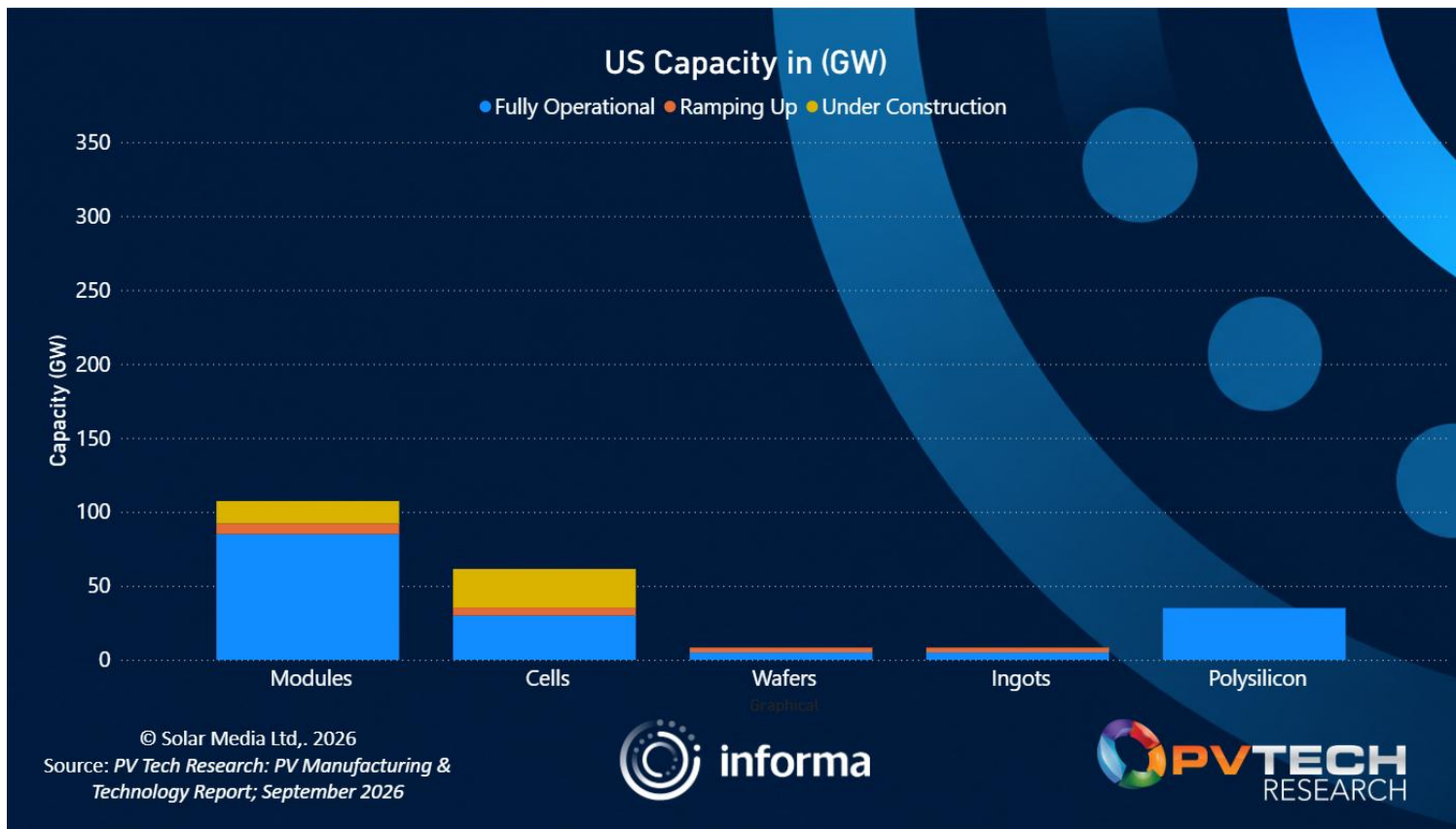
Announced & Planning (230 GW cell / 224 GW module) and early Construction are most exposed to delay or rescoping.

Tesla & SpaceX's 200GW are the main drivers

Both announcements combined make the majority share of the announced capacity at every stage except for polysilicon.

What is actually being built already?

The value chain pipeline in the US, by segment and stage



Under Construction and ramping up

Manufacturing capacity while under construction (26 GW cell / 15 GW module) could be at risk of delays or revisions.

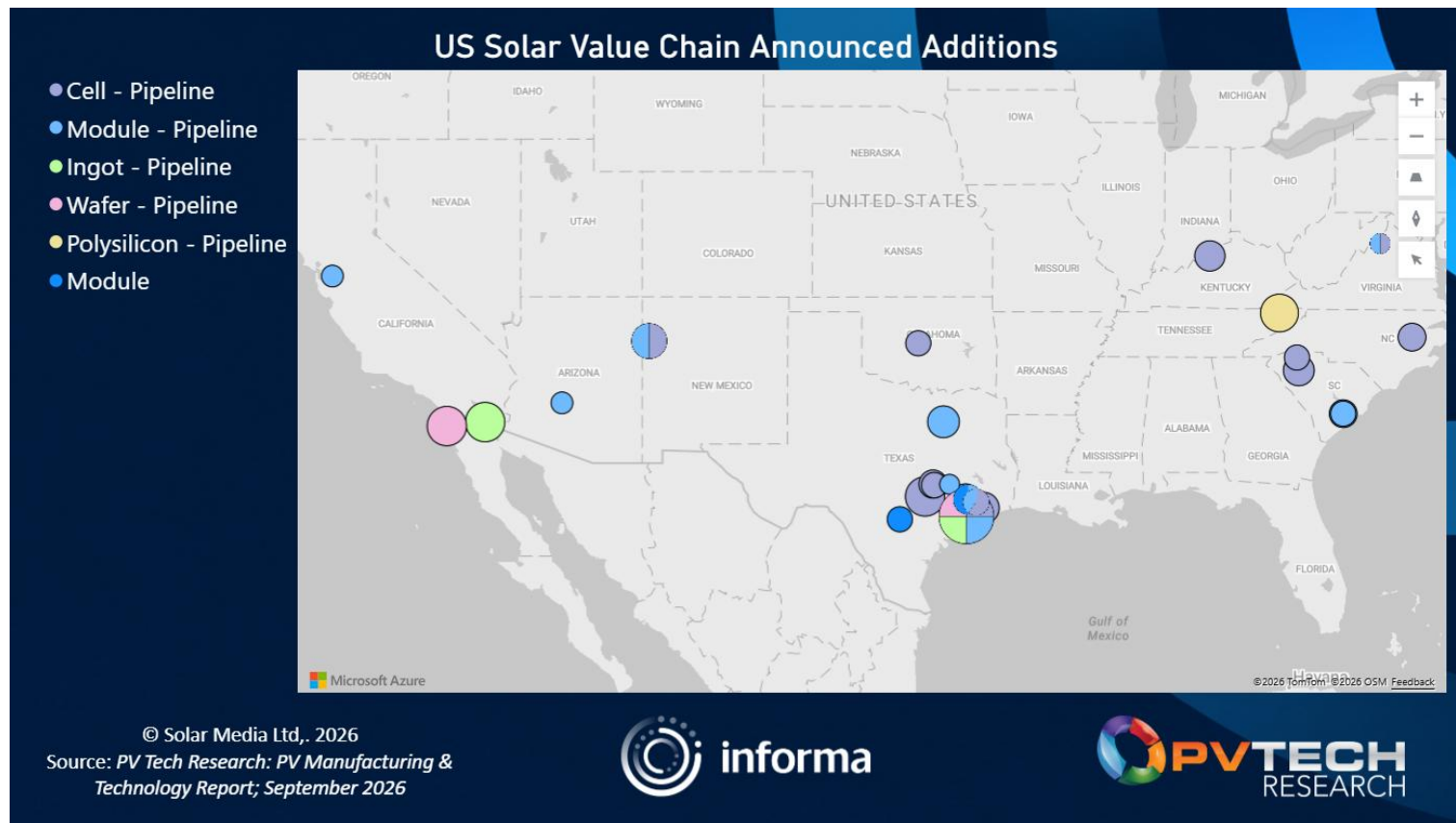
Ingots & Wafer are the smallest at every stage

Across all five stages, ingot & wafer capacity are the smallest number on the page — by a wide margin.

Only "Fully Operational" isn't a projection

35GW polysilicon · 5GW wafer · 30GW cell · 85GW module — the sole tier that reflects reality, not plans.

Is cell capacity catching up to module capacity?



Cells lead the pipeline

31GW between under construction and ramping up— a record for the US solar PV industry.

Module capacity remains the largest part of the value chain

That said, we are seeing a broader trend towards vertical integration in the US – at least for Modules & Cells.

Four technologies, one shared problem

Thin film is the exception; PERC, HJT and TOPCon all show a cell-to-module gap

THIN FILM — THE VERTICALLY INTEGRATED EXCEPTION

19.5GW capacity, 15.4GW production (~79% utilisation) — entirely First Solar. CdTe deposits the semiconductor layer directly during module fabrication, so there's no separate wafer-to-cell step, and no cell-to-module gap.

PERC

~30%

cell covers module cap.

Kept alive as the known reliable technology in the industry

HJT

~30%

cell covers module cap.

Leading announced module technology — seen as furthest from TOPCon patent exposure.

TOPCon

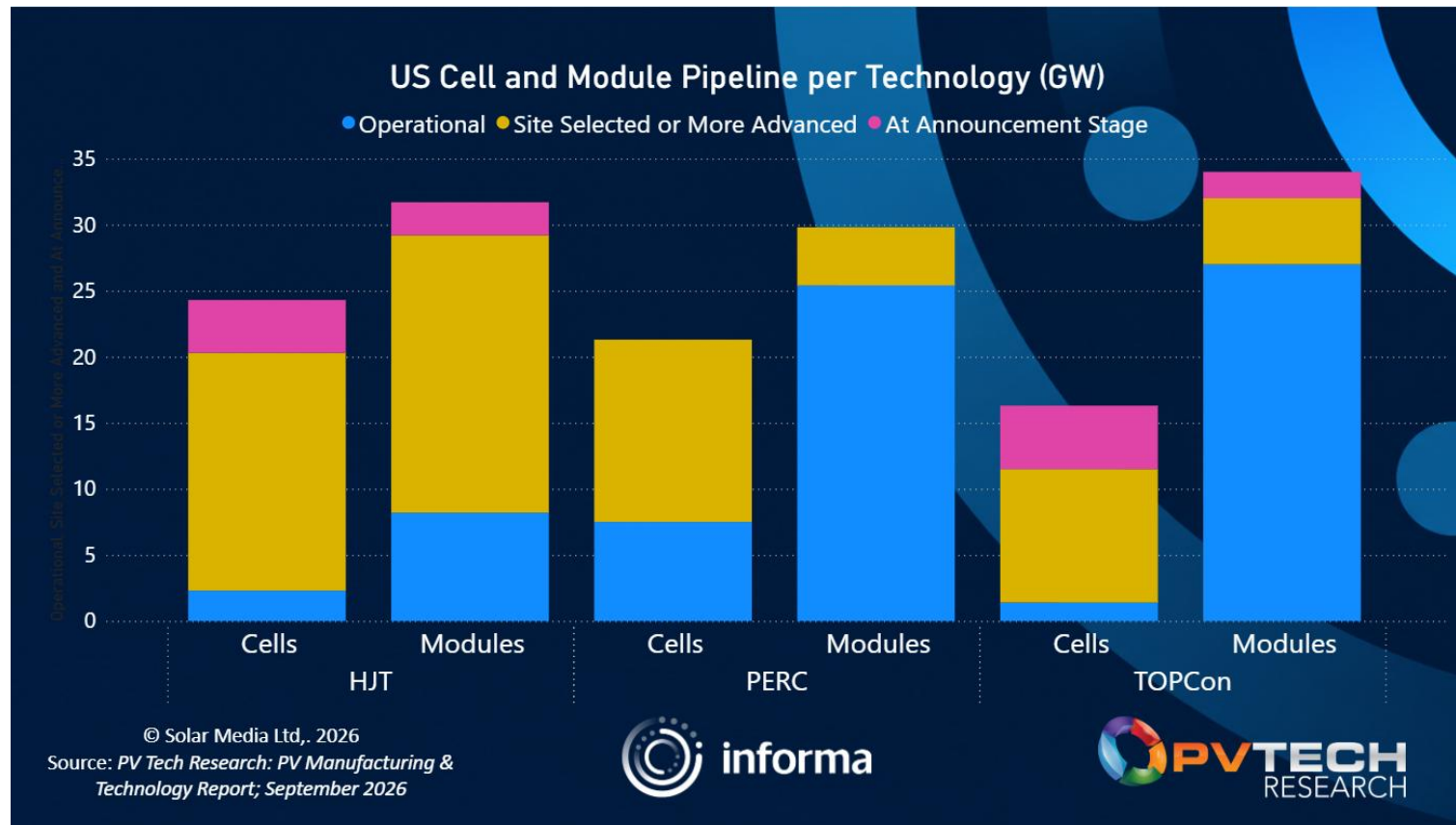
~5%

cell covers module cap.

Dominant technology worldwide for modules, but in the US, it has the widest cell-to-module gap of any technology and the most legal risks.

Not converging on one winner

The technology split within the under-construction pipeline



TOPCon still leads in module assembly but is currently dependent on imported cells. It is also the technology with the biggest cell-to-module gap in the supply chain. That is, in contrast to HJT, which seems to be building the pipeline of cells and modules concurrently.

From capacity to compliance

Scale alone doesn't determine market access

AD/CVD

FEOC

Section 232

A domestically located cell facility does not automatically produce compliant output if it relies on Chinese polysilicon or on wafers processed by FEOC-restricted entities. When Section 232 restrictions are added, the calculus shifts again: cells that qualify under AD/CVD rules today may still face price restrictions if their upstream wafer or polysilicon inputs originate outside the US.

The wafer gap is therefore a multi-layered compliance issue, not just a capacity one — the more fragmented the chain, the more exposure manufacturers and developers carry across every regulatory front at once.

APPLYING THE FOUR-TIER FRAMEWORK

PV Tech Research's four-tier cell procurement framework maps the 37.7GW under-construction cell pipeline against AD/CVD, FEOC and Section 232 requirements — identifying what's fully compliant (Tier 1), what carries uncertainty, and what's structurally unlikely to qualify for federal procurement or IRA incentive eligibility.

Where this leaves us by 2030

~40GW

Of PV-allocated Polysilicon

+43GW

Ingot & wafer Capacity

+38GW

Cell Capacity

Assumptions:

All numbers assume that the current market conditions remain unchanged, including the current phase-out of the 45x and all the import restrictions

What isn't Resolved:

While the number of Ingots & Wafers is promising, much of that is part of Tesla's integrated capacity – it may not be available to the other manufacturers

Regional hubs to watch: Texas, the Southeast, the Great Lakes and California — particularly at the wafer stage, where competition is thinnest and the gap is widest.

US Success Story – many regions are now looking to repeat it mainly the European Union

Thank you!

For more information about the report,
contact or scan the QR code:

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