

# Solar Manufacturing in Asia at a Crossroads

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For governments and firms looking to diversify clean technology supply chains, solar stands out as a unique challenge given China's scale and cost advantages. The US has ramped up trade barriers to reduce reliance on China's domestic and overseas solar manufacturing, imposing anti-dumping and countervailing duties of up to 3400% on Vietnam, Thailand, Malaysia, and Cambodia in April 2025, countries that have received significant Chinese solar manufacturing investment. Over the past year, these duties have all but eliminated Chinese investment and reduced manufacturing capacity in these countries by nearly 40%.

But US trade measures have largely led to a reshuffling of Chinese investment to new geographies, and the growing breadth of enforcement risks deterring non-Chinese investment that could serve as a genuine alternative. India is one such promising alternative, on track to become the world's third-largest solar manufacturing base after nearly a decade of domestic-led investment. But India's solar industry is heavily reliant on China for upstream inputs, which exposes Indian producers to the same kind of US trade scrutiny as Southeast Asia. The US Department of Commerce introduced steep tariffs on solar imports from India in February 2026, exacerbating domestic overcapacity concerns and leading investment in India to fall 27% quarter-on-quarter. In this note, we use Rhodium's [Clean Investment Monitor](#) data to dig into what's been happening in Southeast Asia and India—regions that have absorbed the most solar manufacturing investment globally outside of the US, Europe, and China since 2018—and explore what these trends mean for broader diversification efforts.

## Diversification is hard to do

Over the last decade, China has emerged as the dominant global player in many clean manufacturing supply chains, including solar, electric vehicles (EVs), and batteries.

Governments worldwide are now looking to mitigate their exposure to this concentration, using trade barriers to protect domestic industries and forging new trade partnerships as alternatives. But disentangling from China has proven challenging, given China's steep cost advantages and excess capacity that spans the entire supply chain.

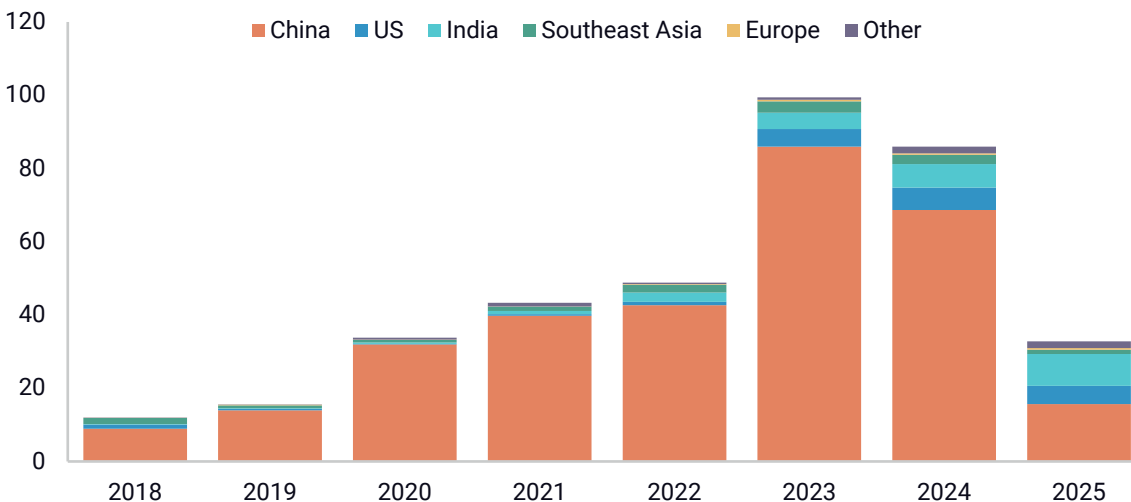
Nowhere is this more evident than solar. China has seen more than 80% of global investment in solar supply chain components since 2018 (Figure 1). After years of heavy investment, China is now home to 90% of global solar cell manufacturing—which represents more than twice global demand in 2025—and more than 99% of the upstream inputs, including wafers and polysilicon. [New investment is slowing under pressure from overcapacity and domestic price wars](#), but China's manufacturing base will endure.

The scale of China's production has driven costs down, enabling massive global solar deployment, but excess supply and low prices make it hard for other countries to compete on manufacturing. For more than a decade, the US has erected trade barriers against Chinese solar manufacturers in successive waves to protect domestic manufacturers. Early efforts triggered China to begin relocating production in Southeast Asian countries. This prompted US trade officials to impose sweeping duties to tackle circumvention, with steep tariffs imposed on solar cells and modules imported from Vietnam, Thailand, Cambodia, and Malaysia in the spring of 2025.

FIGURE 1

### China's solar investment has waned only after establishing global dominance

Capital investment in solar manufacturing from Q1 2018 - Q1 2026, billion 2024 USD



Source: Clean Investment Monitor, Rhodium Group

US trade enforcement has slowed Chinese solar investment in the region as intended but is not without tradeoffs. Chinese investment has simply shifted elsewhere, while genuinely domestic and non-Chinese producers in the target countries have suffered as collateral under blanket tariffs. The latest fallout from US trade investigations is now hitting closer to home: in late June 2026, a group of US solar manufacturers filed an anti-circumvention inquiry against Qcells, a South Korean company with operations in the US and a driving force behind securing duties against Vietnam, Thailand, Malaysia, and Cambodia. The case, which focuses on the use of Chinese wafers in Qcells South Korean production, illustrates a fracturing of the US domestic solar industry, with companies who lost access

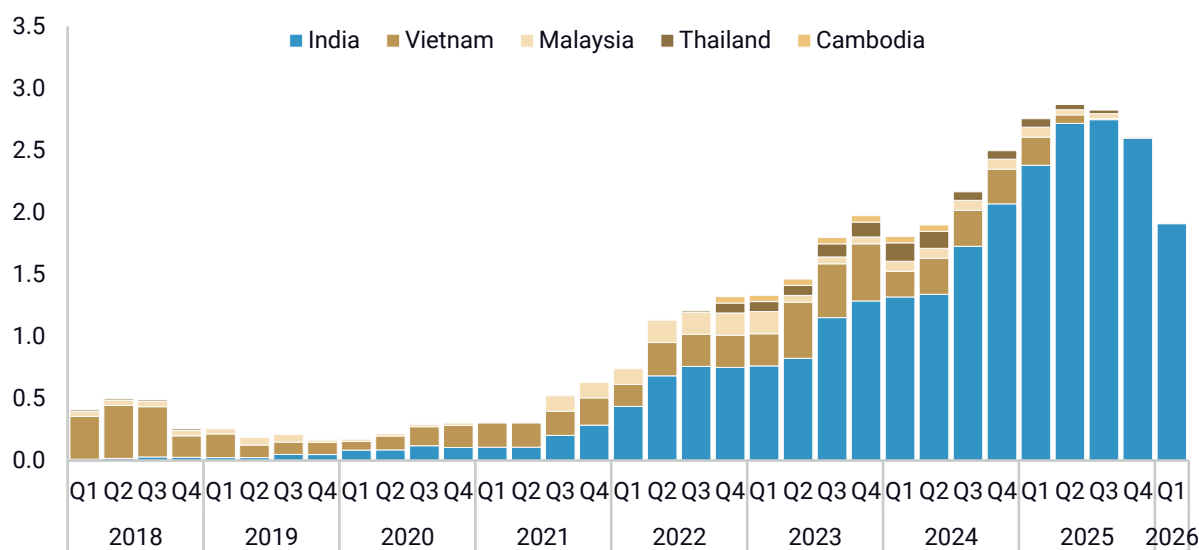
to low-cost Southeast Asian cell supplies due to the AD/CVD tariffs now fighting back against the company that led the charge, and the focus on Chinese upstream dependency could pose risks for any manufacturer looking to serve the US market.

Meanwhile, countries with large solar manufacturing industries well-positioned to act as alternatives—India chief among them—have built their solar industries largely reliant on China for upstream inputs such as polysilicon, ingots, and wafers. Access to cheap inputs is part of what has enabled rapid scale-up—with India’s annual investment in the solar supply chain growing by a factor of ten in the last five years—but it’s also a major vulnerability. Reliance on Chinese inputs may undermine the case for India and other hubs to serve as genuine alternatives, and it also exposes them to the same trade scrutiny as China itself. In India, preliminary tariffs on US-bound exports have effectively closed the US market, compounding challenges for an industry already facing domestic overcapacity in module assembly. Together, these conditions put pressure on manufacturers to diversify their export markets, reduce reliance on Chinese inputs, and ultimately invest in those upstream segments themselves.

In this note, we draw on data through Q1 2026 from the [Clean Investment Monitor](#)—which tracks quarterly clean technology manufacturing investments—to examine how the global solar manufacturing landscape is responding to US tariffs, overcapacity, and related pressures. We focus on India and Southeast Asia, regions that have received the most solar manufacturing investment since 2018 outside of the US, China, and Europe (Figure 1). However, in recent quarters, investment has fallen markedly in India and the four Southeast Asian countries facing steep US antidumping and countervailing duties: Vietnam, Thailand, Malaysia, and Cambodia (Figure 2). We explore the underlying drivers of this decline in these countries, as well as markets where solar manufacturing investment has remained stable or grown.

FIGURE 2  
**Solar manufacturing investment slows in India, Vietnam, Malaysia, Thailand, and Cambodia**

Capital investment in solar manufacturing from Q1 2018 - Q1 2026, billion 2024 USD



Source: Clean Investment Monitor, Rhodium Group

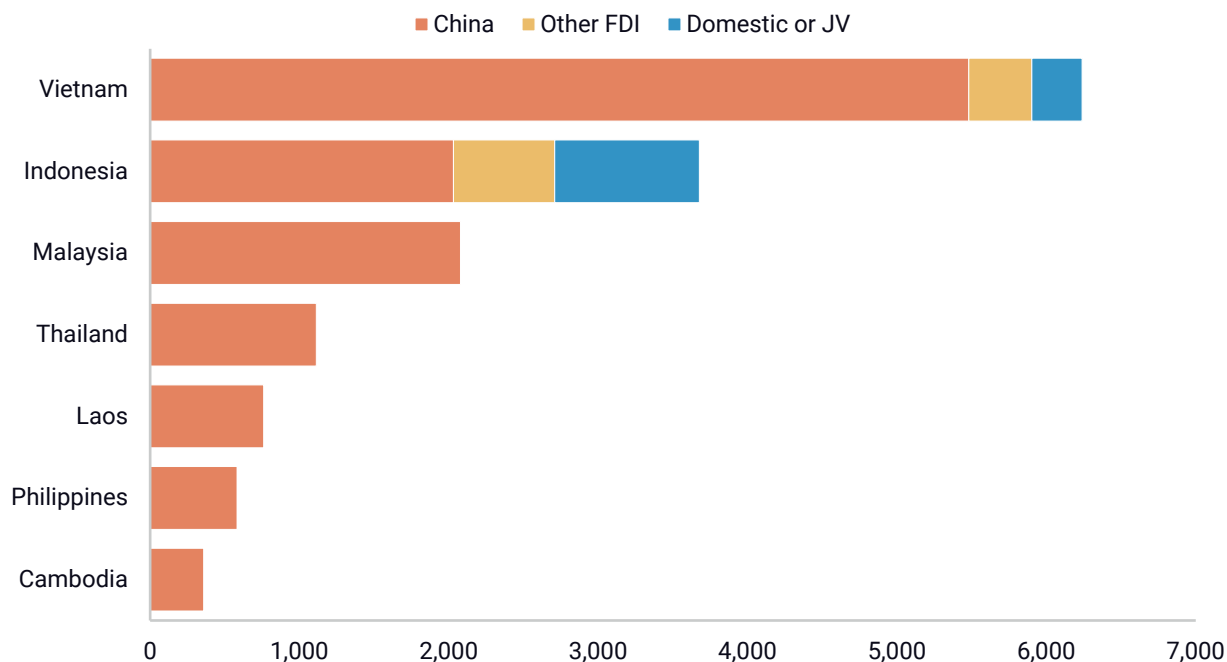
## Upheaval in Southeast Asia

In the early 2000s, investment in Southeast Asian solar manufacturing was modest and dominated by Western and East Asian companies seeking lower-cost production. Beginning in the early 2010s, however, investment flows began to ramp up, as Chinese firms sought to skirt anti-dumping tariffs that the US and EU imposed on Chinese-made panels starting around 2012 and 2013. Chinese investment accelerated to Southeast Asia following growing US-China trade tensions and the resulting tariff hikes on Chinese goods between 2018 and 2020. Since 2018, investment of Chinese origin has accounted for 84% of solar manufacturing investment in the region (Figure 3). Vietnam and Indonesia stand out among Southeast Asian countries in having attracted more diversified investments over this period—including domestic companies, joint ventures, and non-Chinese foreign capital, in addition to Chinese investment.

FIGURE 3

### Chinese investment underpins Southeast Asian solar industry

Announced capital investment in solar manufacturing by country of origin from Q1 2018 - Q1 2026, million 2024 USD

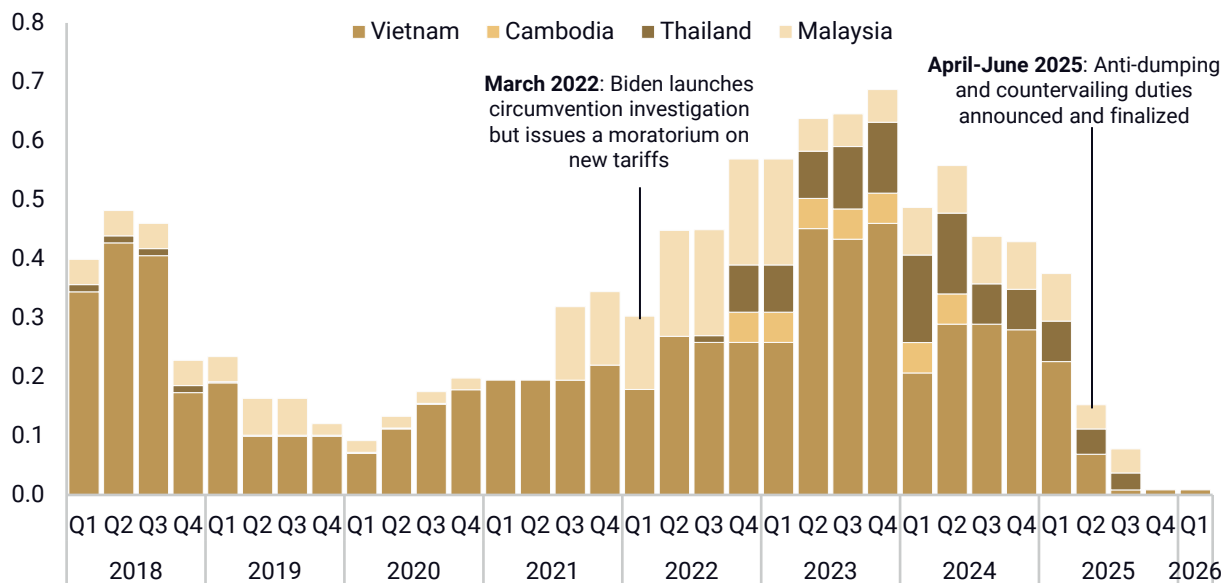


Source: Clean Investment Monitor, Rhodium Group, Rhodium's China Cross-Border Monitor

Since 2022, the US government has placed increasing scrutiny on whether Chinese investment in Southeast Asia was being used as a pass-through to circumvent tariffs. Investigations started with Vietnam, Thailand, Malaysia, and Cambodia, which together accounted for more than three-quarters of US solar module imports at the time. The Biden administration launched an investigation but simultaneously issued a temporary moratorium on new tariffs. The Trump administration took up the issue again in 2024. After a year-long investigation, in April 2025 the US Department of Commerce announced anti-dumping and countervailing duties (AD/CVD) of up to 3400% on imports from those four countries.

Solar manufacturing in those target countries took a hit. Total investment across the four markets fell 60% in Q2 2025 relative to the previous quarter and continued to decline through the end of the year. Q4 of 2025 and Q1 of 2026 saw only minimal investment in Vietnam and no activity in the other three target countries, Malaysia, Cambodia, and Thailand.

**FIGURE 4**  
**Latest US tariffs drive down investment in four core Southeast Asian solar hubs**  
 Actual capital investment in solar manufacturing by country from Q1 2018 - Q1 2026, billion 2024 USD



Source: Clean Investment Monitor, Rhodium Group

US tariffs have done more than deter new investment—they have driven the closure of existing facilities and the cancellation of planned ones, rendering the export-oriented manufacturing model largely unviable across the region. Across the four target countries, a combined 29 GW of capacity has been lost through closures and cancellations in the last year, a nearly 40% reduction from Q1 2025 levels, before the tariffs went into effect (Figure 5). Vietnam saw the largest absolute losses at 10 GW, but Malaysia and Cambodia—both with more nascent solar industries—have experienced the steepest proportional declines, with over 70% of existing and planned capacity shuttered in each country.

The slowdowns and closures extend beyond Chinese-owned manufacturers. The AD/CDV announced in 2025 apply at the country level rather than company by company, meaning domestic and non-Chinese producers face the same duties as Chinese-owned facilities. Companies received differentiated rates based on the level of cooperation with the Commerce Department investigation, but compliance was costly and documentation-intensive—a burden that fell hardest on smaller domestic manufacturers who lacked the resources to engage fully, often resulting in steeper penalty rates for companies the policy was not designed to target. The region’s legacy Western and East Asian firms were also impacted, although many were able to receive lower rates by cooperating with investigations.

FIGURE 5

**Steep US tariffs have rapidly reduced solar production capacity in targeted countries**

Current and planned solar module manufacturing capacity before and after AD/CVD duties applied (GW)

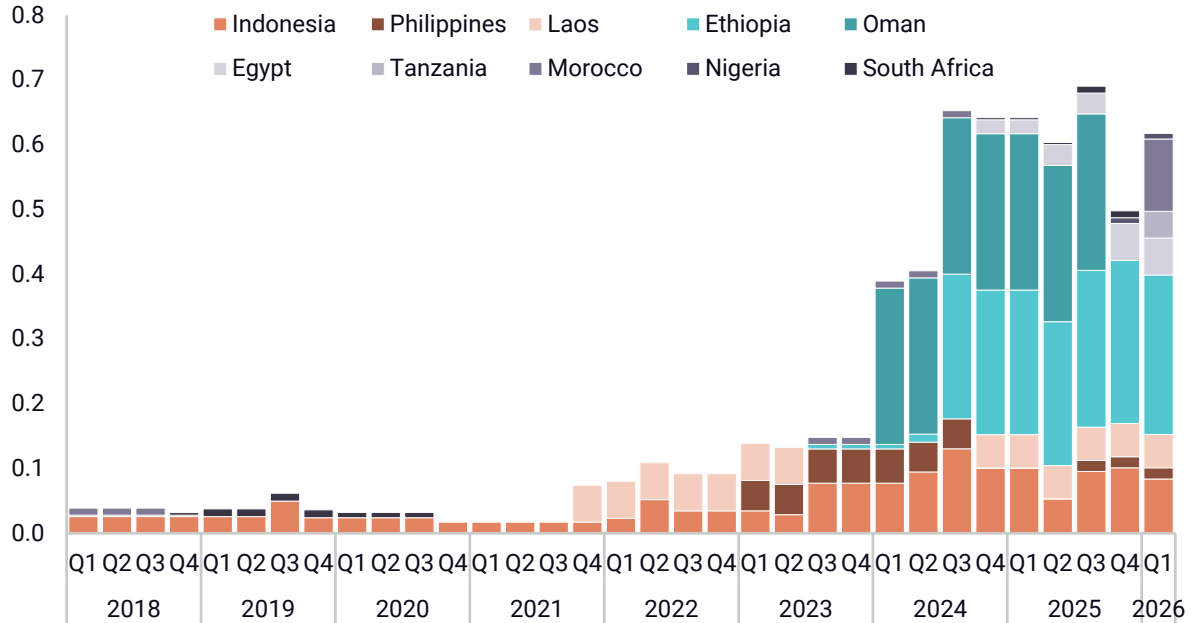


Source: Clean Investment Monitor, Rhodium Group

As solar manufacturing contracts in Vietnam, Thailand, Malaysia, and Cambodia, investment is rising elsewhere (Figure 6). This includes Laos, Indonesia, and Oman, which, as [Rhodium Group's China Cross-Border Monitor](#) finds, is largely fueled by Chinese firms seeking new hubs to sidestep US tariffs. More recently, Ethiopia and the Philippines have emerged as the latest destinations for Chinese manufacturing investment. In response to this pattern of tariff-hopping, the US placed preliminary AD/CVD duties on Indonesia and Laos in the spring of 2026, and an anti-circumvention complaint has been filed targeting Ethiopia.

However, Chinese firms looking to invest abroad face mounting pressure not only from the US but also from Beijing. This follows new rules released in early May 2026, which aim to tighten Chinese government control over outbound investment. First, the rules aim to reduce outflow of tech, talent, and innovation, making getting approval for overseas investment more complex for Chinese firms. Second, they provide a legal basis for taking countermeasures against host country actions that Beijing deems discriminatory, which may put recipient countries in a more defensive posture. While it's not clear whether the new rules will shift investment flows substantially, they add complexities for Chinese firms seeking to invest overseas and raise the risk of retribution for host countries.

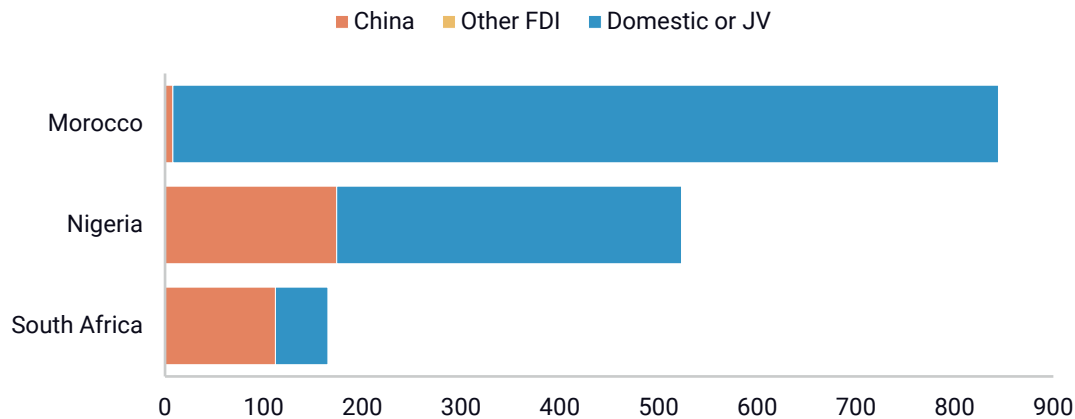
**FIGURE 6**  
**Solar manufacturing investment remains steady elsewhere in Southeast Asia and is rising in the Middle East and Africa**  
 Actual capital investment in solar manufacturing by country from Q1 2018 - Q1 2026, billion 2024 USD



Source: Clean Investment Monitor, Rhodium Group

Not all new solar manufacturing investment is driven by China. Morocco, South Africa, and Nigeria have each seen a surge in solar manufacturing investment in recent quarters. Existing and planned investments have had meaningful participation by domestic companies—a sign that local solar industries are beginning to take shape in addition to China’s overseas hubs.

**FIGURE 7**  
**Emerging solar supply chains in South Africa, Morocco, and Nigeria are led by domestic investors**  
 Announced capital investment in solar manufacturing by country of origin from Q1 2018 - Q1 2026, million 2024 USD



Source: Clean Investment Monitor, Rhodium Group, Rhodium’s China Cross-Border Monitor

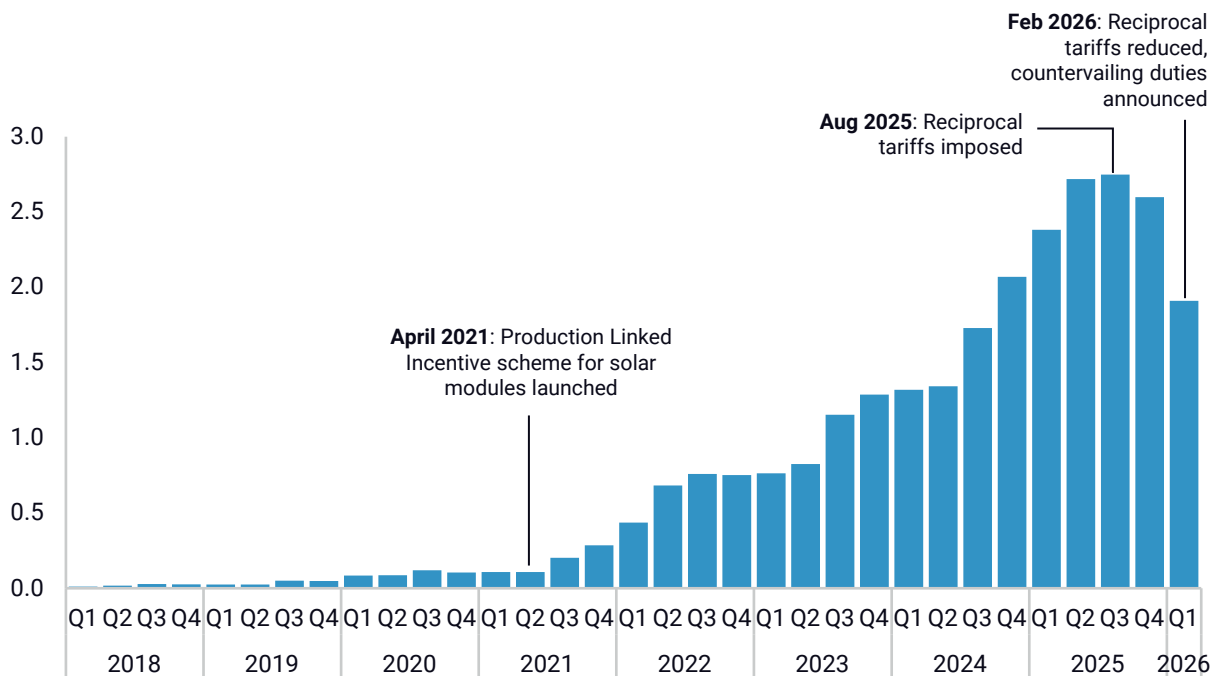
In the next section, we dive into solar manufacturing in India, where a domestic solar industry has emerged at scale—however, not without its own dependencies on China.

## Recalibrating in India

India has seen a massive build-out of its solar industry in recent years, with annual investment rising from \$84 million in 2018 to \$10 billion in 2025. This has put the country in third behind China and the US in current and planned solar cell and module capacity globally. Solar investment trends have turned the corner, however, with quarterly investment growth slowing in Q3 2025 before falling the following two quarters. In Q1 2026, India saw a 27% reduction in solar manufacturing investment from the previous quarter, and 20% since Q1 2025 (Figure 8).

The downturn can be attributed to two major forces: mounting US tariffs and domestic overcapacity. The Trump administration’s reciprocal tariffs imposed 50% on Indian goods starting in August 2025. While these were reduced to 18% in February 2026, later that same month Indian solar producers took a much greater hit when the US Commerce Department levied preliminary AD/CVD duties of approximately 250% on Indian solar products. The US market—which absorbed 99% of India’s module shipments in Q3 2025—has effectively closed to most Indian manufacturers. Exports, which accounted for roughly 35-40% of India’s solar module production before the duties, fell 80% from Q3 2025 to Q1 2026 as a result.

FIGURE 8  
**Overcapacity and US tariffs reverse India’s solar manufacturing surge**  
 Capital investment in solar manufacturing from Q1 2018 - Q1 2026, billion 2024 USD

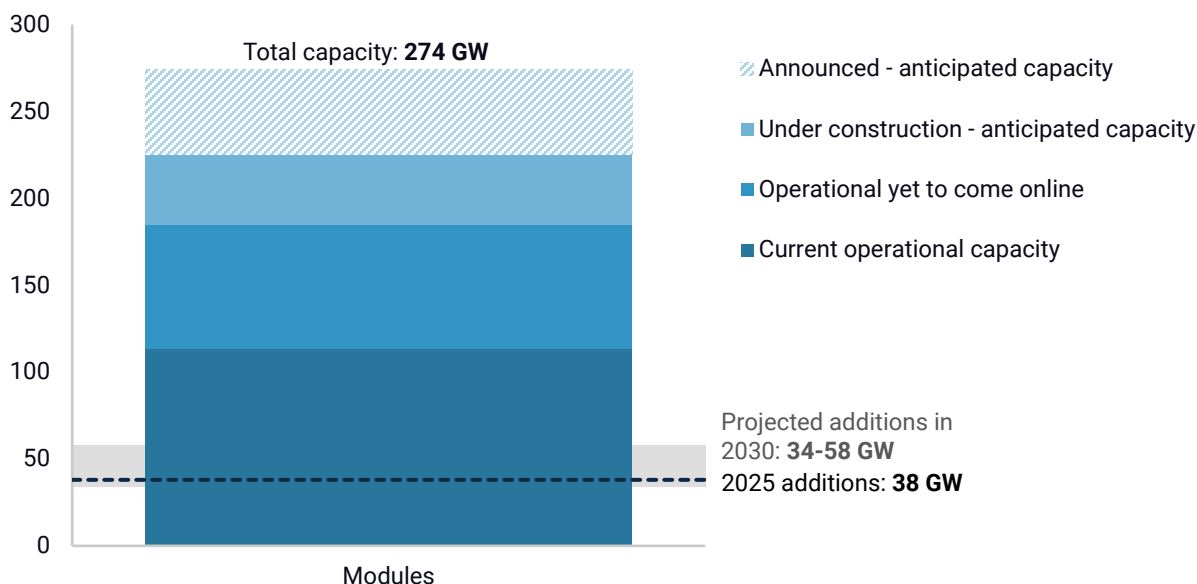


Source: Clean Investment Monitor, Rhodium Group

The loss of the US market comes at a time when India already has an oversupply of solar panels. Government support has driven a rapid build-out of manufacturing capacity. This includes the Production Linked Incentives (PLI) scheme, which pays cash incentives tied to output, as well as a requirement that any solar project receiving government support procure panels from an approved list of domestic manufacturers. India now has enough operating module manufacturing capacity to supply three times the panels installed domestically in 2025, and two to three times projected annual additions by 2030 (Figure 9). The resulting overcapacity has kept prices low, supporting growing domestic deployment and exports. However, the supply-demand imbalance, combined with US tariffs and pending investigations, has driven manufacturers to scale back.

**FIGURE 9**  
**India’s module capacity is 3x higher than 2025 demand, with the gap set to widen as planned capacity outpaces demand growth by 2030**

2026 Q1 current and planned manufacturing capacity in 2030 (GW)



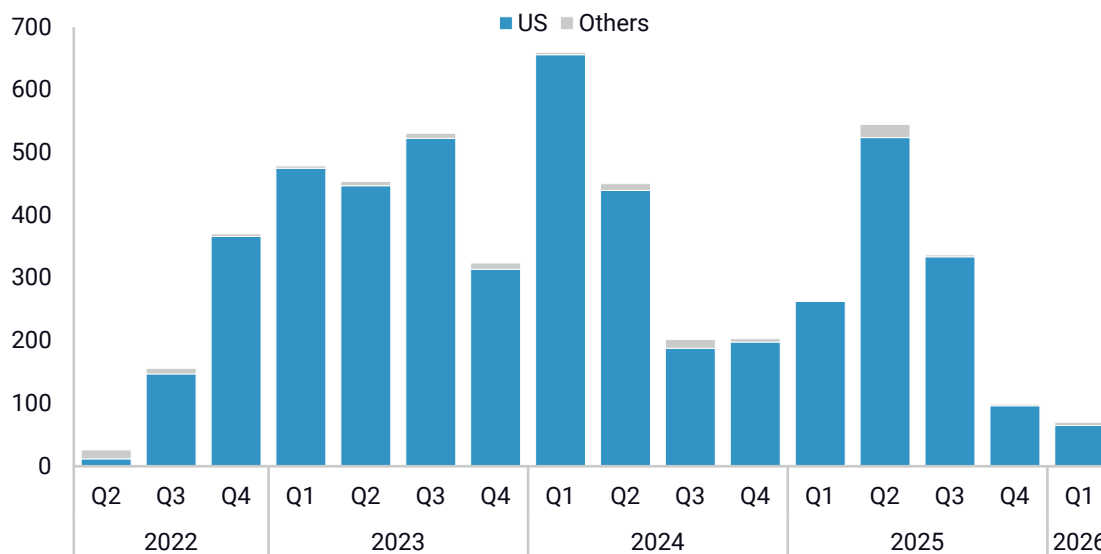
Source: Clean Investment Monitor, Rhodium Group, Rhodium Climate Outlook

While both India and Southeast Asia have seen slowing investment, India’s solar industry differs from the latter in important ways. First, it’s almost entirely domestically owned, with more than 95% of investment since 2018 from domestic firms. And unlike Southeast Asian manufacturers built almost exclusively around exports, Indian producers primarily serve a large and growing domestic market. These two features—domestic ownership and local demand—provide a degree of political and economic resilience for India’s solar industry that Chinese-owned export facilities lack in the face of global market volatility. While new investments have slowed, India hasn’t experienced the kind of scaling back of existing and planned capacity as we’ve seen in Vietnam, Malaysia, Thailand, and Cambodia.

The scale of overcapacity, however, means that India’s domestic market alone is unlikely to justify the investments made to date. India’s solar module exports fell by 70% from Q3 to Q4 2025 following US blanket tariffs, and another 30% quarter-on-quarter in Q1 2026 following the US’s preliminary CVD determination (Figure 10). Despite the fallout, Indian manufacturers have not yet pivoted to new markets. Europe is a clear alternative, but

pivoting is complicated by the region’s stringent supply chain due diligence and sustainability requirements under the EU’s CBAM and other policies, with which many Indian manufacturers cannot yet comply. The emphasis in the EU on “non-price” criteria—environmental, social, and resilience parameters used in renewable auctions—can benefit Indian over lower-cost Chinese panels. However, the EU’s growing scrutiny on upstream inputs is likely to pose both a sourcing and compliance burden. Other alternative export destinations include quickly growing solar markets in Asia and Africa, but they are far from matching the scale of the US market.

**FIGURE 10**  
**India’s solar exports have yet to find a new home after the US market closed**  
 Solar PV module exports by trade partner, million 2024 USD



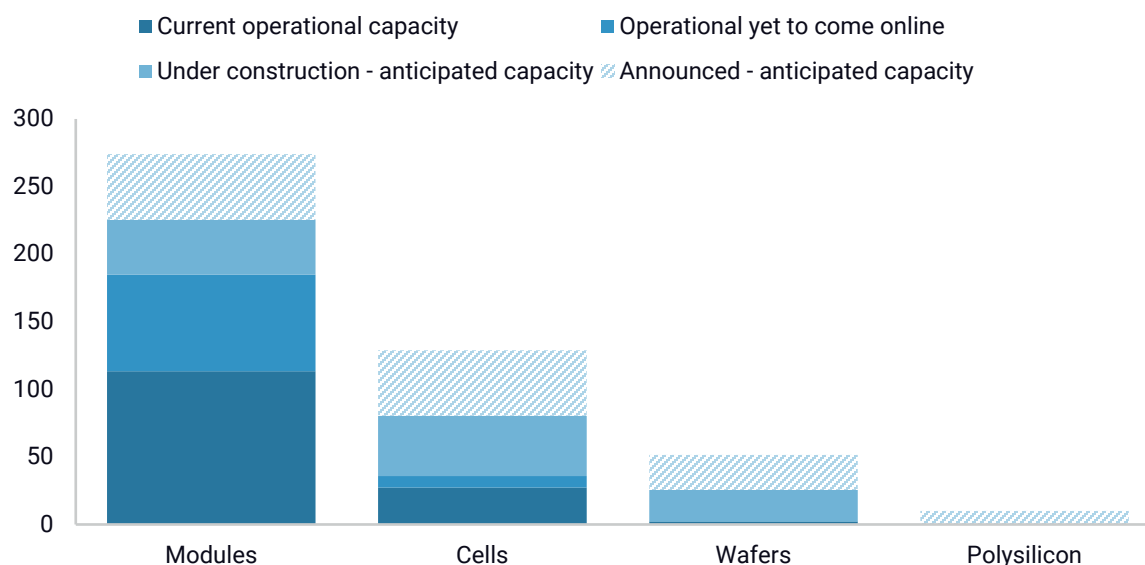
Source: UN Comtrade

In the longer term, the health of India’s solar industry will depend in part on its ability to move up the supply chain. Today, 80% of India’s operating solar manufacturing capacity is concentrated in module assembly, with a pipeline set to more than double by 2030 as announced and under construction projects come online and operational projects ramp up to full capacity (Figure 11). These downstream facilities rely heavily on Chinese inputs. The planned projects in mid- and upstream segments—including cells, wafers, and polysilicon—are nascent but growing. Deepening this supply chain could help address the limits of a saturated module assembly market, reduce exposure to China input price and supply risk, and respond to pressure from the US, Europe, and other trade partners who are increasingly scrutinizing reliance on Chinese upstream components.

FIGURE 11

### India's solar manufacturing pipeline set to diversify if proposed projects materialize

2026 Q1 current and planned manufacturing capacity in 2030 (GW)



Source: Clean Investment Monitor, Rhodium Group

## Moving on up

For governments seeking to limit exposure to Chinese supply chains, reducing reliance in the solar sector will ultimately require developing genuine alternative industries across the full supply chain. So far, most ex-China investments have been in module assembly, where countries like India have proven that domestic industries can be built at scale. But downstream manufacturing in India and in much of the world still relies heavily on upstream Chinese components like wafers and polysilicon.

The critical next step is moving into those upstream segments, which will likely prove far harder to do than the downstream investment made to date. Polysilicon and wafer manufacturing are capital-intensive to produce, requiring billions in upfront investment, and Western producers and new entrants will need time to come down the cost curve to catch up with Chinese competitors who have spent decades optimizing these processes. Given the time and capital involved, industry players need sustained policy support—such as tariffs and domestic content requirements—for investments to pencil out.

That combination of capital, patience, and policy has proven difficult to recreate outside of China. A leading indicator of progress will be the pace and scale of new upstream investments. In the months ahead, the [Clean Investment Monitor](#) will be tracking new announcements and the existing pipeline of announced and under construction projects on a quarterly basis to map where, when, and to what extent the global solar supply chain solar is diversifying.

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