2025 PV

Module Price Index

Secondary Solar Market

ENERGYBIN BUCKSTOP

Key Findings

For the fifth year of publishing the PV Module Price Index - Secondary Solar Market, the findings point to opportunities that lie within a robust and sustainable secondary market that supports the ongoing extension of PV asset lifecycles, maximization of asset recovery, and minimization, if not elimination, of solar e-waste. Both the value and size of the secondary market increase as reuse of PV modules not yet at end-of-life becomes mainstream and a comprehensive recycling infrastructure to extract and redeploy materials is established.

Resale platforms, like EnergyBin, shed light on secondary market activity and trends. Although this report is heavily based on pricing and product availability from the EnergyBin exchange, as listed by members, who are solar companies engaged in hardware trade, key findings illustrate what's likely the case in the greater secondary market, specifically on a wholesale level.

- In 2025, modules listed for resale on the EnergyBin wholesale exchange were predominantly new (98%) and ranged in power from 400 to 525 watts.
- New modules from the All Black, Bifacial, and Monofacial classifications held their resale value from January 2024. All Black and Monofacial modules increased in price by 2.2 and 23.7% respectively. The average Bifacial price decreased by 9.5%; however, the average price in Q4 2025 was 17% higher than that of Q1 2024.
- P-Type module supply comprised 72% of All Black, Bifacial, and Monofacial classifications. Resale values in Q4 2025 for All Black and Bifacial P-Type modules increased by 42 and 14% from Q1. However, the average Monofacial P-Type module price decreased by 8%. The phase-out of P-Type modules has already commenced within the global market. PERC modules are nearly nonexistent in various markets, including the European Union. In the U.S., new technology innovations, such as N-Type HJT, will likely replace PERC production lines. The large share of P-Type modules listed for resale on EnergyBin in 2025 reflect a rush to offload this technology before the resale value begins to drop, which will happen once N-Type module supply surpasses P-Type and demand increasingly shifts to N-Type.
- Legacy and Used classifications listed for resale on EnergyBin were scarce in 2025, making up just 2% of total listings. The low volume could be an indicator that POLY supply has nearly dried up. Even with a steady average price of $0.150/W, they failed to compete within the global market with new TOPCon modules listed at $0.090/W shipped FOB from China (as of December). That reality limited remarketing to the domestic U.S. market unless resellers were willing to sell to international buyers for less.
- The average used module price plummeted by 30% from January 2024, down to $0.058/W in Q4 2025. Much of today's used module supply is bypassing wholesale platforms and either exported directly to international buyers or transported to disposal facilities. Until the world market corrects for oversupply of new modules, the price of used modules will likely remain under $0.100/W.
- One exception that appears to justify the viability of used module resale today is that of top-quality modules that are less than 10 years old, have a degradation rate of at or below 0.5-1% per year, and are defect-free. As buyers favor well-made modules over price, used module resale, particularly those in excellent working condition with 3.2 mm glass and no cracked backsheets, becomes an opportunity.

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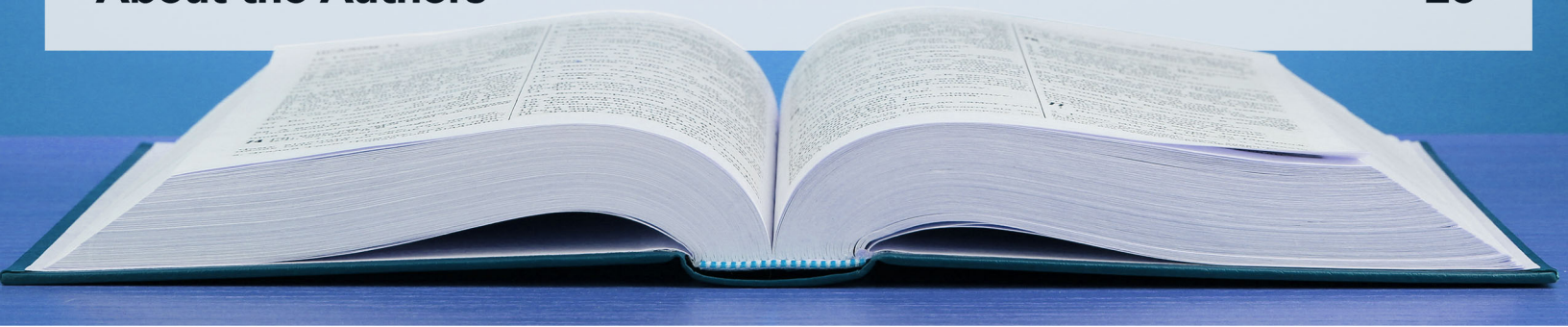


Overview of the Secondary Solar Market

The secondary solar market exists to bring together buyers and sellers to trade new and used PV hardware and materials that have left primary market channels. It is also referred to as the downstream market or aftermarket and includes such facets as reuse, repair, remarketing, resale, and recycling. The secondary market is a critical component within the circular economy loop.

Traditionally, the term "secondary market" has referred to the stock market. EDUCBA describes the difference between the primary and secondary markets in this manner: "The securities are firstly offered in the primary market to the general public for the subscription where a company receives money from the investors and the investors get the securities [known as the IPO – initial public offering]. Thereafter, they are listed on the stock exchange for the purpose of trading [secondary market]."

This same concept also exists in many industries that deal in goods. Along with goods traded in the secondary market, new services are created to support trade and reuse of those goods. For example, the real estate industry represents a portfolio of new and used properties that may change ownership multiple times. The original developer or property owner may be involved in the initial sale. But then, a real estate broker resells the property as owners come and go. In addition to brokers, the real estate secondary market has generated opportunities for insurance companies, appraisers and repair services – all services that the original owner/developer would not offer.

Like the real estate industry, both new and used PV hardware can be found in the secondary market. Commonly, solar modules, inverters, BOS parts, and other components enter the market by way of clearance, close-outs, and surplus. Asset liquidations from discontinued product lines, company acquisitions or bankruptcies are also common. Additionally, leftover products flow from bulk purchases and project installations. Products from project cancellations, delayed or downsized projects enter the downstream market as well. In these scenarios, products are new and have not been installed. Furthermore, the secondary market receives used and refurbished hardware that has been decommissioned from a working solar system. Used products are sorted into two categories: (1) those that can be reused and remarketed, and (2) those that are ready for recycling.

In the solar industry, the secondary market is following a business trend that started in the early 1990s. Companies throughout North America, Europe and Japan shifted from merely offering products to delivering value to their customers. This trend came at the cusp of staggering demand, increased competition and shrinking profit margins. Harvard Business Review comments that, "as businesses began offering solutions instead of products, it became evident that selling spare parts and after-sales services – conducting repairs; installing upgrades; reconditioning equipment; carrying out inspections and day-to-day maintenance; offering technical support, consulting and training; and arranging finances – could be a bountiful source of revenues and profits as well."

This trend has led to distributors offering consulting services, financing options, and some operating as recycling drop-off locations for end-of-life materials. Installers have also expanded their business models to include maintenance and decommissioning services. These services offer additional revenue streams and prop up bottom-line profits.

Such revenues and profits gained from secondary market activities may even surpass that of companies' primary product or service offerings. Harvard Business Review notes that, "In industries such as automobiles, white goods, industrial machinery and information technology, companies have sold so many units over the years that their aftermarkets have become four to five times larger than the original equipment businesses." It is estimated that "American businesses and consumers spend approximately $1 trillion every year on assets they already own."

Those engaged in equipment trade in the secondary market include solar companies, solar equipment brokers, resellers and suppliers, recycling and refurbishment firms, insurance companies and third-party warranty companies. These players connect to each other through online exchange markets and membership associations.

Companies operating in the secondary market tend to take on dual roles of 'buyer' and 'seller'. In one transaction, a company may offer products for sale; in the next, that company may buy equipment from another company. Companies who specialize in solar equipment brokering represent a range of clients, including DIY homeowners, bargain shoppers, non-profit organizations, savvy commercial property owners, O&M companies and repairers. Many secondary market brokers and resellers serve clients throughout the world.

Market Size

Credibly estimating global flows of used panels is a statistical challenge for multiple reasons. First, the Basel Convention restrictions on the transportation of electronic waste incentivize 'grey market' exporters to mis-classify panels as 'household goods' or other trade codes that are not covered by e-waste laws. The relevance of these regulations increased in the solar market after the Basel Convention was expanded on January 1, 2025 to cover non-hazardous e-waste (such as solar panels). The U.S. is not a signatory to the Basel Convention, but many traders, exporters, and monitoring groups choose to abide by the Convention's best practices regardless.

Two different ways can be used to estimate panel flows from the U.S. to other countries. First, trade data from the U.S. ITC classified as solar panels (HS 8541.43) can be analyzed to filter for pricing, where manifest data contains both pricing and wattage. A statistical filter can be applied in order to identify panels that are likely traded at used pricing levels (in this case defined as under $0.08/watt, per EnergyBin's resale data). This analysis, covering a sample size of exports to five major developing-country solar importers, shows around 50 MW of U.S. used panel exports in 2025, concentrated in export flows to Pakistan, playing a significant role in what commentators have called "Pakistan's solar boom."

2025 US ITC Data: Panel flows to key geographies, filtered for used pricing levels
(Buckstop analysis of U.S. ITC Data)

Filtering for used pricing amongst panel shipments only captures some of the wholesale market, however. Regulatory changes to trade classifications and Basel Convention compliance have driven a significant portion of used or end-of-life panels into HS codes that cover electronic waste for precious metal recovery (eg. 8549.29) but do not contain certain hazardous metals that are common among other forms of electronic waste. Whether these panels are actually 'waste' or being resold, refurbished, or recycled once they leave the U.S. market is not certain.

Analyzing this data, based on proprietary estimates of solar panel wattage-per-kg for older panels from Buckstop's >150,000-SKU database of solar assets, produces an estimate of an additional 150 MW of solar exports, likely exported for reuse, but which may also have been recycled offshore. These export flows are relatively lumpy, reflecting large individual liquidations. For instance, the value of shipments identified as likely solar e-waste is driven by large monthly spikes reflecting individual liquidations, such as the spike in exports from Houston to Pakistan in October 2025, which tracks with the timing and scale of 82 GW of project cancellations of U.S. utility-scale solar projects in 2025, some of which would have been partially built.

2025 U.S. ITC Data: Panel flows to key geographies, MW and value, filtered for used pricing levels and likely solar content (Buckstop analysis of U.S. ITC Data)

Destination Country	Visibly Used (8541.43)	Scrap Exports (8549.29)	Total Capacity (MW)	Total Value ($M)
Filter	*Shipments at <$0.08/W*	*E-waste shipments for precious metal recovery*		
Pakistan	26.2	84.5	110.7	7.2
India	4.8	62.1	66.9	11.4
Nigeria	5.1	12.4	17.5	1.8
Afghanistan	6.1	8.8	14.9	0.9
South Africa	5.6	3.2	8.8	2.1
Other	2.5	6.7	9.2	1.1
TOTAL	**50.3**	**177.7**	**228**	**24.5**

Why It Matters

The secondary market offers solar companies the opportunity to create financial, social, and operating value. As a result of the solar industry's phenomenal growth over the last decade, the scale of the secondary market has grown significantly. In the United States, solar deployment has grown rapidly, from around 30 GW of installed capacity in 2015 to 255 GW at the start of 2025, or an annual growth rate of around 25%.

Secondary markets are not just useful sources for spare parts and liquidity sources for excess stock. Resale also allows solar operators to find used parts, donate unwanted inventory, lessen supply chain shortages through recycling, and help solve energy poverty around the world.

Circularity in solar is set to grow substantially in coming years as operators of older projects consider repowering scenarios 10-15 years into their useful lives, PPA terms end, and regulatory changes contribute to project cancellations. Circularity will also be a driving factor at the start of projects' lives, as decommissioning bonds and regulatory best practices incentivize solar developers and operators to consider circularity throughout an asset's lifecycle. Assets that are truly at end of life may also sustain value because of the increasing value of the raw materials within a solar panel, such as silver and aluminum.

About the Index

The PV Module Price Index is presented by EnergyBin, LLC. and Buckstop, Inc. to provide the solar industry with historical crystalline-silicon (c-Si) module valuation within the secondary solar market.

All prices are represented as wholesale values and are taken from trade activity on the EnergyBin wholesale exchange. Modules assessed in this index were listed for resale and available for immediate delivery from a U.S. location in 2025.

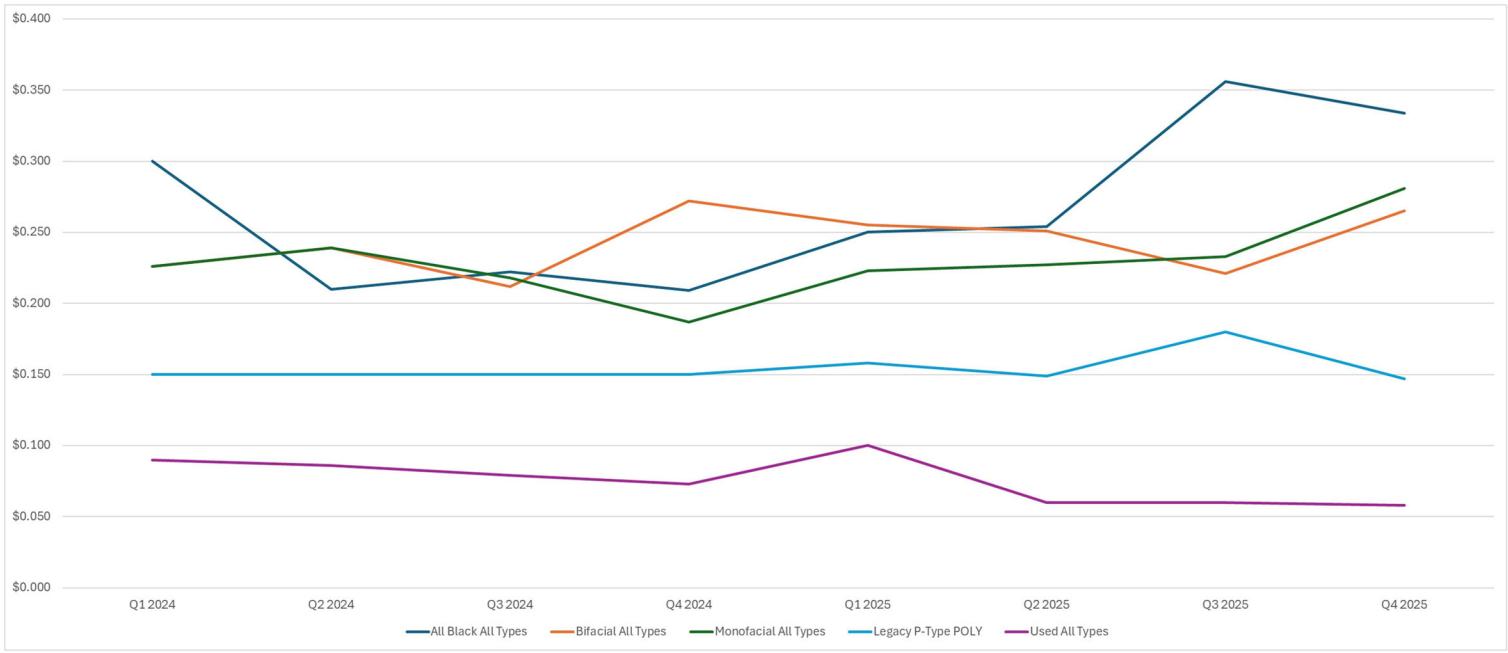
When interpreting the price index, consider that findings are based on modules traded within the secondary market, and therefore, the following applies:

1. The price per watt (PPW) is based on spot prices of c-Si modules listed for resale on the EnergyBin wholesale exchange.
2. The PPW is represented as the weighted average per module class for a given timeframe.
3. Prices are quoted by resellers for the U.S. market.
4. Because these goods are already located within the U.S. market, no additional import duty would be assessed, as they are treated as domestic trade goods within the secondary market.

Modules assessed for the price index were taken from resale listings posted to EnergyBin from 2020 through 2025. This index represents a sample of 2,800 listings comprising 8.7 million modules and classified into categories of All Black, Bifacial, Monofacial, Legacy POLY, and Used. Resale listings ranged in quantity from 1 to 300,000 modules with an average quantity of 3,000.

PV Module Price Trends

U.S. Secondary Market PV Module Prices by Module Type



The price per watt (PPW) is based on spot prices of c-Si PV modules listed for sale on the EnergyBin wholesale exchange. Prices are quoted by sellers for the U.S. market. The PPW is represented as the weighted average per module type per month. These listings are for modules located within the U.S. remarketed in the secondary market and ready to ship. If applicable, tariffs have already been assessed.

Source: EnergyBin, LLC. / Buckstop, Inc. |
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Average PPWs by Module Type
Q1 2024 - Q4 2025

	All Black All Types	Bifacial All Types	Monofacial All Types	Legacy P-Type POLY	Used All Types
Q1 2024	$0.300	$0.226	$0.226	$0.150	$0.090
Q2 2024	$0.210	$0.239	$0.239	$0.150	$0.086
Q3 2024	$0.222	$0.212	$0.218	$0.150	$0.079
Q4 2024	$0.209	$0.272	$0.187	$0.150	$0.073
Q1 2025	$0.250	$0.255	$0.223	$0.158	$0.100
Q2 2025	$0.254	$0.251	$0.227	$0.149	$0.060
Q3 2025	$0.356	$0.221	$0.233	$0.180	$0.060
Q4 2025	$0.334	$0.265	$0.281	$0.147	$0.058

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Overall, the price index shows that new PV modules retain resale value within the U.S. secondary market unless their technology is older, such as Legacy POLY modules.

Price Trends by Module Type

Module Type	S/Wp as of December 2025	Trend since June 2025	Trend since December 2024	Trend since June 2024	Trend since January 2024	Description
All Black	$0.332	↗ 27.2%	↗ 56.6%	↗ 39.5%	↗ 2.2%	Module types mono or bifacial, n-type or p-type with black backsheets, black frames, and a minimum module efficiency of 19.0 percent.
Bifacial	$0.228	↘ -24.2%	↘ -20.0%	↘ -2.1%	↘ -9.5%	Modules made with bifacial cells, transparent backsheets, or double-glass, framed or unframed, that are either n-type or p-type (excluding All Black), and have a minimum module efficiency of 19.0 percent.
Monofacial	$0.334	↘ -10.9%	↗ 42.1%	↗ 45.9%	↗ 23.7%	Monofacial module types that are either n-type or p-type (excluding All Black), and have a minimum module efficiency of 19.0 percent.
Legacy	$0.200	↗ 26.6%	↗ 33.3%	↗ 33.3%	↗ 33.3%	Modules made with p-type poly cells, have efficiency rates below 19.0 percent, are in new condition (never installed), and include a full, limited, or no warranty.
Used	$0.056	↘ -6.7%	↘ -21.1%	↘ -29.1%	↘ -30.0%	Modules of all types that have been decommissioned, refurbished or not, tested, appraised for resale value, and include a limited or no warranty.

Source: EnergyBin, LLC. / Buckstop, Inc. | 2025 PV Module Price Index – Secondary Solar Market

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For All Black, Bifacial, and Monofacial classifications, modules appear to have held their value over the past two years. In the cases of All Black and Monofacial modules, PPWs increased by 2.2 and 23.7% respectively since January 2024. However, the average PPW for Bifacial modules decreased by 9.5%; yet the average price in Q4 2025 was 17% higher than that of Q1 2024.

In Q4 2025, PPWs for non-black Bifacial and Monofacial modules listed lower than national averages - $0.300/Wp (utility), $0.456/Wp (commercial), and $0.321/Wp (residential) - as quoted by National Laboratory of the Rockies. When said that modules retain resale value, it's not suggesting that they match primary market values. Rather, secondary market prices tracked across multiple industries tend to be 20 to 70% less than primary market prices.

The steady decline of resale value is evidenced in Legacy modules, for which the price has remained at $0.150/W for the past two years. As these modules age, they become obsolete. It's questionable whether demand for Legacy modules exists. At their listed resale price, they failed to compete in the global market, where the Chinese Module Marker published by OPIS noted an average price of $0.09/W for TOPCon modules shipped FOB from China in December. This reality limited remarketing to the domestic U.S. market unless resellers were willing to sell to international buyers for far less.

Furthermore, the average PPW for Used modules decreased by 30% from January 2024, down to $0.058/Wp in Q4. Such a low price hinders resale efforts because margins become too thin to justify the expense of remarketing and the cost of repair is altogether prohibitive.

As seen in the next table, price fluctuations within the secondary market are common and often tied to market conditions, most notably geopolitical factors, that also affect the primary market and product availability for any given time.

One observes this trend most notably in the evidence presented for P-Type modules, of which prices in Q4 for All Black, Bifacial, and Monofacial classifications averaged $0.305/W, $0.290/W, and $0.229/W respectively. In the case of All Black and Bifacial modules, prices increased from Q1 by 42% (All Black) and 14% (Bifacial).

2025 PPW Ranges by Month

	January			February			March			April			May			June		
Module Class	Low	Avg (Weighted)	High	Low	Avg (Weighted)	High	Low	Avg (Weighted)	High	Low	Avg (Weighted)	High	Low	Avg (Weighted)	High	Low	Avg (Weighted)	High
All Black P-Type	$0.120	$0.213	$0.290	$0.076	$0.263	$0.500	$0.140	$0.170	$0.290	$0.235	$0.244	$0.550	$0.160	$0.286	$0.380	$0.200	$0.219	$0.290
All Black N-Type	$0.330	$0.360	$0.450	$0.100	$0.493	$0.500	$0.190	$0.190	$0.190	$0.210	$0.219	$0.300	$0.220	$0.264	$0.495	$0.275	$0.275	$0.275
Bifacial P-Type	$0.150	$0.252	$0.360	$0.150	$0.268	$0.360	$0.200	$0.246	$0.350	$0.230	$0.272	$0.360	$0.220	$0.300	$0.330	$0.150	$0.175	$0.290
Bifacial N-Type	$0.160	$0.213	$0.270	$0.275	$0.275	$0.275	$0.160	$0.160	$0.160	$0.240	$0.259	$0.290	$0.280	$0.305	$0.310	$0.280	$0.305	$0.310
Monofacial P-Type	$0.060	$0.217	$0.340	$0.084	$0.277	$0.380	$0.230	$0.250	$0.344	$0.204	$0.233	$0.335	$0.095	$0.142	$0.380	$0.340	$0.375	$0.720
Monofacial N-Type	$0.160	$0.198	$0.250	$0.100	$0.117	$0.200	$0.190	$0.190	$0.240	$0.112	$0.112	$0.112	--	--	--	--	--	--
Legacy (POLY)	$0.150	$0.158	$0.170	--	--	--	--	--	--	$0.140	$0.140	$0.140	$0.150	$0.150	$0.150	$0.150	$0.158	$0.170
Used	$0.100	$0.100	$0.100	$0.100	$0.100	$0.100	--	--	--	--	--	--	--	--	--	--	--	--

	July			August			September			October			November			December		
Module Class	Low	Avg (Weighted)	High	Low	Avg (Weighted)	High	Low	Avg (Weighted)	High	Low	Avg (Weighted)	High	Low	Avg (Weighted)	High	Low	Avg (Weighted)	High
All Black P-Type	$0.210	$0.320	$0.550	$0.190	$0.388	$0.440	$0.235	$0.368	$0.400	$0.250	$0.288	$0.335	$0.260	$0.308	$0.390	$0.200	$0.318	$0.390
All Black N-Type	$0.190	$0.312	$0.330	$0.240	$0.352	$0.370	$0.225	$0.438	$0.485	$0.395	$0.395	$0.395	--	--	--	$0.210	$0.349	$0.350
Bifacial P-Type	$0.155	$0.191	$0.355	$0.160	$0.197	$0.259	$0.200	$0.227	$0.282	$0.225	$0.263	$0.350	$0.240	$0.305	$0.360	$0.250	$0.303	$0.380
Bifacial N-Type	$0.215	$0.226	$0.295	$0.220	$0.278	$0.325	$0.225	$0.230	$0.240	$0.280	$0.280	$0.280	$0.250	$0.301	$0.380	--	--	--
Monofacial P-Type	$0.242	$0.242	$0.242	$0.220	$0.307	$0.320	$0.130	$0.150	$0.220	$0.130	$0.234	$0.360	$0.160	$0.223	$0.370	--	--	--
Monofacial N-Type	--	--	--	--	--	--	--	--	--	--	--	--	$0.235	$0.254	$0.280	$0.210	$0.384	$0.390
Legacy (POLY)	$0.180	$0.180	$0.180	--	--	--	--	--	--	$0.120	$0.120	$0.120	$0.120	$0.120	$0.120	$0.200	$0.200	$0.200
Used	$0.060	$0.060	$0.060	$0.059	$0.059	$0.059	$0.060	$0.060	$0.060	$0.063	$0.063	$0.063	$0.056	$0.056	$0.056	$0.056	$0.056	$0.056

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These spikes are likely correlated to new tariffs imposed beginning in June following the U.S. International Trade Commission's affirmative determination in its antidumping and countervailing duty investigation referring to imports from Cambodia, Malaysia, Thailand, and Vietnam. Although modules assessed in this index were not subject to new tariffs, the increased demand resulting from a steep drop in imports may have caused resellers to react with price increases.

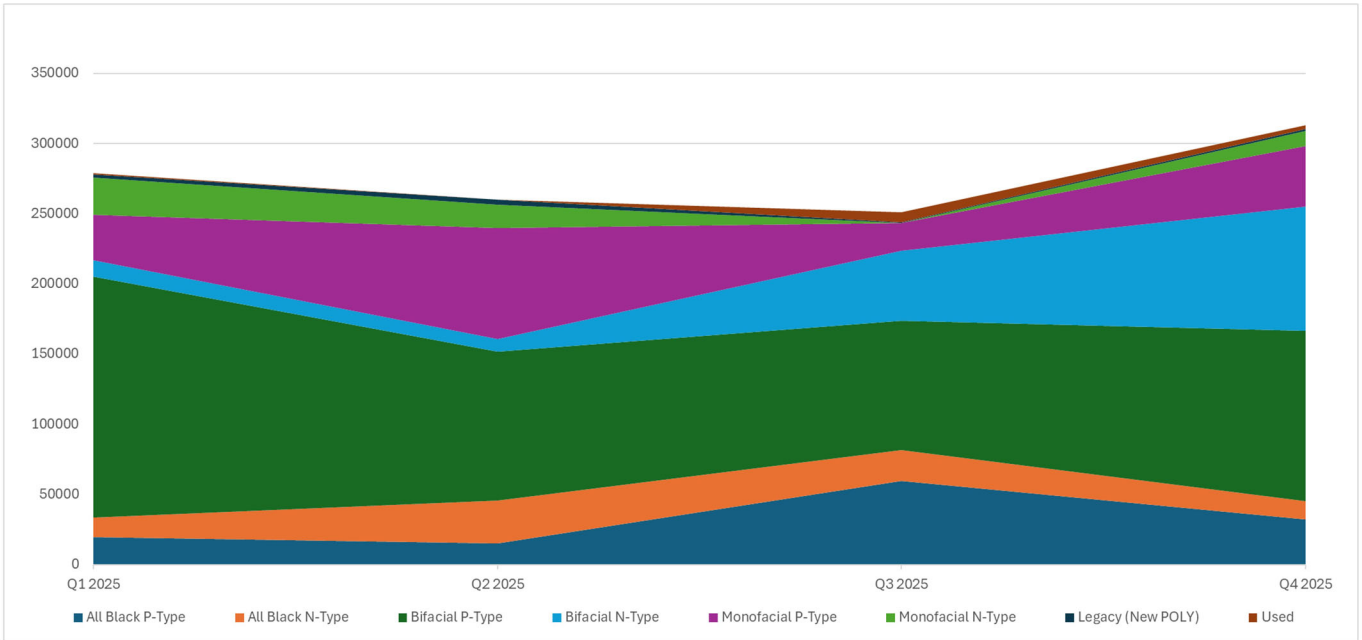
But this was not the case for Monofacial P-Type PPWs, which decreased by 8% from Q1 2025. This indicator points to the move away from the production of P-Type cell technology. As stated in the International Technology Roadmap for Photovoltaics (ITRPV) 16th Edition, published in May 2025, the phase-out of PERC cells commenced in 2024. The market share of PERC cells is expected to drop to 10% by 2027, and by 2035, they will altogether disappear.

Another observation to note is that for the past two years, the index has not revealed any clear seasonal price trends. However, PPW ranges vary widely, particularly for All Black, Bifacial, and Monofacial classifications.

In consideration of low-end prices present every month, buyers, brokers, and resellers would benefit by regularly referencing the secondary market for deals priced well below averages. Consistently checking secondary market pricing and availability would likely result in substantial annual cost savings and increased profit margins.

PV Module Supply Trends

Total Quantity by Module Type



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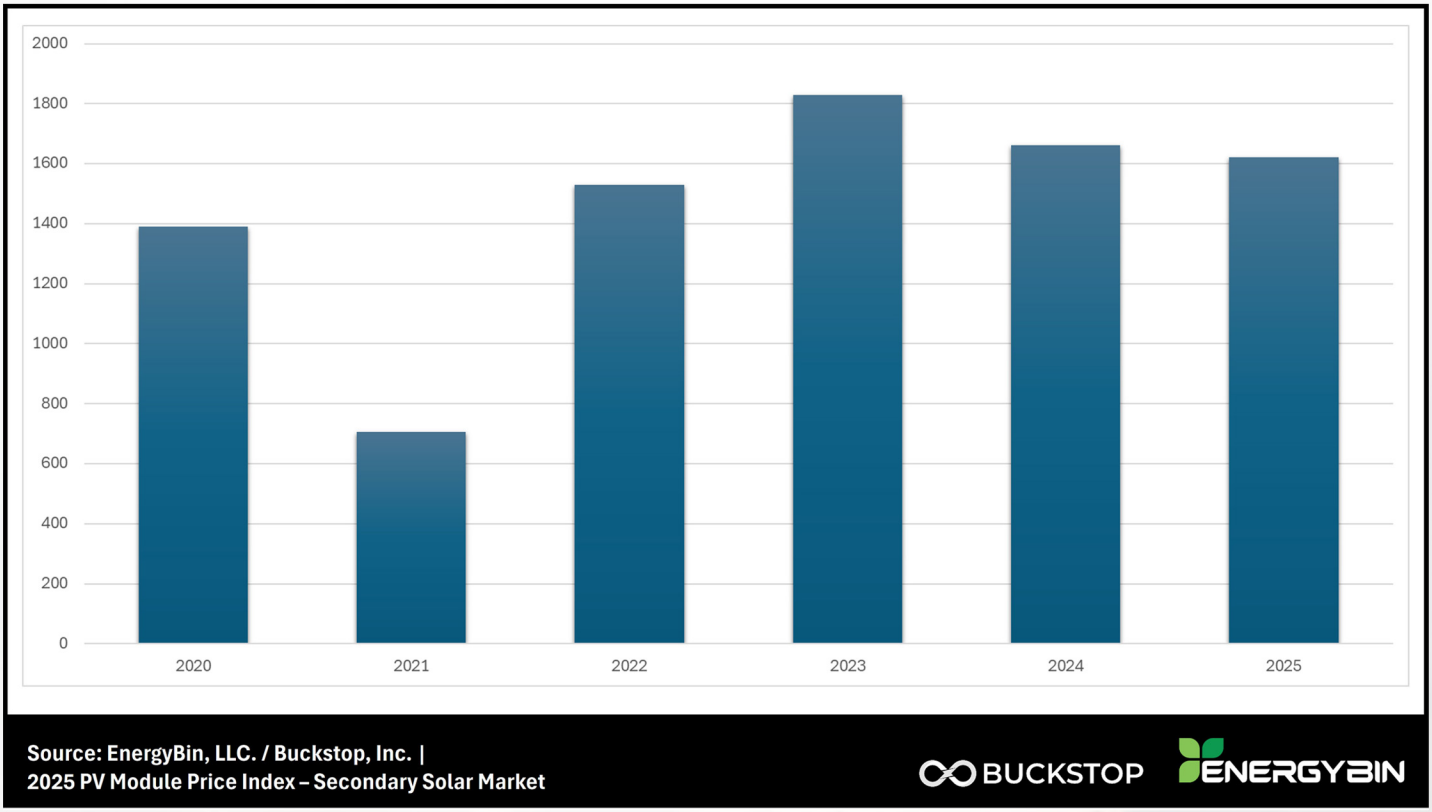
In 2025, modules listed for resale on EnergyBin totaled 1.62 million. Annual supply was down 2.4% from 2024 but increased by 16.8% since 2020, suggesting that the secondary market is indeed growing despite industry setbacks, namely oversupply within the primary market and geopolitical factors.

Total C-Si Modules (In Thousands)



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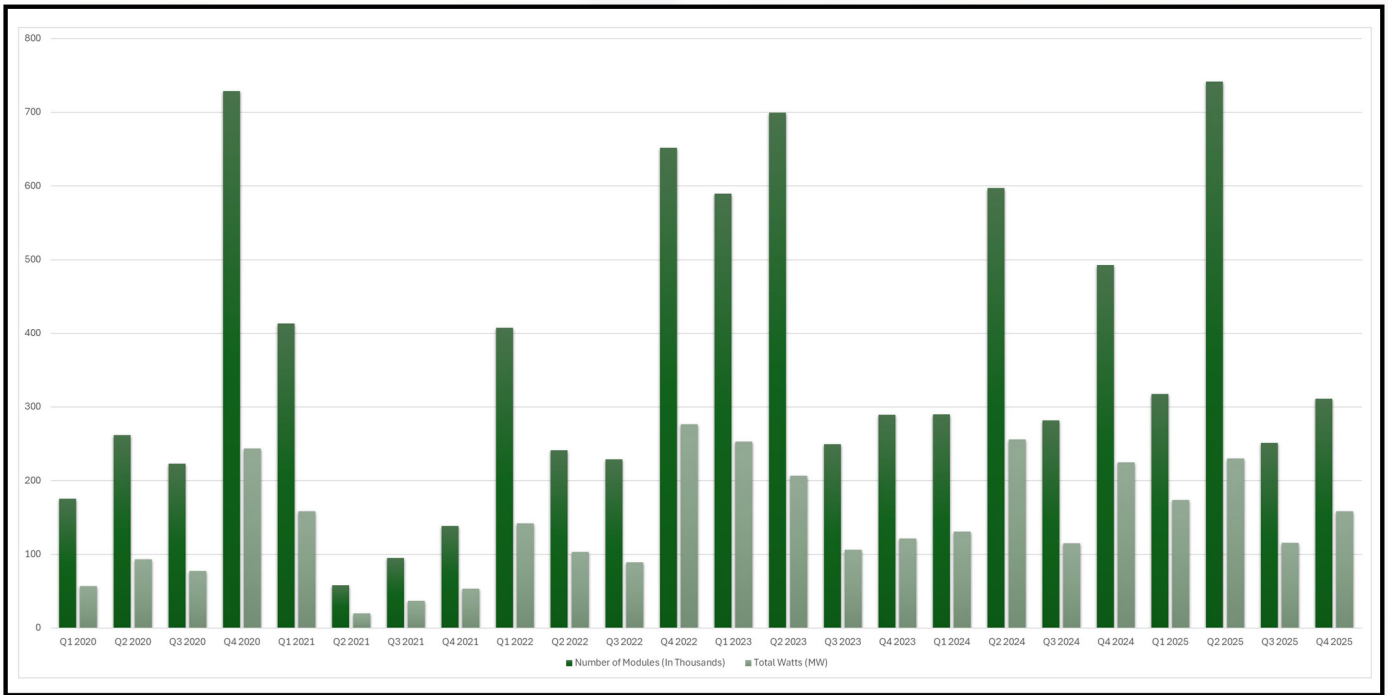
Quarterly Volume Disbursement



Source: EnergyBin, LLC. / Buckstop, Inc. |
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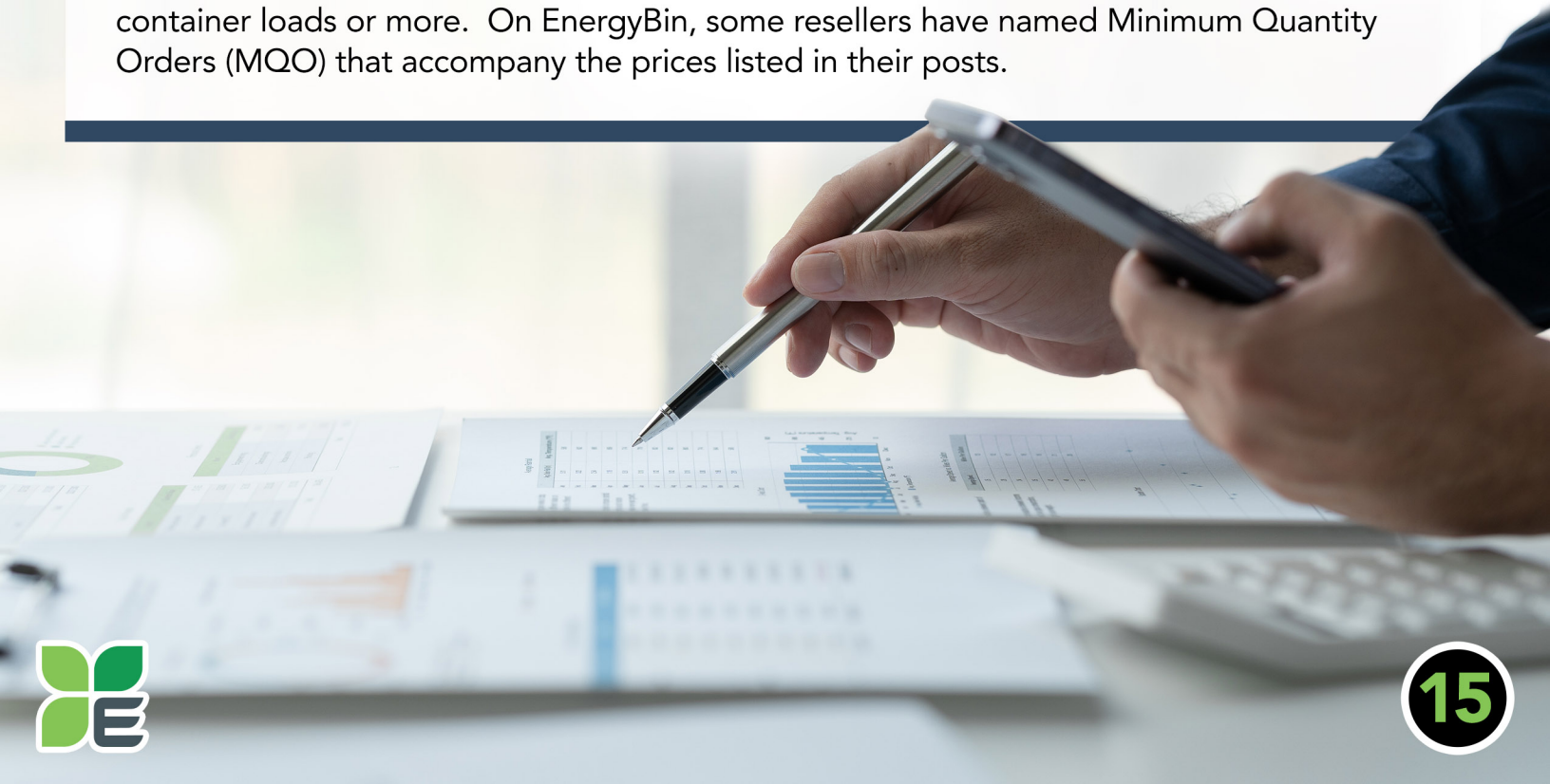
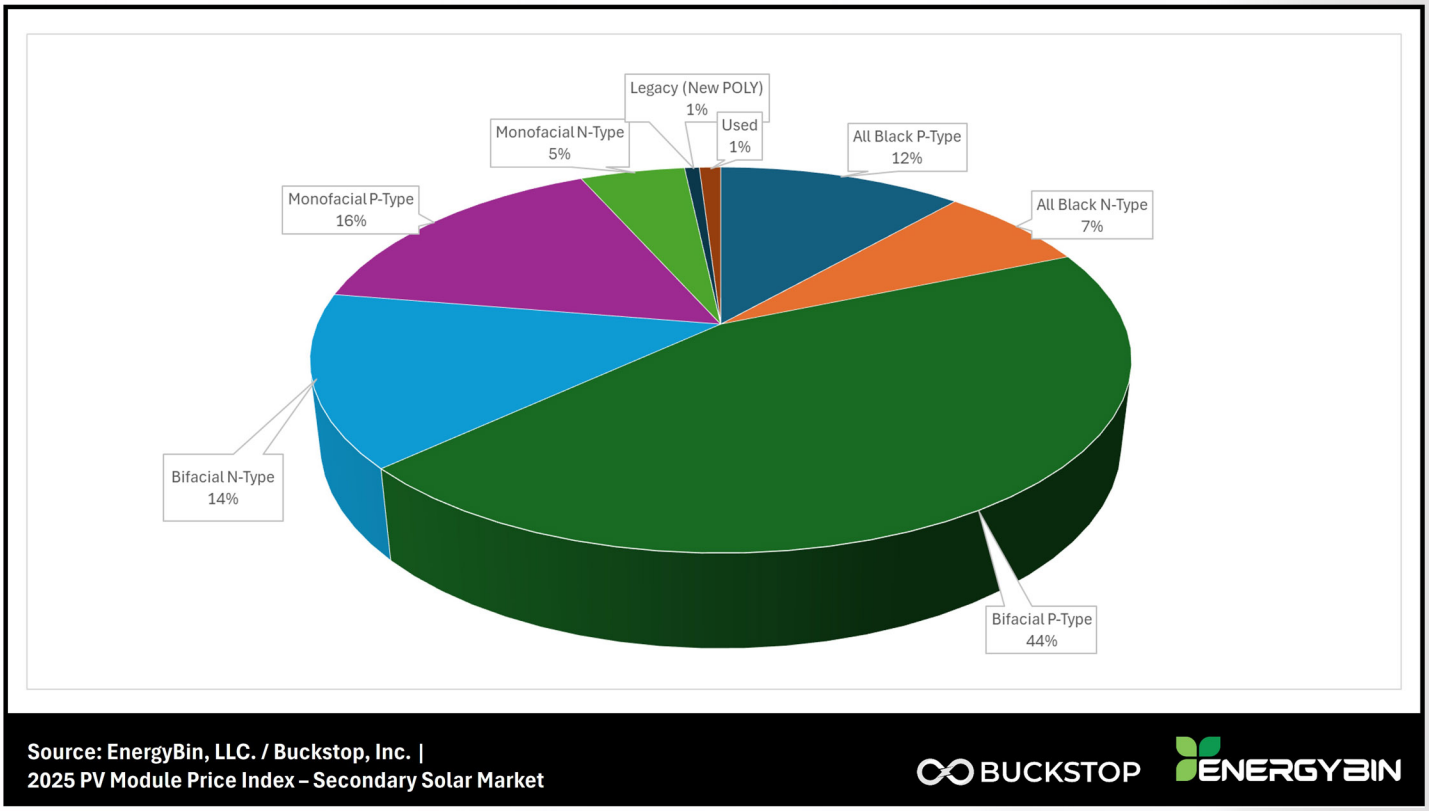
Regarding seasonality within the secondary solar market, no obvious trend exists related to module volume. However, for the past three years, Q2 has seen the greatest volume of modules listed for resale on EnergyBin. This recurrence may be due to large quantities of excess modules coming from new shipments, of which solar companies - from distributors to developers and installers - ordered in bulk to lock in a lower price per watt.

Even in the wholesale side of the secondary market, resellers advertise bulk discounts for container loads or more. On EnergyBin, some resellers have named Minimum Quantity Orders (MQO) that accompany the prices listed in their posts.



Module Breakdown by Classification



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Most modules for resale on EnergyBin in 2025 (98%) were new All Black (19%), Bifacial (58%), and Monofacial (21%) classifications. This volume is primarily flowing from project cancellations and delays. In the utility sector, SEIA and Wood Mackenzie identified 18 GWdc of projects on federal lands and over 73 GWdc on private lands that have either been canceled or delayed due to permitting challenges.

Legacy POLY modules made up a mere 1% of total modules for resale on EnergyBin in 2025, as was also the case in 2024. Solar companies have nearly cleared all remaining POLY stock from their warehouses. Resale is uncertain; even though these modules were new and functioning (never installed), the average price per watt of $0.200 in Q4 was uncompetitive with newer, higher efficiency technology.

Perhaps resellers may be better off donating Legacy modules to gain a charitable tax deduction, at least as the global market still grapples with oversupply of newer modules.

2025 Power Ranges

Module Class	Wattage		Efficiency	
	Average	Range	Average	Range
All Black	400	320-450	20.60%	18.7% - 23.1%
Bifacial	525	360-700	21.40%	19.3% - 23.3%
Monofacial	410	295-585	20.30%	17.3% - 22.7%
Legacy (POLY)	295	310-330	16.10%	15.3% - 17.0%
Used	295	280-310		

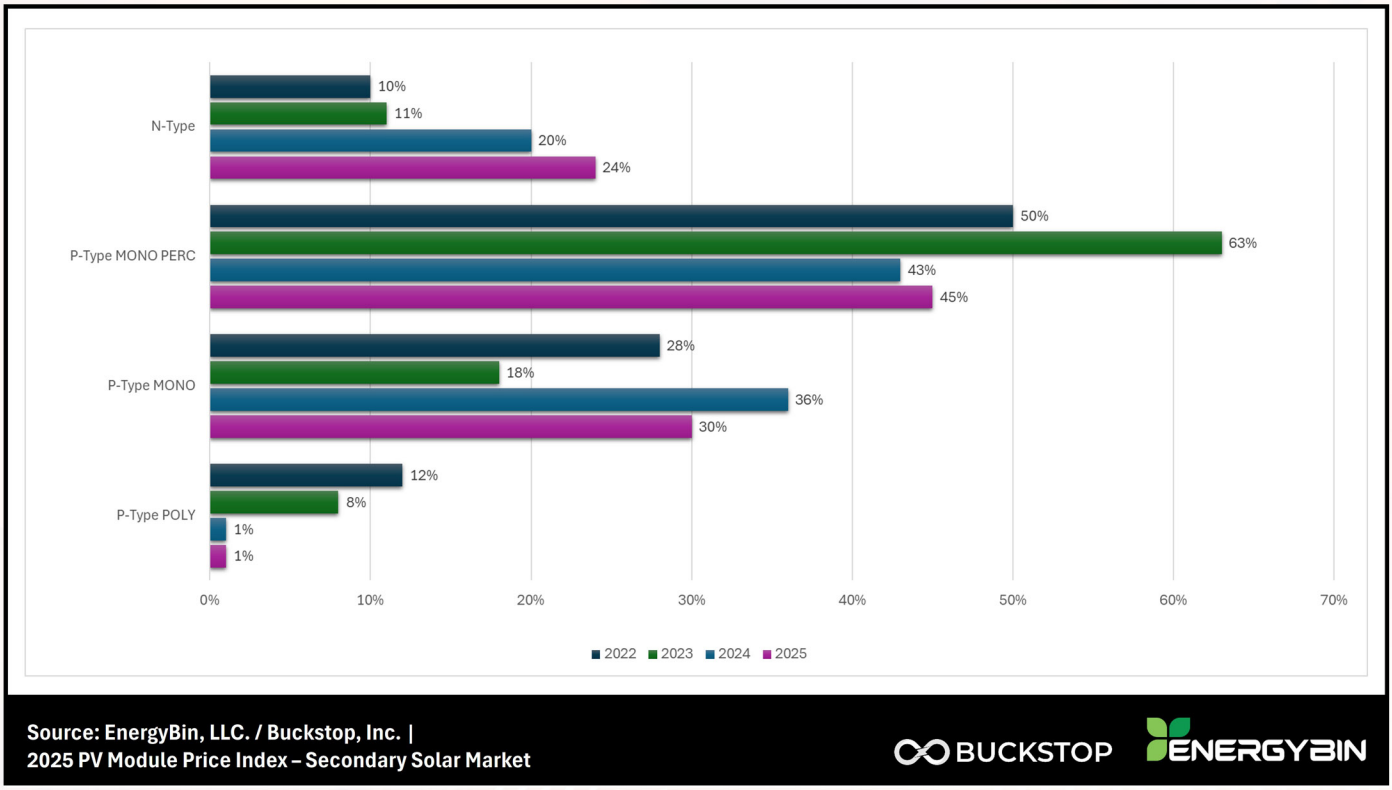
Source: EnergyBin, LLC. / Buckstop, Inc. |
2025 PV Module Price Index – Secondary Solar Market

BUCKSTOP ENERGYBIN

In 2025, the average wattage for All Black, Bifacial, and Monofacial modules ranged from 400 to 525 watts. This is an indicator that top quality modules for the residential, commercial, and utility sectors can be sourced within the secondary market.

The efficiency values were taken from manufacturers' datasheets under Standard Test Conditions (STC). Average efficiency ranged from 20.30 to 21.40%.

Cell Technology Breakdown



Source: EnergyBin, LLC. / Buckstop, Inc. | 2025 PV Module Price Index – Secondary Solar Market

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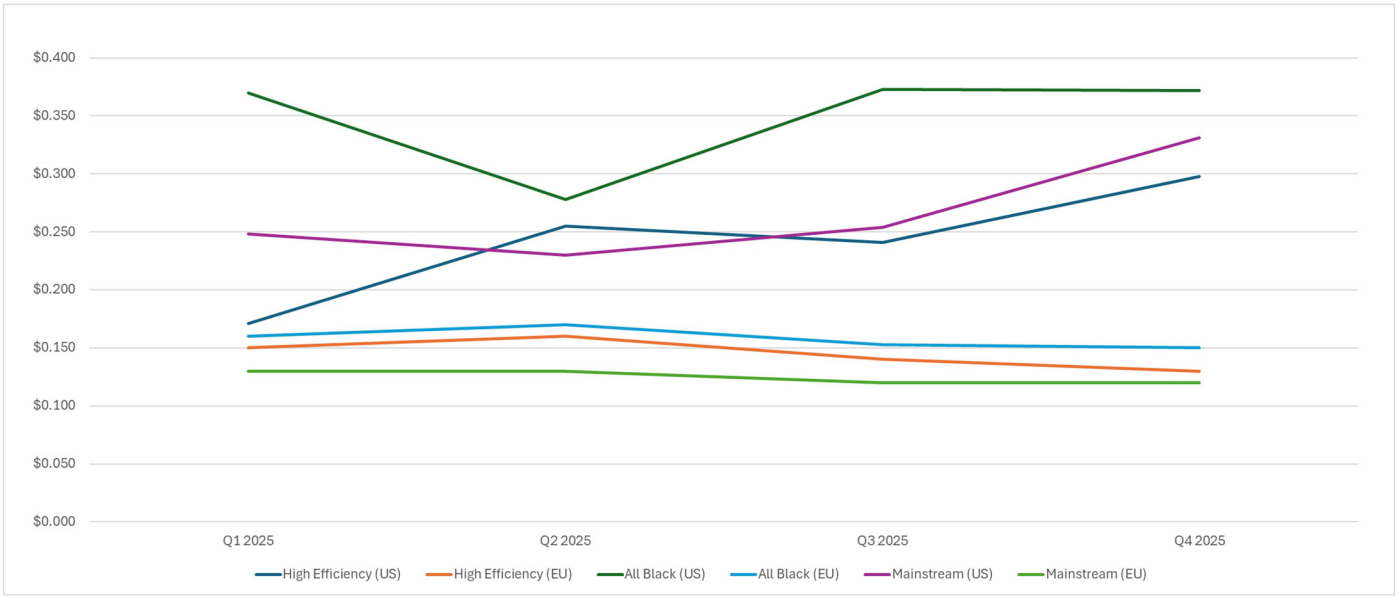
As previously stated, most modules listed for resale on EnergyBin were higher wattages and efficiency levels. Since 2024, N-Type modules increased by 4% and comprised one-fourth of the total modules for resale, whereas P-Type All Black, Bifacial, and Monofacial modules amounted to 72%.

The large share of P-Type modules reflects a rush to off-load this technology before the resale value begins to drop, which will happen once N-Type module supply surpasses P-Type and demand increasingly shifts to N-Type.

With the phase-out of P-Type modules in motion, now's the time to plan for upcoming maintenance needs pertaining to P-Type solar arrays, particularly for those arrays built with modules from Chinese or South-East Asian manufacturers. These manufacturers have ceased PERC production lines, and supply outside the U.S. has nearly dried up. Unless the project is slated for a near-term repower, operators may want to consider stocking PERC replacement modules (new and used) while they can still be found within the U.S. secondary market.

Regarding domestic manufacturing, the U.S. market has yet to phase out PERC production lines. Hesitancy regarding intellectual property lawsuits has resulted in buyers sticking to what they know. However, Wood Mackenzie has speculated that the opportunity for domestic manufacturers to jump directly to N-Type, Heterojunction Technology (HJT) production would still lead to a rapid phase-out of P-Type PERC modules. When that happens, the resale value may not hold up for long, and supply may be difficult to come by.

U.S. - EU PV Module PPW Comparison



Source: www.EnergyBin.com | www.pvxchange.com. The U.S. price per watt (PPW) is based on spot prices of c-Si PV modules listed for sale on the EnergyBin wholesale exchange. The PPW is represented as the weighted average per module type. These listings are for modules located within the U.S. remarketed in the secondary market and ready to ship. The EU PPW is from PVXchange, from which only tax-free prices for PV modules are shown, and prices stated reflect the average offer prices on European spot market (customs cleared).

Source: EnergyBin, LLC. / Buckstop, Inc. |
2025 PV Module Price Index – Secondary Solar Market

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	Q1 2025	Q2 2025	Q3 2025	Q4 2025	Description (As defined by www.pvxchange.com)
High Efficiency (US)	$0.171	$0.255	$0.241	$0.298	Photovoltaic modules with mono- or bifacial HJT. N-type/TOPCon or xBC (Back Content) cells and combinations thereof, which have efficiencies higher than 22.5 percent.
High Efficiency (EU)	$0.150	$0.160	$0.140	$0.130	
All Black (US)	$0.370	$0.278	$0.373	$0.372	All Black photovoltaic modules with mono- or bifacial HJT. N-type/TOPCon or xBC (Back Content) cells and combinations thereof, which have efficiencies up to 22.5 percent.
All Black (EU)	$0.160	$0.170	$0.153	$0.150	
Mainstream (US)	$0.248	$0.230	$0.254	$0.331	Photovoltaic modules with mono- or bifacial HJT. N-type/TOPCon or xBC (Back Content) cells and combinations thereof, which have efficiencies up to 22.5 percent.
Mainstream (EU)	$0.130	$0.130	$0.120	$0.120	

Source: EnergyBin, LLC. / Buckstop, Inc. |
2025 PV Module Price Index – Secondary Solar Market

BUCKSTOP ENERGYBIN

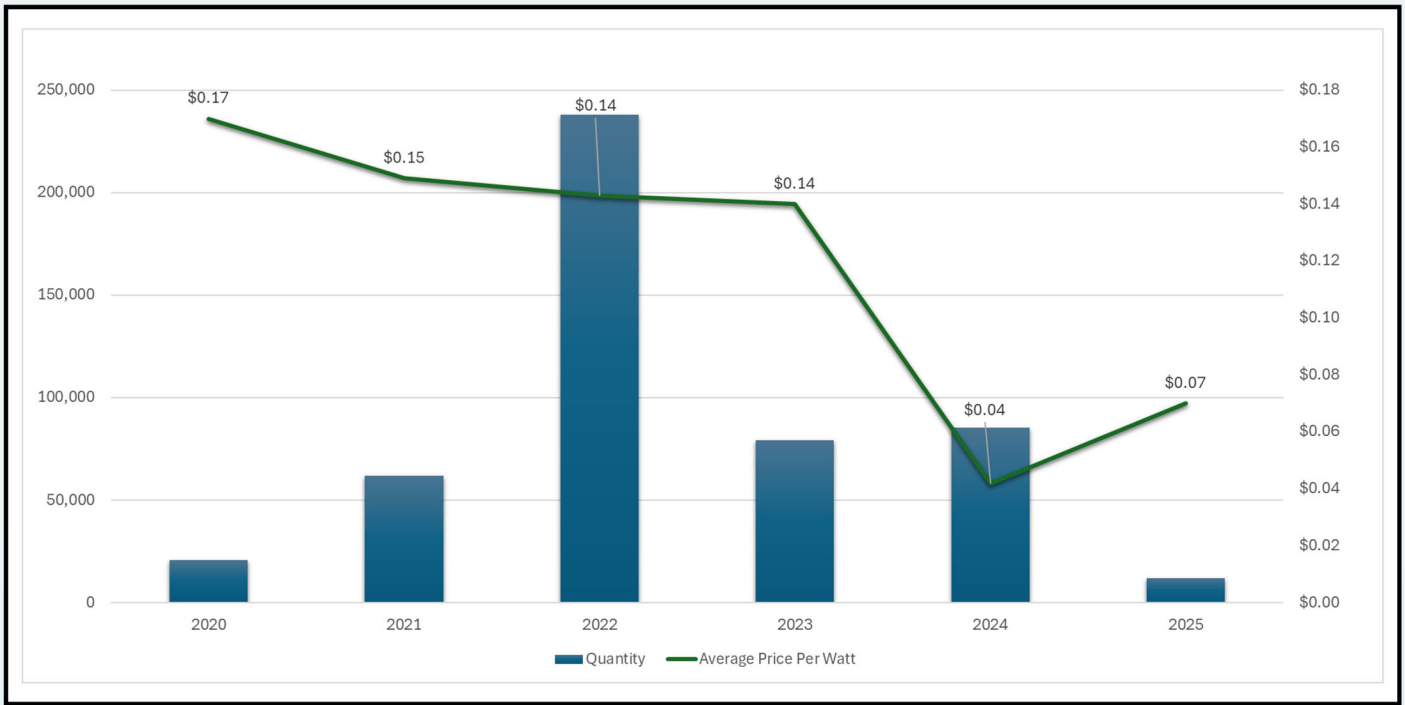
This price index was compared to EU averages using data published by PVXchange Trading GmbH, which reports monthly prices quoted on the EU spot market (customs cleared). PVXchange prices have been converted from Euros to U.S. dollars. Additionally, PVXchange classification descriptions were adopted for this comparison. Therefore, only N-Type module prices are included in the table and graph.

If there's any indication about what will eventually happen to P-Type module supply in the U.S., one need only to look to the European market. P-Type module supply all but dried up by Q1, with the rare exception of the occasional delayed or canceled project that freed inventory for resale.

Through the year, U.S. prices were higher than EU prices for High Efficiency, Mainstream, and All Black modules. Higher prices were likely due to Section 201 and AD/CVD tariffs as well as Presidential tariffs on U.S. imports from all global partners. Tariffs have safeguarded the U.S. from the supply glut that Europe was subject to in 2024 and 2025.

Last October, the Chinese government intervened to stabilize the global market by restricting expansion and mandating production cuts, which will drive up prices through 2026 according to Wood Mackenzie. However, oversupply was so great throughout the EU market that at the close of Q4, prices had yet to increase.

Used PV Modules for Resale on EnergyBin



Source: EnergyBin, LLC. / Buckstop, Inc. |
2025 PV Module Price Index – Secondary Solar Market

BUCKSTOP ENERGYBIN

On EnergyBin, used modules remained at just 1% of overall resale supply in 2025, down from 5% in 2024.

Back in 2022, EnergyBin saw an uptick of used modules for resale of 71 megawatts (MW), which represented 9% of resale listings that year. The primary reason for the volume was regular postings of large, decommissioned quantities that ranged from 1 to 27.5 MW.

2022 may have signaled the start of a multi-year repowering trend where still-functioning modules with resale value were decommissioned and remarketed within the secondary market. However, used module supply on EnergyBin in the years following 2022 failed to reflect such a trend.

Due to the plummeting price (from $0.140/W in 2022 to $0.070/W in 2025), it's likely that any used supply is bypassing the EnergyBin wholesale exchange and either exported directly to buyers in other countries or transported to disposal facilities. Buckstop's market size analysis drawing from U.S. ITC data supports this assumption (see 'Market Size'), highlighting key export destination countries of Pakistan, India, Nigeria, Afghanistan, and South Africa.

Used Module PPWs & Power Ranges

Year	PPW Range ($/Wp) Low	PPW Range ($/Wp) Average (Weighted)	PPW Range ($/Wp) High	Wattage Average	Wattage Range
2020	$0.100	$0.170	$0.295	250	75 - 310
2021	$0.086	$0.149	$0.260	250	120 - 435
2022	$0.053	$0.143	$0.310	270	120 - 435
2023	$0.010	$0.140	$0.630	275	185 - 445
2024	$0.021	$0.042	$0.200	295	165 - 405
2025	$0.056	$0.069	$0.331	295	240 - 395

Source: EnergyBin, LLC. / Buckstop, Inc. |
2025 PV Module Price Index – Secondary Solar Market

BUCKSTOP ENERGYBIN

Prior to 2024, the average resale value held steady through 2023. Since 2024, the case for used module resale has been weakened by the global supply glut of new modules. Until the world market corrects for oversupply of new modules, the price of used modules will likely remain under $0.100/W.

One exception may be that of top-quality modules that are less than 10 years old, have a degradation rate of at or below 0.5-1% per year, and that have no defects. For example, in Q3 2025, a reseller listed 160 SunPower 395-watt modules that had been tested. These modules were installed in 2021 as a 63.2-kilowatt commercial rooftop array. The system was decommissioned after the building owner decided he no longer wanted solar. This example presents a strong case for remarketing rather than disposal.

Regarding quality, the condition of used modules directly correlates to resale value. In recent years, manufacturers have cut costs to undercut competitors' pricing. For example, the move from a fully tempered 3.2 mm glass to a 2.0 mm double-glass design has made modules more fragile. The race to the bottom has resulted in ample errors occurring within a few years of deployment.

As buyers favor well-made modules over price, used module resale, particularly those in excellent working condition with 3.2 mm glass and no cracked backsheets, becomes an opportunity.

Our Recommendations

As new solar price deflation slows, pre-owned solar creates an opportunity. The remarkable decline in new module prices in recent years, driven by efficiency improvements and oversupply in China, may come to an end in 2026. Such a change would boost the secondary market as used modules become more viable, particularly for those that are top-quality and in excellent performance condition.

There are two reasons to expect slowed price deflation. First, Chinese module makers are facing a second year of heavy losses due to negative operating margins, and the government has embarked upon an 'anti-involution' drive in the solar sector aimed at tackling the problem of production overcapacity, which among other factors will move solar production away from cheap coal-powered electricity. The Chinese solar sector thus faces both a financial incentive and a policy incentive to decrease production.

Second, the spiking cost of silver–up over 200% in the last 12 months–has increased the commodity cost of modules, which could drive up delivered module prices. Newer modules contain around 3g of silver in many cases (~$9 at today's prices, compared to $3 a year ago), and older modules can contain up to 15g of silver ($43 at current prices), which should help support pricing for module recycling.

In the U.S. market specifically, solar module prices face two policy risks. The unclear path of U.S.-China trade relations creates a two-way risk: if U.S.-China relations improve, landed panel prices could fall because of lower tariffs. Though, the wave of manufacturing facility cancellations, project cancellations, and bankruptcies in the sector as a result of the repeal of the Inflation Reduction Act may reduce both supply and demand for modules.

If supply falls short of demand, module prices will likely increase. Already in January of this year, the price for TOPCon modules jumped to $0.115/W FOB China. The 30% increase over December was a result of policy changes to address oversupply and higher costs of input materials, most notably silver.

However, until supply balances out, analysts warn that prices will be volatile, particularly due to the postponement of the plan to reduce polysilicon overcapacity by China's State Administration for Market Regulation and the end of China's VAT export rebates from April 1, 2026.

Price volatility from the primary market will have a ripple effect on the secondary market, which creates an ongoing challenge to estimate resale values. For those PV professionals who keep an eye on secondary market activity, market intelligence can be gleaned and resale opportunities spotted.

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About the Authors

Melissa Ann Schmid
Marketing Communication Manager

EnergyBin, LLC.

Melissa is the Marketing Communication Manager at EnergyBin and BrokerBin. She is committed to advancing environmentally and socially responsible secondary markets for the renewable energy and enterprise IT hardware sectors. Melissa holds a Master's in International Business from Saint Mary's University of Minnesota and a B.S. in Business Administration from University of Northern Colorado. Her work has been published in Social Responsibility Journal, Journal of Business, Society, and Government, Solar Power World, and Resource Recycling, amongst other publications.

Email: melissa@energybin.com

Nick Kumleben
Chief Business Development Officer & Co-Founder

Buckstop, Inc.

Nick is the Energy Director at Greenmantle, advising top financial, mining and energy firms on the global energy transition, with a focus on critical minerals. His background includes roles in a $2BN fintech startup, hedge fund investment analysis, and clean hydrogen development. A Clean Energy Leadership Institute fellow, Nick holds a B.A. in History with highest honors from the University of Virginia and is a CFA charterholder. His work has been published in The Financial Times, the Wall Street Journal, Foreign Policy, and The Spectator, amongst other publications.

Email: nick@buckstop.com

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EnergyBin is a global exchange for PV Lifecycle professionals to connect, access market intelligence, and buy & sell wholesale solar equipment. Over 1,000 solar companies, including manufacturers, distributors, resellers, brokers, developers, EPCs, installers, and O&M specialists utilize EnergyBin to promote solutions for repair, resale, and recycling, expand their global supply chains, buy & sell new and used solar hardware, build new business with pre-qualified members, and browse pricing & product availability. EnergyBin members oversee projects in the residential, commercial, agricultural, industrial, and small-scale utility markets.

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BUCKSTOP

Founded in 2025, Buckstop is building the intelligence layer for the circular economy. The mission is to create a sustainable end-of-life for every electronic device on Earth, turning yesterday's waste into tomorrow's resources. Buckstop's agentic platform instantly appraises end-of-life energy assets, unlocks their value, and manages everything from pickup to payment ensuring regulatory compliance along the way. The proprietary pricing engine assesses solar panels, inverters, racking, batteries, and more for the utility, commercial, and residential sectors by using real-time market data.

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