THE STATE OF CLEAN ENERGY MANUFACTURING

AMERICAN CLEAN POWER

AMERICA BUILDS POWER

2026

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ACP sincerely thanks its member companies and other organizations for their contributions to the industry data provided in this report. ACP strives to provide the best information on the clean power industry—for the industry and by the industry—and therefore welcomes your comments.

Graphics and text in this report can be used with citation. Creation of new graphics based on data in the report must receive written approval from ACP. When other data sources are used, they are noted. Data should not be used without permission from ACP.

Note: All $ reported are in USD, $2025 where B or bn = billion, M or mil = million. Inflation is based on the Bureau of Economic Analysis' GDP-deflator by state. All jobs are in "job-years" representing one full-time job sustained for one year.

Photo credit (cover): Form Energy, EDP Renewables North America LLC

LETTER FROM THE CEO

America is in the midst of the most ambitious industrial buildout in fifty years. While the national conversation around manufacturing often focuses on what we've lost, a new industrial base is emerging.

Clean energy manufacturing is building capacity in communities that have waited decades for an industrial investment of this scale.

The strategic payoff is real. The United States can now produce enough solar and battery storage modules to meet domestic demand. Solar component imports have fallen 33 percent. The country is on track to satisfy most critical battery storage supply chain needs by the end of the decade. Now, we must provide a secure policy environment to ensure that the 950 manufacturing facilities expected online by 2030 can build the components needed to power our nation's future, right here at home.

Every week, somewhere in the country, another line goes live. New hires hit the ground running. Another factory opens its doors. We're writing America's new manufacturing story – and we're doing it together.

Jason Grumet
Chief Executive Officer
American Clean Power Association

Photo Credit: NextPower

EXECUTIVE SUMMARY

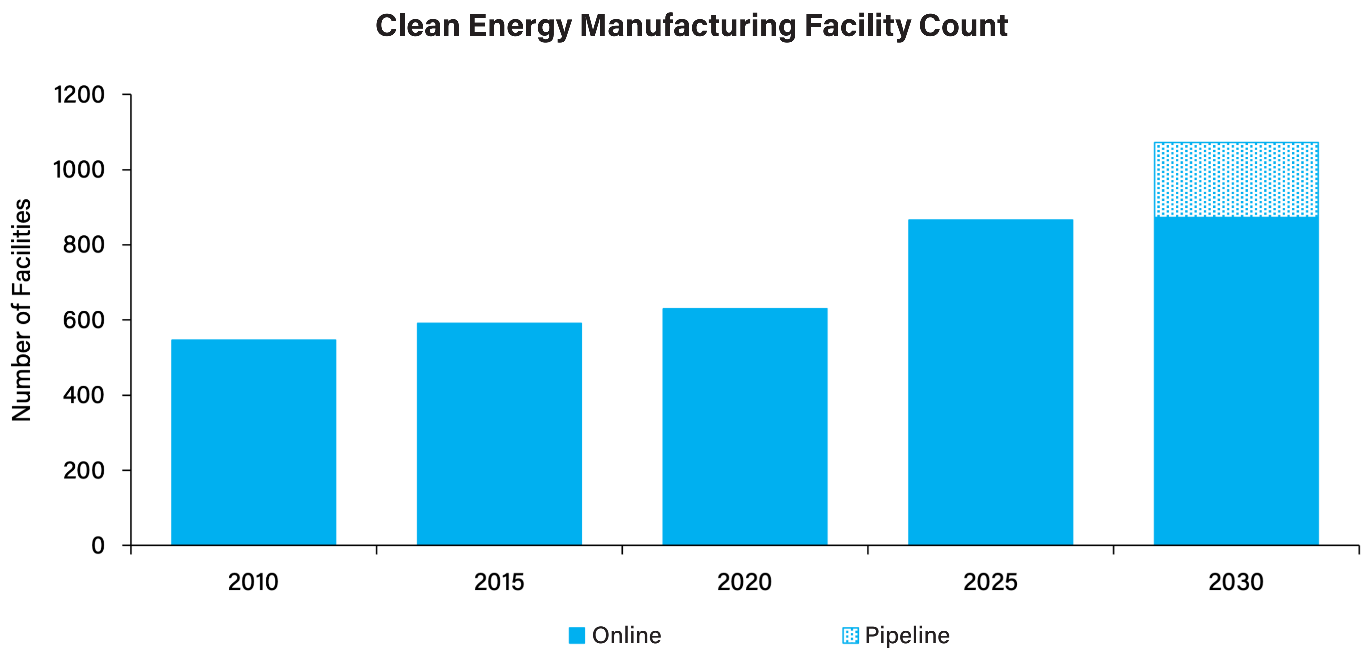
American clean energy manufacturing is now a cornerstone of the U.S. industrial economy. **Over 70 new domestic clean energy component manufacturing facilities started operations in 2025, pushing the total footprint to more than 825 facilities.**

Solar tracker components manufactured in Pennsylvania, electrical balance of system produced in Tennessee, battery storage cells made in Michigan, and wind turbine blades in Colorado are just a few examples of the **300+ manufacturing facilities actively building primary components for utility-scale solar, battery storage, land-based wind, and offshore wind in the United States in 2025.**

Manufacturing construction spending has been on the rise even as overall employment in the sector faces headwinds, reflecting an industry that is actively investing in its future. A significant driver of that investment is the rapid expansion of clean energy component manufacturing. The number of facilities surged by 37% in the last five years, projected to reach nearly 50% growth by the end of the decade.

The U.S. can now produce enough solar and battery storage modules to meet domestic demand and continues to lead in wind nacelle and tower manufacturing. Rapid growth in solar and storage production, sustained wind manufacturing, and rising investment in critical minerals are reshaping the nation's energy supply chain. **Imports are already falling, down 33% for solar and 10% for storage from last year. By 2030, domestic manufacturing could satisfy most critical battery storage supply chain needs.**

As energy demand rises and retail power prices climb, clean energy stands out as the fastest, most cost-effective path to deliver reliable, affordable power.



EXECUTIVE SUMMARY

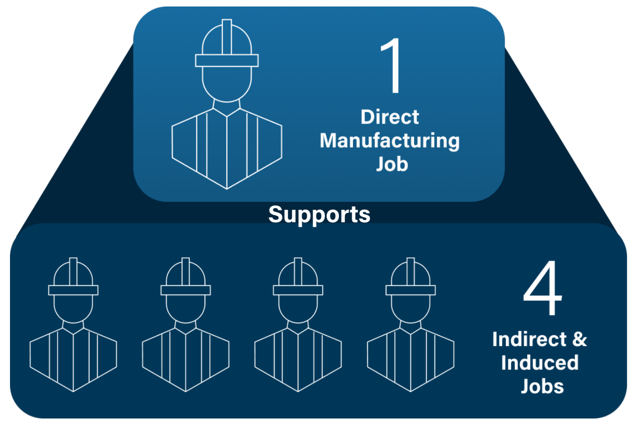
Manufacturing the components necessary to build power plants in the U.S. adds additional economic value to all fifty states and limits our exposure to global supply chain concerns. Clean energy manufacturing is creating new pockets of job growth within the broader sector. While manufacturing employment has faced downward pressure overall, the buildout of these facilities represents a meaningful and growing counterforce.

The 825+ manufacturing plants supporting the domestic clean energy supply chain result in **over 215,000 jobs**. This includes **50,000 direct jobs**, which earn over **35% more than the national average**. Active manufacturing facilities contribute **$31 billion** to annual U.S. GDP—more than half the GDP of Wyoming—and support **$62 billion** in annual domestic spending. Solar facilities drive half of this economic impact, with land-based wind and battery storage making up another 25% each.

The **construction** of the facilities that came online in 2025, as well as those still under-construction, support **207,000 jobs**. An estimated 120,000 of these jobs stem from the construction of battery storage component manufacturing facilities.

The industry expects over 950 manufacturing facilities to be operational in the United States by 2030. This supply chain footprint is expected to support **374,000 jobs**, contribute **$55 billion** to GDP, and strengthen national security, technology leadership and economic growth through American-made clean energy.

	Facilities	Jobs	Earnings	GDP	Economic Output
Online	825+	215,900	$15.8 billion	$30.8 billion	$61.5 billion
Under Construction	140+	206,900	$13.5 billion	$20.1 billion	$37.1 billion
Total Expected Online by 2030	950+	373,800	$27.7 billion	$55.2 billion	$107.8 billion



The average earnings of a clean energy manufacturing employee is **$28,000/yr more (35+%),** than the average American worker

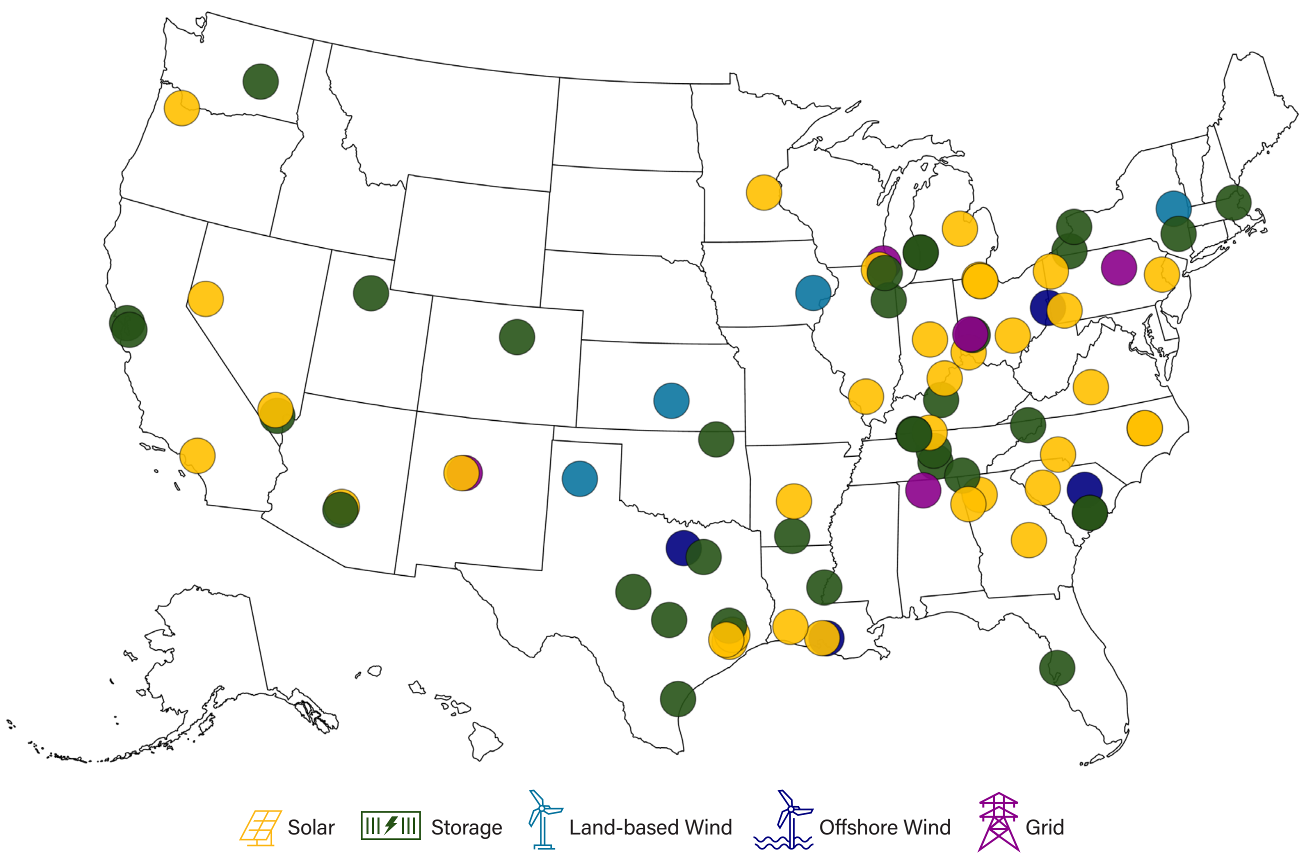
INTRODUCTION

America's Clean Energy Manufacturing Progress in 2025

The clean power industry built over 70 new manufacturing facilities in 2025

- Of the 70 new manufacturing plants, over 55 manufacture primary supply chain components. This manufacturing growth outpaced the 60 new facilities commissioned in 2024 and the 40 in 2023, reflecting a consistent upward trend in annual clean energy manufacturing expansion.
- Growth continues in 2026 with nearly 10 plants, half of which produce primary components, already commissioned in the first three months of the year.

Clean Energy Manufacturing: New Facilities



New Facilities Count

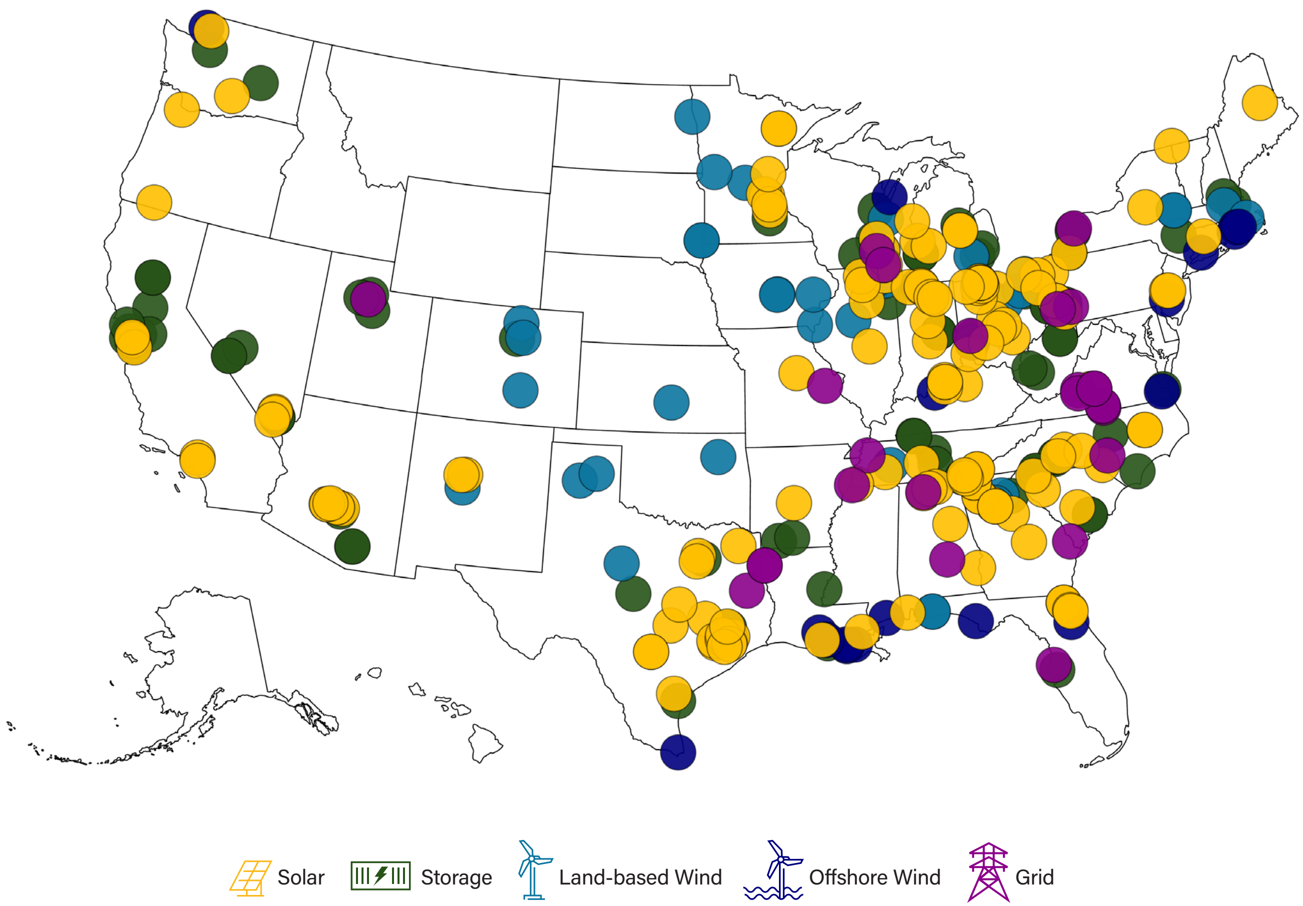
Tech	Primary	Secondary
Solar	25+	9
Battery Storage	25+	5
Land-based Wind	3	1
Offshore Wind	1	3
Grid	3	2

State of the Primary Clean Power Manufacturing Industry

There are over 300 operational facilities across 43 states that manufacture primary components for the clean energy industry

- These primary facilities manufacture or assemble the major components associated with clean energy technology, like the distinct modules and cells for utility-scale solar and battery storage as well as the blades, towers, and nacelles of a wind turbine.

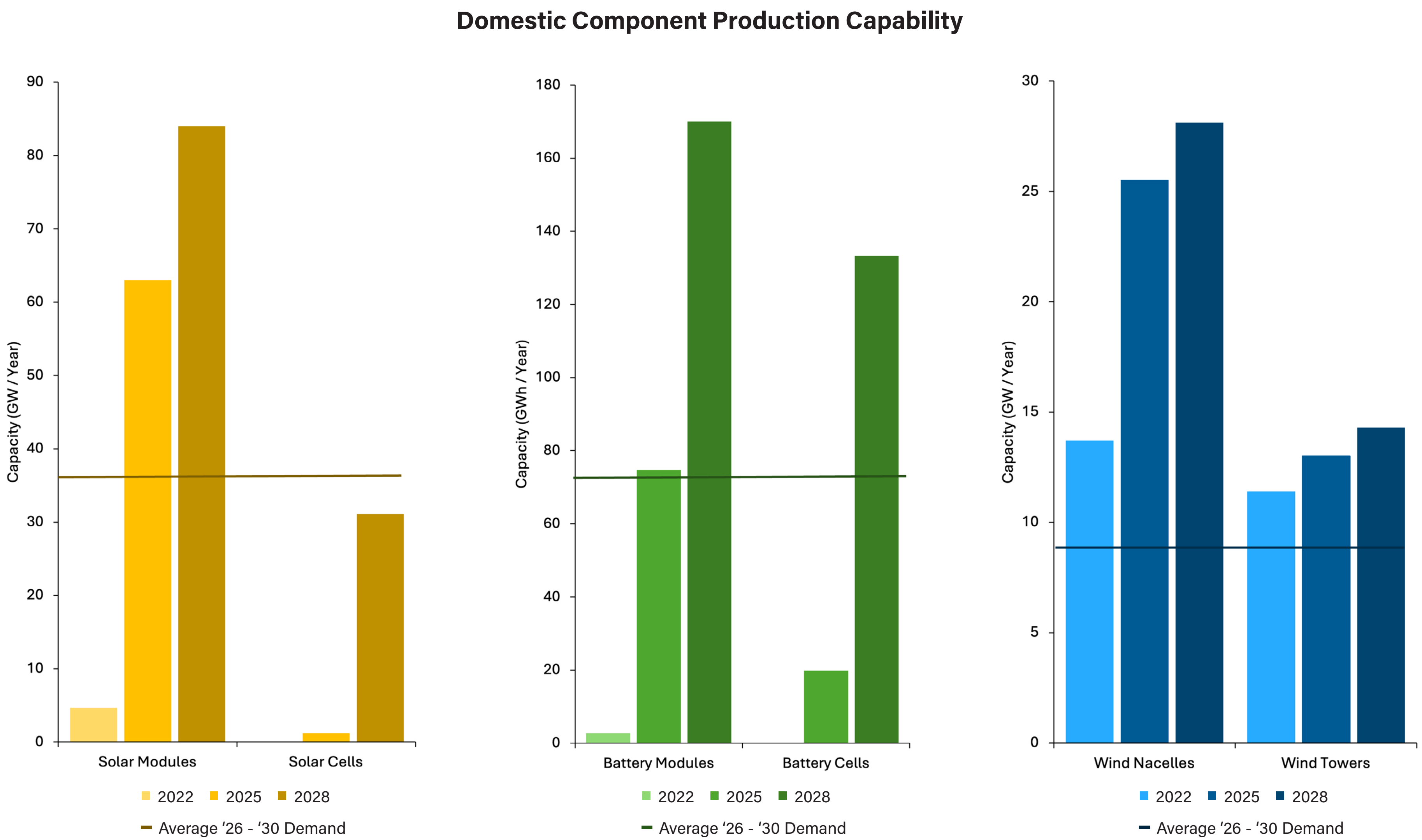
Clean Energy Manufacturing: Primary Facilities



Tech Vertical	Primary Components
Solar PV	Module Frame Junction Box Trackers Racking Inverter Cell Glass Encapsulant Ingot/Wafer Polysilicon
Batteries & Energy Storage	Battery System Battery Inverter E-BOS Enclosure Module Cell Anode Active Material (AAM) Cathode Active Material (CAM) Binder Electrolyte Extraction & Processing – Lithium Extraction & Processing – Graphite
Land-Based Wind	Nacelle Blades Tower Drivetrain Cables
Offshore Wind	Vessel Cables
Grid	Distribution Transformers Enclosure Power Transformers Transmission Towers

State of the Primary Clean Power Manufacturing Industry

U.S. manufacturing capacity now meets clean power demand for solar and battery storage modules, as well as wind nacelles and towers

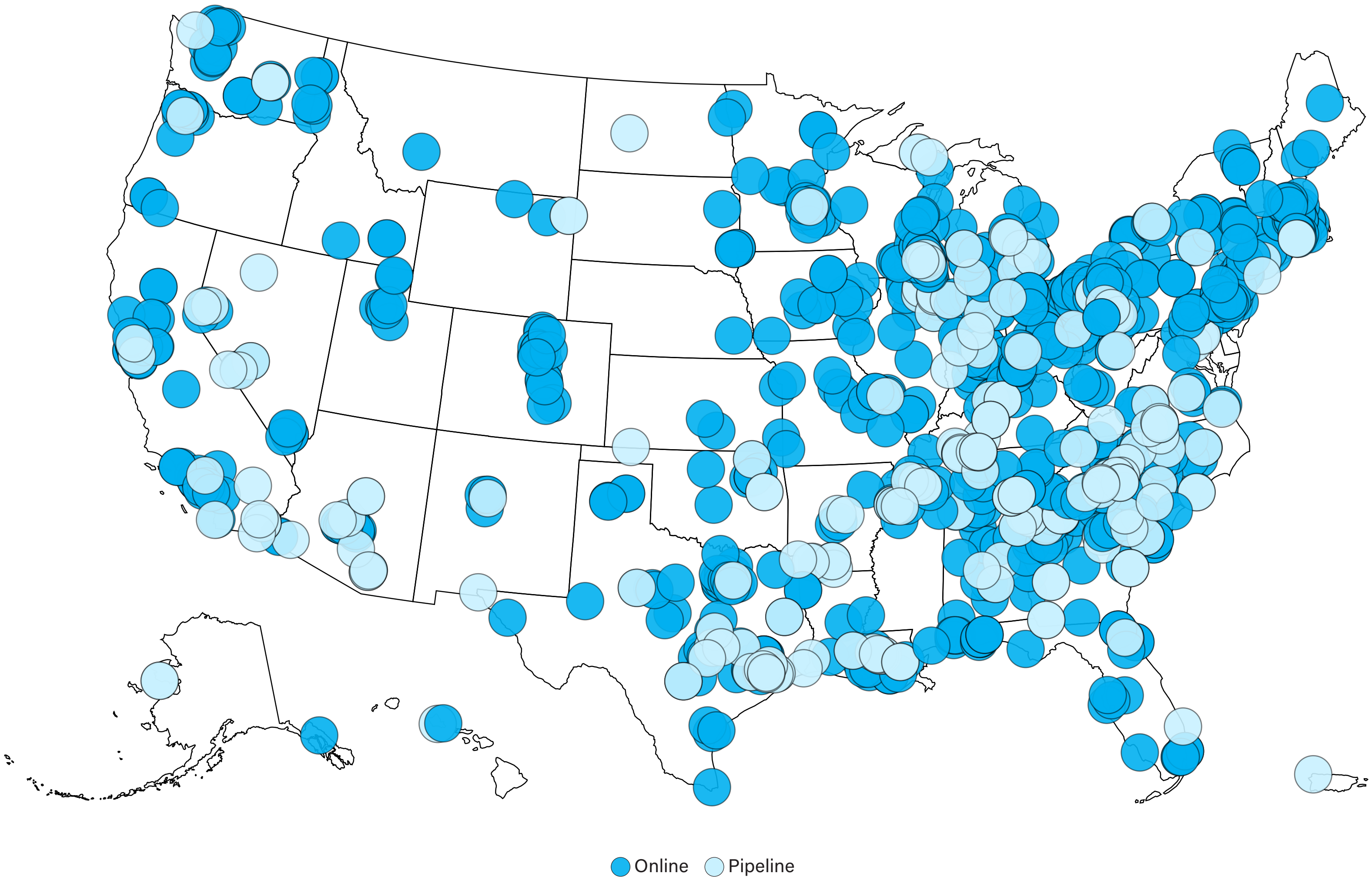


Note: Demand estimates are based on average outlook from Aurora, BNEF, S&P Global, and Wood Mackenzie

State of the Entire Clean Power Manufacturing Industry

There are over 825 manufacturing facilities online supporting the clean energy supply chain. These facilities produce primary components along with thousands of secondary parts—such as steel, plastic, and electrical components—required by clean energy supply chains.

Clean Energy Manufacturing: Online and Pipeline



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GDP Impact of Operational Clean Energy Component Manufacturing on Leading States

Total

Rank	State	GDP ($mil)	# of Facilities[1]
1	Texas	$4,587	72
2	Michigan	$2,631	30
3	Illinois	$2,102	41
4	Ohio	$2,054	70
5	Georgia	$2,003	30

Solar

Rank	State	GDP ($mil)	# of Facilities
1	Texas	$4,214	30
2	Ohio	$1,502	30
3	Georgia	$1,493	18
4	Indiana	$1,149	17
5	Michigan	$1,068	18

Battery Storage

Rank	State	GDP ($mil)	# of Facilities
1	Illinois	$1,530	3
2	Michigan	$1,450	5
3	California	$1,047	16
4	Nevada	$1,018	7
5	Tennessee	$484	7

Wind

Rank	State	GDP ($mil)	# of Facilities
1	Colorado	$1,792	8
2	Iowa	$623	11
3	Florida	$577	12
4	Ohio	$463	31
5	North Dakota	$453	1

1 Some facilities manufacture components for more than one technology. They are considered 1 facility in the total count. Totals are also inclusive of tracked grid manufacturing facilities. Texas – 2, Ohio – 4, California – 1, Illinois – 1, and North Carolina - 4

01

AMERICA'S CLEAN ENERGY SUPPLY CHAINS

Visualizing the Technology and the Supply Chain

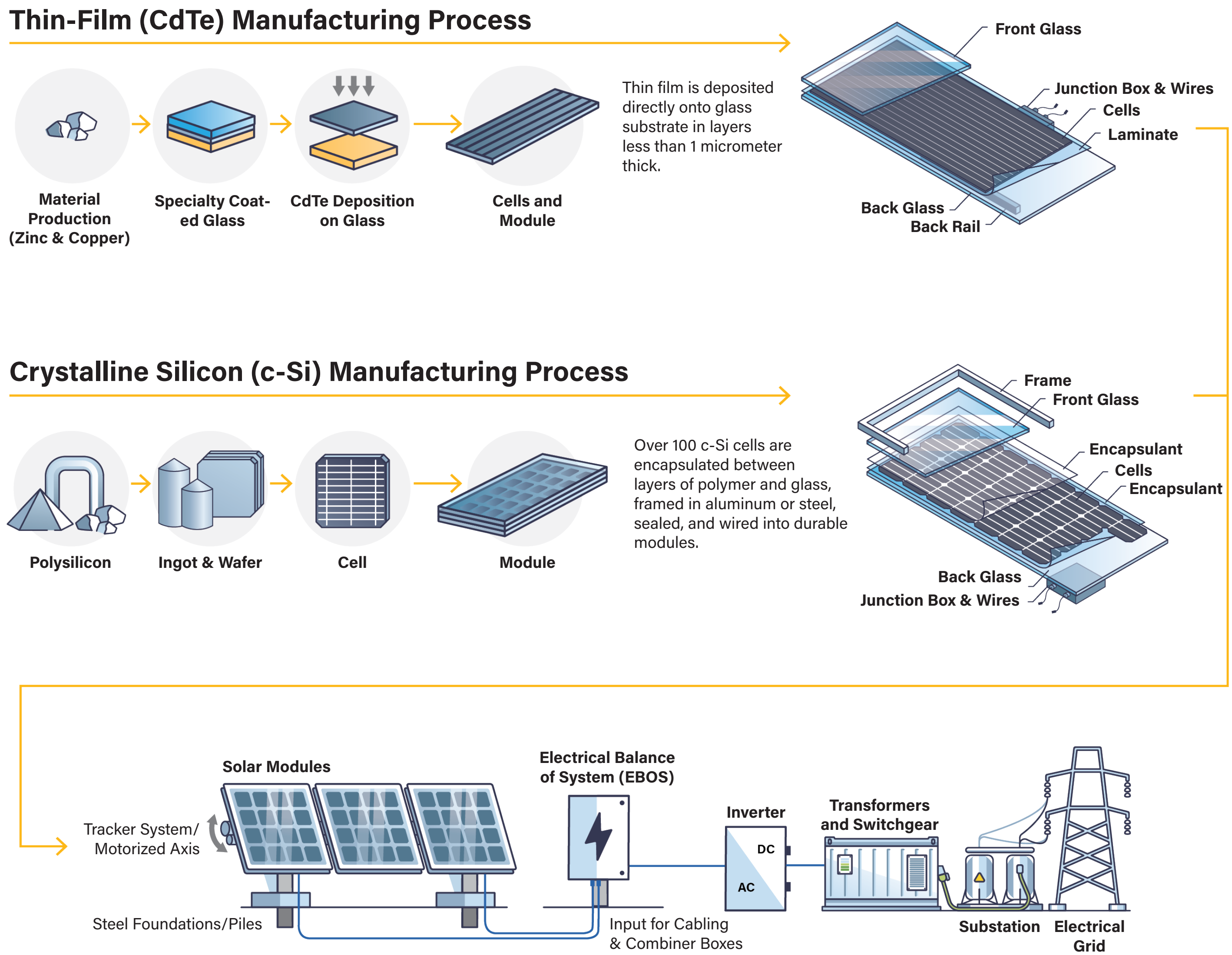
There is much more than meets the eye when you see a solar panel, battery storage system, or wind turbine. For each of these technologies to provide the electricity needed to power the American economy, it has taken thousands of materials, parts, and people that come together in a complex supply chain.

This report provides a technical description of the key components used in each technology, as well as a high-level visualization of how each technology's supply chain functions.

Solar Supply Chain

Major Materials & Components

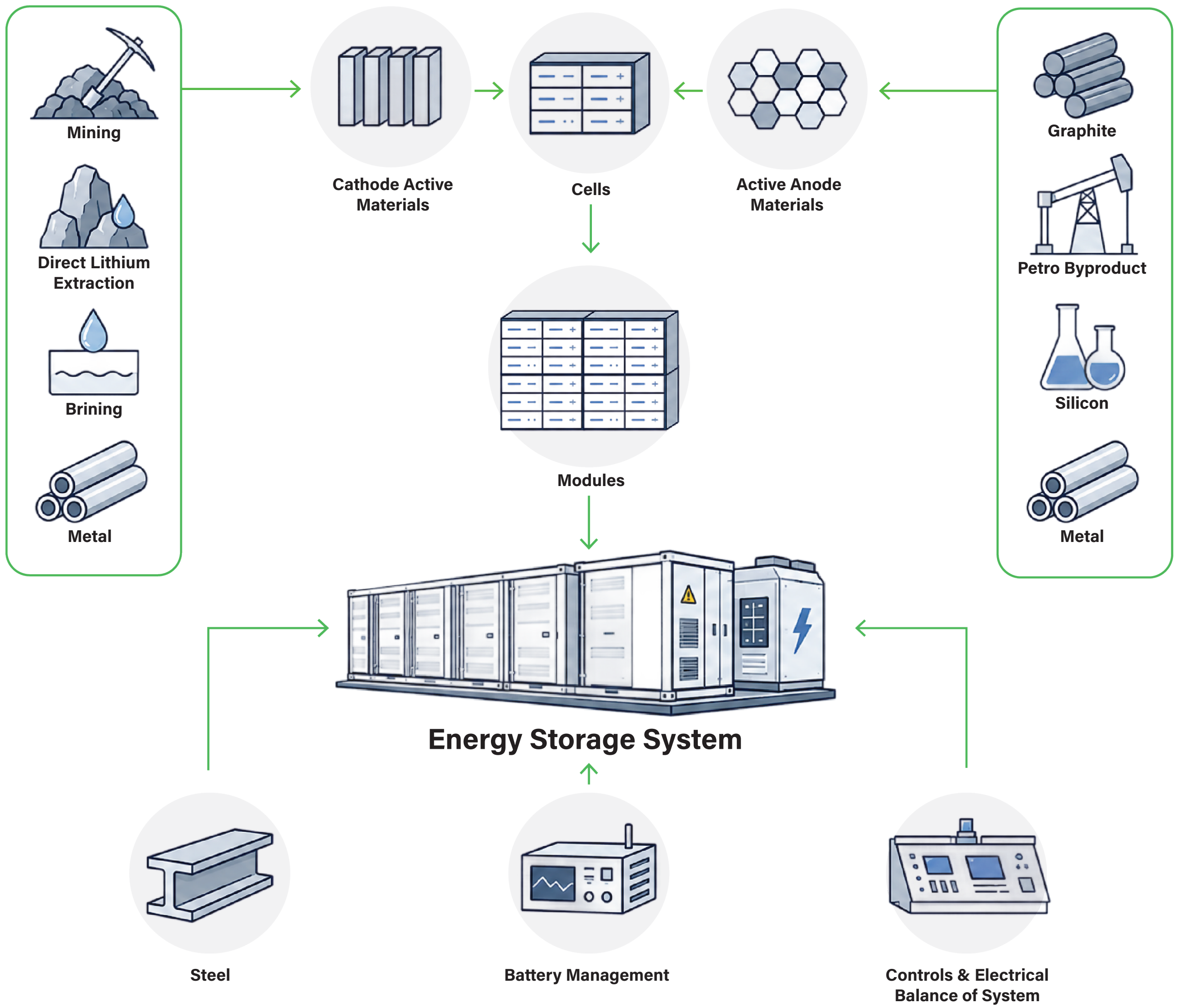
- **Polysilicon:** Ultra-pure silicon, refined from metallurgical-grade silicon which is refined from quartz sand
- **Ingot:** Melted down polysilicon, that is then slowly cooled into large solid crystals
- **Wafer:** Thinly sliced ingots
- **c-Si cells:** Chemically-treated wafers
- **c-Si Modules:** Collection of over 100 c-Si cells packaged together between layers of polymer and glass, framed, sealed, and wired together
- **CdTe Modules:** Glass treated with semiconductor layers less than 1 micrometer thick
- **Trackers:** Motorized mounting systems that slowly rotate the panels throughout the day
- **Racking:** Metal holding modules in place
- **Frames:** Metal border surrounding a solar panel
- **Electrical Balance of System (E-BOS):** Electrical parts converting solar energy into usable power



Battery Storage Supply Chain

Major Materials & Components

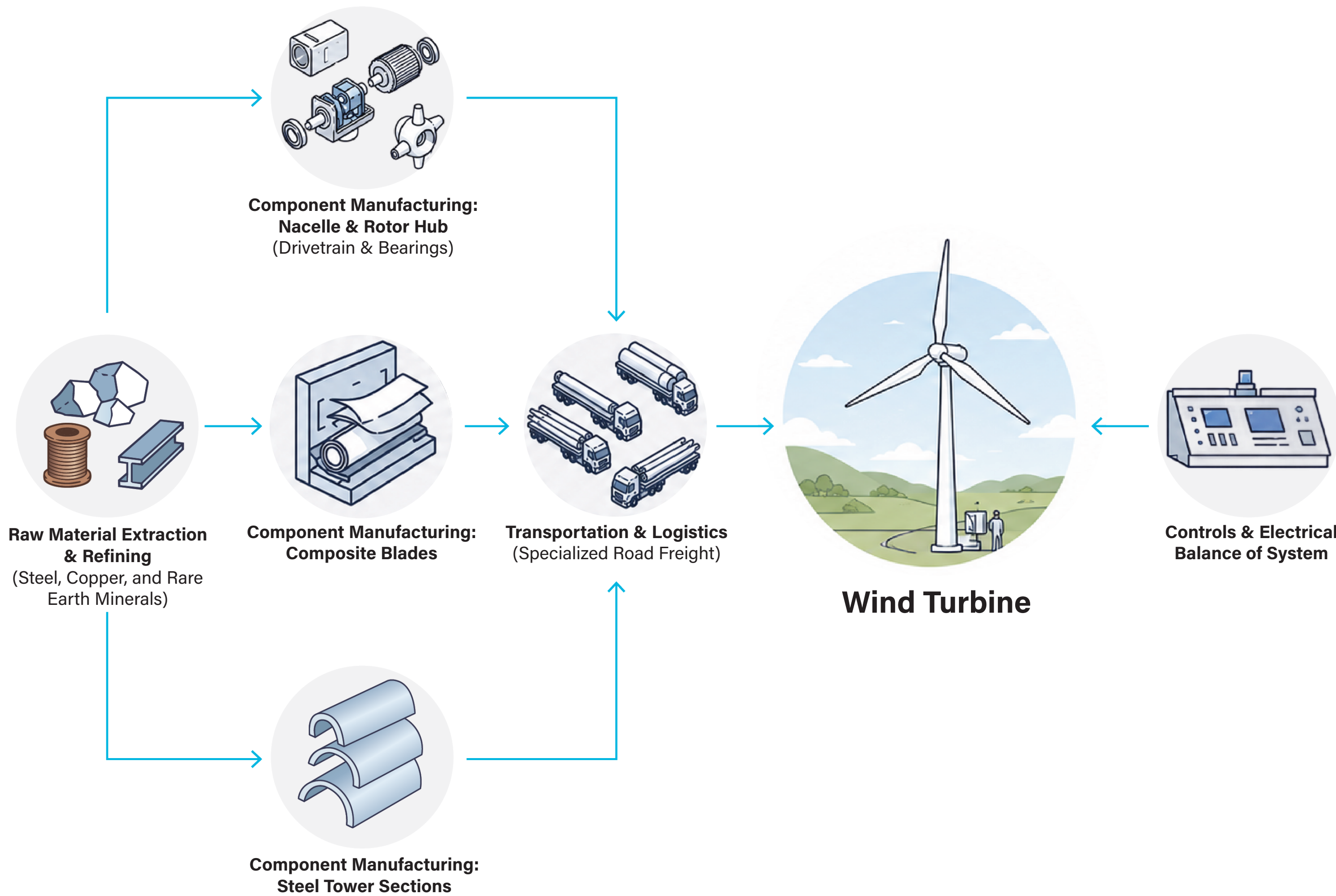
- **Cathode active material (CAM):** Commonly made of Lithium-Iron-Phosphate (LFP). When a battery is charging, electricity enters at the cathode, causing lithium ions to leave the CAM
- **Electrolyte:** Liquid that allows the ions to flow through the cell
- **Binder:** The "glue" holding the active materials and conductive agents together within the electrode
- **Anode Active Material (AAM):** Usually made of graphite, it is where ions are stored. When a battery discharges the ions move in the opposite direction
- **Cells:** The collection of CAM, electrolyte, separator, and AAM storing the energy
- **Module:** Group of cells packaged and wired together
- **Racking:** Connected modules coordinating charging and discharging
- **Enclosure:** The container enclosing the racking
- **E-BOS:** Power converters, transformers, electronic and safety controls



Wind Supply Chain

Major Materials & Components

- **Blades:** The large wings of a wind turbine that catch the wind and spin
- **Hubs:** The central "cap" at the front of the turbine where all three blades connect
- **Towers:** The tall steel pole that holds everything up off the ground
- **Yaw Bearing:** A rotating ring that lets the nacelle slowly turn left or right to face the wind
- **Pitch Bearing:** A mechanism at the base of each blade that tilts the blade to catch more or less wind
- **Drivetrain:** The system inside the nacelle that takes the spinning motion from the blades and turns it into electricity
- **Nacelles:** The large box sitting on top of the tower that houses the turbine's working parts
- **Cover:** The outer shell of the nacelle that protects all the internal parts from weather
- **E-BOS:** Includes switching devices, controller units, and transformers



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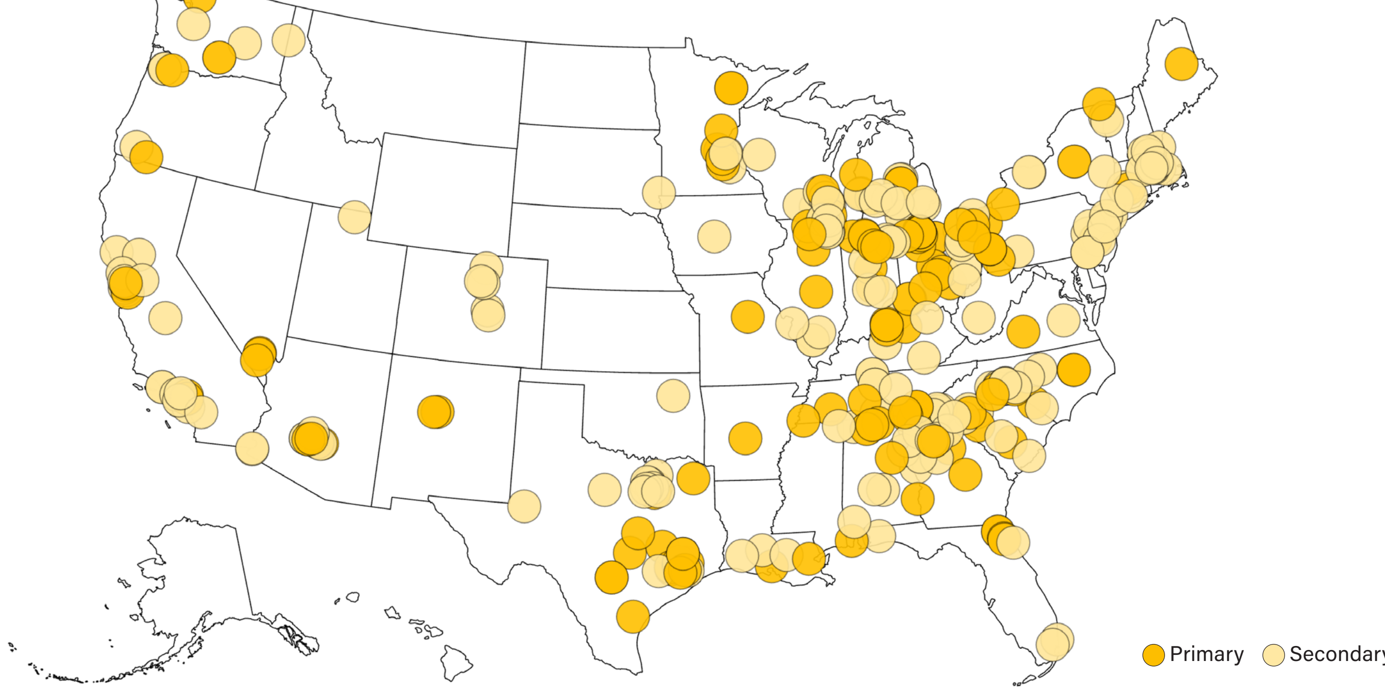
SOLAR MANUFACTURING

State of the Solar Manufacturing Industry

Nearly 30 new utility-scale solar PV manufacturing facilities started production in 2025

- More than one-third of the new facilities manufacture crystalline silicon and thin-film solar modules. Solar tracker and inverter production represented the majority of other new facilities.
- Over 300 online manufacturing facilities support the solar supply chain, spanning 42 states. Each facility enhances supply chain security and reduces reliance on imports.
- There are more than 140 facilities in 30 states that produce primary components like modules, cells, ingots and wafers, trackers, racking systems, among others.
- Over the past five years the number of online solar primary component manufacturing plants in the U.S. has grown by close to 150%. While much of that growth is concentrated in module manufacturing, U.S. solar cell capacity is on track for a similar expansion.

Online Utility-Scale Solar Manufacturing



Number of Solar Facilities

Module	Cell	Ingot/Wafer	Polysilicon	Trackers	Racking	Frame	E-BOS Components	Recycling	Other
35+	3	1	3	40+	25+	4	50+	25+	100+

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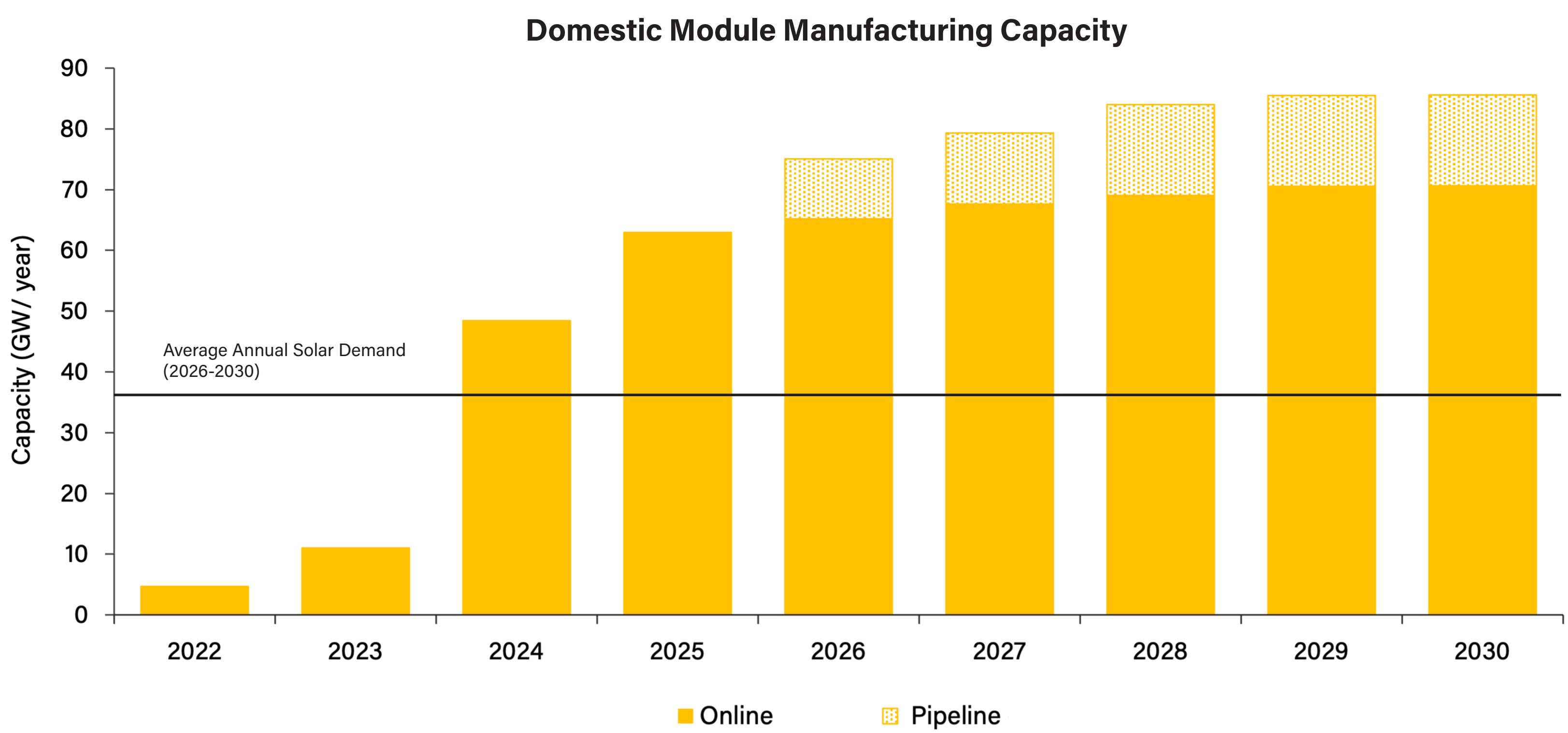
Downstream Solar Facilities

U.S. solar module capacity has exceeded 60 GW, more than enough to meet domestic demand

- In 2025, U.S. module manufacturers commissioned 15 GW of new capacity, with total annual capacity reaching 63 GW[1] – sufficient to meet average demand from U.S. utility solar installations. This represents a rapid increase in manufacturing capacity of more than 1600% in a 5-year period. Total module capability is expected to increase to over 85 GW/year by the end of the decade.
- Utility-scale solar module production primarily falls into two commercial technologies: crystalline silicon (c-Si) and thin-film (typically CdTe). Of U.S. module manufacturing capability, thin-film accounts for 14 GW and c-Si the remaining 49 GW.
- Domestic solar module capacity already outpaces installation demand. To capture more domestic value, c-Si module manufacturing must use U.S. c-Si cells.
- C-Si module production with domestic cells, in combination with domestic thin-film capacity could meet annual solar demand by 2027.

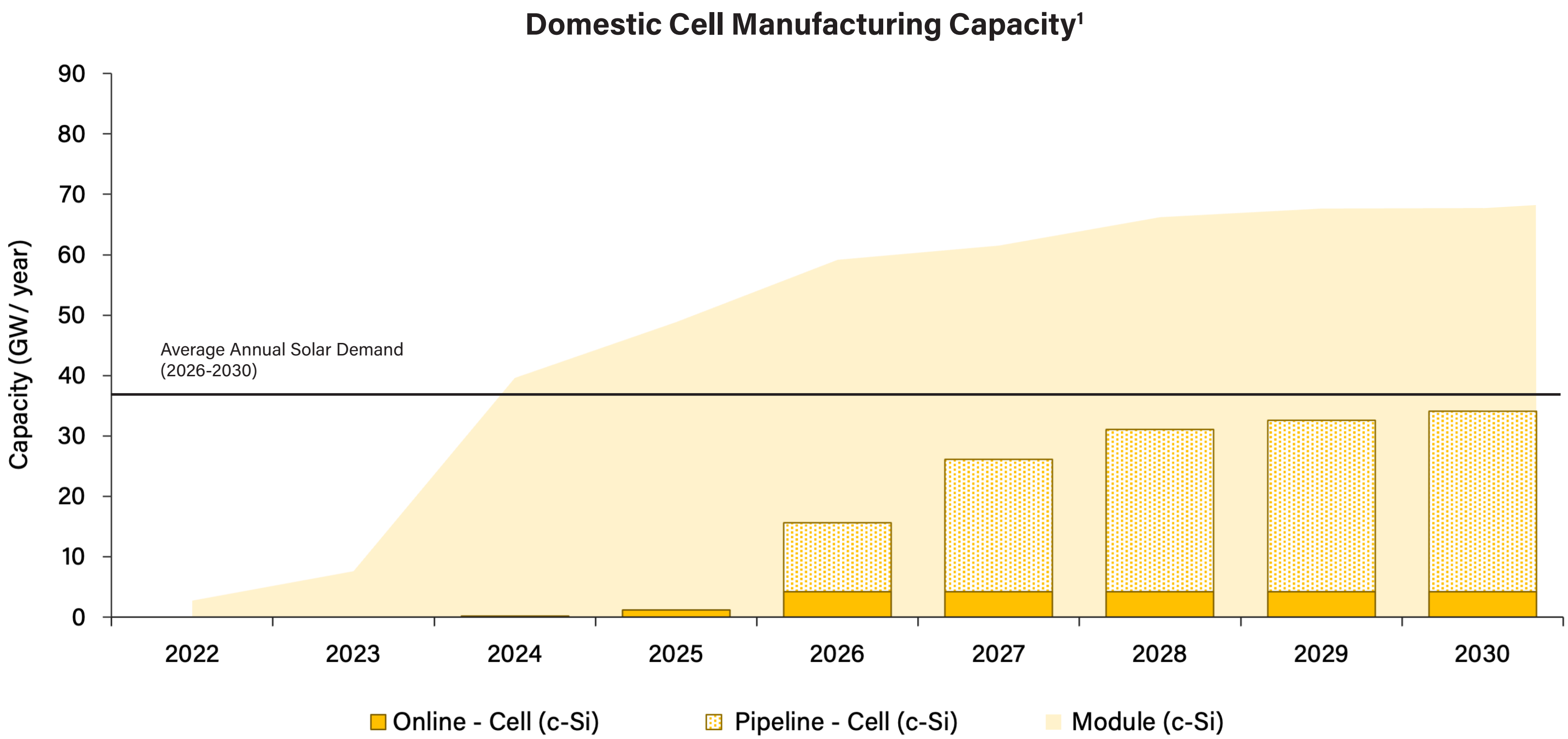


1 Note all solar GW numbers throughout this section are in "direct current" (dc)

Downstream Solar Facilities

Solar cell manufacturing growth is following modules, with at least one new facility built each year for the last three years (2024-2026)

- 3 c-Si cell facilities are now active. The first launched in 2024, the second in 2025, and the third in Q1 2026.
- Cell capacity has been slower to onshore than module manufacturing, primarily because it requires secure offtake from established downstream manufacturers to justify the significant capital investment.
- If all planned facilities reach full capacity, domestic supply could cover 50% of c-Si module manufacturing demand when operating at full utilization.
- Announced cell capacity falls just shy of average total solar installation demand by 2030. However, with c-Si expected to hold about 60% solar technology market share, cell capacity will likely exceed c-Si module installation demand.[2]
- Domestic cell manufacturers are partnering with developers and manufacturers across the solar supply chain to increase domestic content in U.S. solar installations. In fact, the first U.S.-made solar module with domestic cell, wafers, and polysilicon was announced in Q1 of 2025.[3]
- Localizing cell production is essential to increasing domestic content in the c-Si supply chain and the industry is responding to this need.



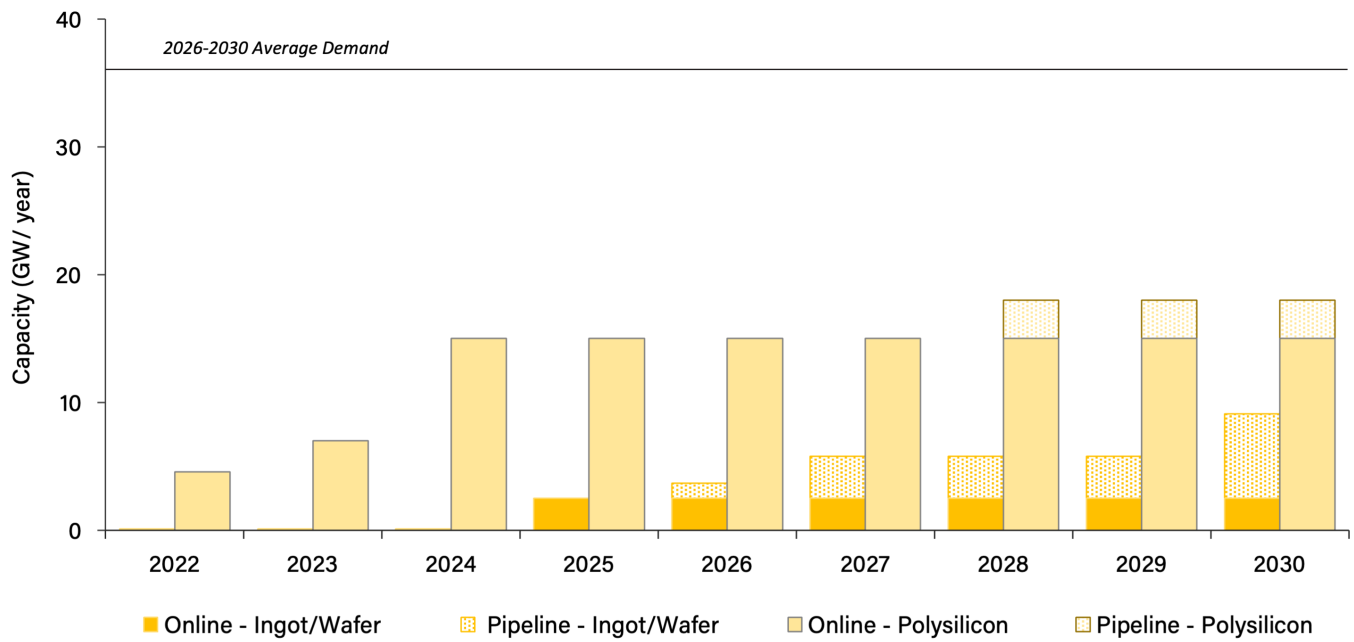
1 Note all solar GW numbers throughout this section are in "direct current", dc
2 Intertek CEA
3 Suniva. 2025. Corning, Suniva and Heliene Announce First 'Made in America' Solar Module Supply Chain.

Upstream Solar Facilities

U.S. polysilicon capacity is more than enough to meet domestic ingot and wafer demand, which can satisfy nearly 25% of current U.S. cell needs

- Corning is the exclusive producer of solar ingots and wafers in the U.S. Corning's 2025 nameplate capacity can satisfy nearly 25% of current U.S. cell manufacturing needs.
- Anticipated ingot and wafer capabilities will more than double by the end of the decade but will still be less than domestically manufactured cell demand and even less of total solar demand.
- U.S. polysilicon capacity is more than enough to meet domestic ingot and wafer demand. However, it falls short of both domestic cell production and overall solar installation demand despite announced capacity expansion.
- Akin to c-Si cell manufacturing needing the demand pull of module capacity, the onshoring of ingot and wafer manufacturing is necessary to incentivize increased domestic polysilicon capacity.
- A larger U.S. cell manufacturing base could make it more appealing to reshore ingot and to reshore ingot and wafer manufacturing and in turn domestic polysilicon production. Until this onshoring materializes, cell manufacturers will rely on imported wafers.
- U.S. companies often export domestic polysilicon to foreign manufacturers, then re-import it as wafers or cells to be manufactured into modules domestically.

Domestic Ingot & Wafer and Polysilicon Capacity



Solar Balance of System and Module Bill of Materials Facilities

There are close to 70 tracking and racking facilities and more than 50 E-BOS facilities

- The almost 70 tracker and racking component manufacturing facilities online are spread out across 25 states, ensuring that nearly all solar PV installations in the U.S. can source trackers and racking rails domestically.
- Due to prior cost effectiveness, solar frames were historically made from imported aluminum. There has been a wave of new domestic steel frame manufacturing announcements in recent years, positioning steel to be a cost-competitive, stronger, and more durable alternative to imported aluminum.
- There are 50 E-BOS component manufacturing facilities in the U.S. These include the inverters, wiring, cables, transformers, switchgears, and junction boxes of a solar facility.
- Recycling solar panels introduces additional manufacturing opportunity and supports supply chain resilience by retaining critical materials within U.S. borders. Over 25 solar panel recyclers are in operation in the U.S. and companies are working towards circularity of raw materials, like aluminum and glass, in the solar supply chain.

Additional Primary Solar Component Manufacturing

Primary Components	Online	Under Construction or Reopening	In Development
Trackers	40+	-	1
Racking	25+	1	-
Frames	4	-	4
DC E-BOS components	50	4	4
Recycling	25+	2	2

Top States by Online Component Manufacturing

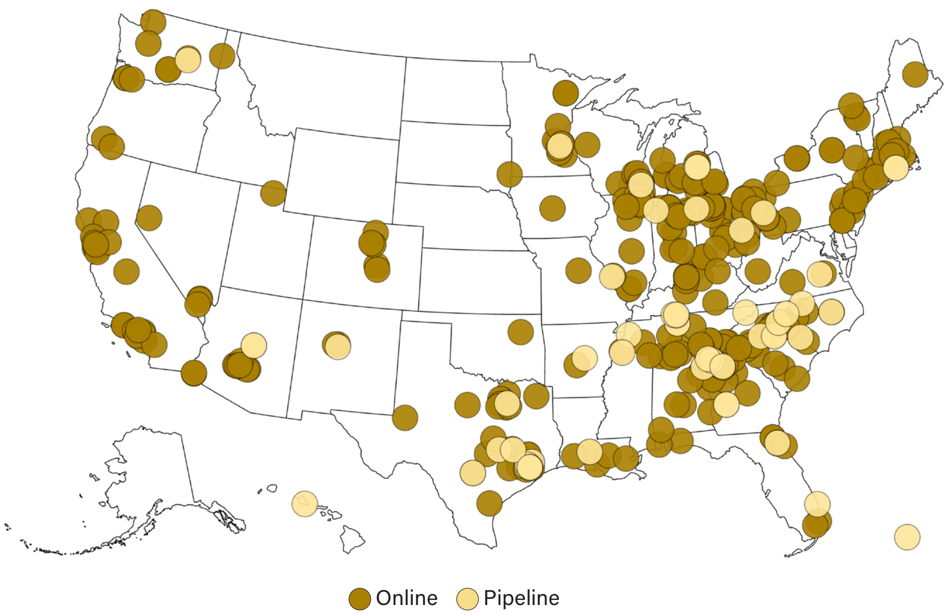
Rank	Trackers	Racking	Frames	E-BOS	Recycling
1	Indiana	Ohio	Arkansas	Wisconsin	Arkansas
2	Texas	Pennsylvania	Ohio	California	Texas
3	Ohio	Minnesota	Texas	North Carolina, Colorado	Georgia

U.S. Solar Manufacturing Pipeline

Over 50 new solar manufacturing plants are in the works, half of which are module and cell facilities

- Despite policy headwinds, utility-scale solar manufacturing is poised for strong, sustained growth.
- ACP is tracking over 50 additional manufacturing sites in 20 states that are either under construction or announced across the solar supply chain. Of these sites, 40 are manufacturing primary solar components.
- Alongside unprecedented growth, there remains opportunity for more. Ingot and wafer production sits as a domestic choke point for the supply chain. Onshoring solar-specific glass production presents another major supply chain prospect as there currently is no domestic capacity. As a result, near-term imports must remain cost efficient to best support the competitiveness of domestic downstream manufacturing.

Utility-Scale Solar Manufacturing Pipeline[2]



Top States by Number of Potential Future Facilities

Rank	State	Number of Facilities	GDP ($mil)
1	Texas	8	$2,688
2	Tennessee	6	$406
3	Georgia	5	$3,655
3	North Carolina	5	$296
5	Ohio	3	$298

Number of Utility-Scale Solar Facilities by Component

Status	Module	Cell	Ingot/ Wafer	Polysilicon	Other
Under Construction	8	7	3[1]	1	10+
Announced	6	6	-	1	10+

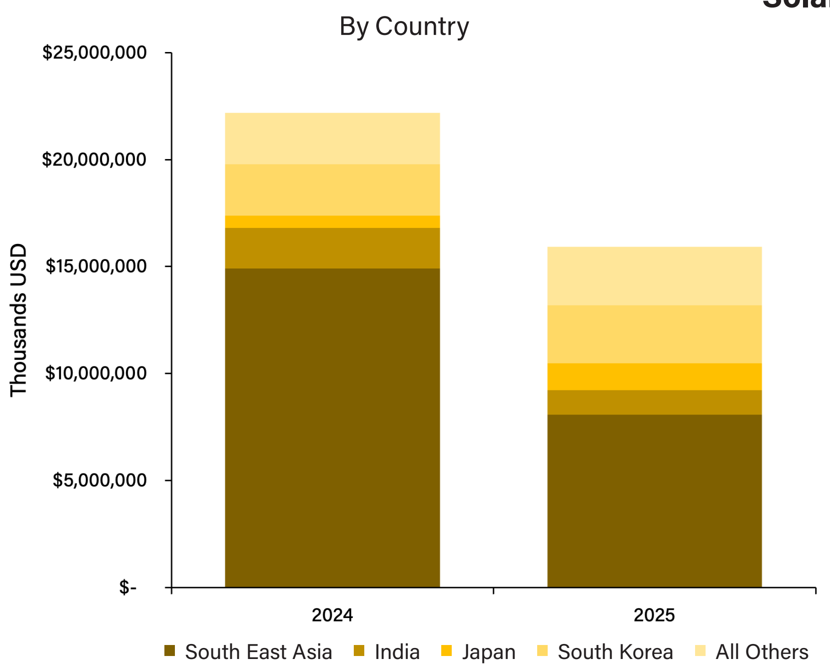
1 The ingot/wafer figure is inclusive of Corning's plant expansion
2 Several announced solar projects have not yet announced site selection. Therefore, they are not shown on the map.

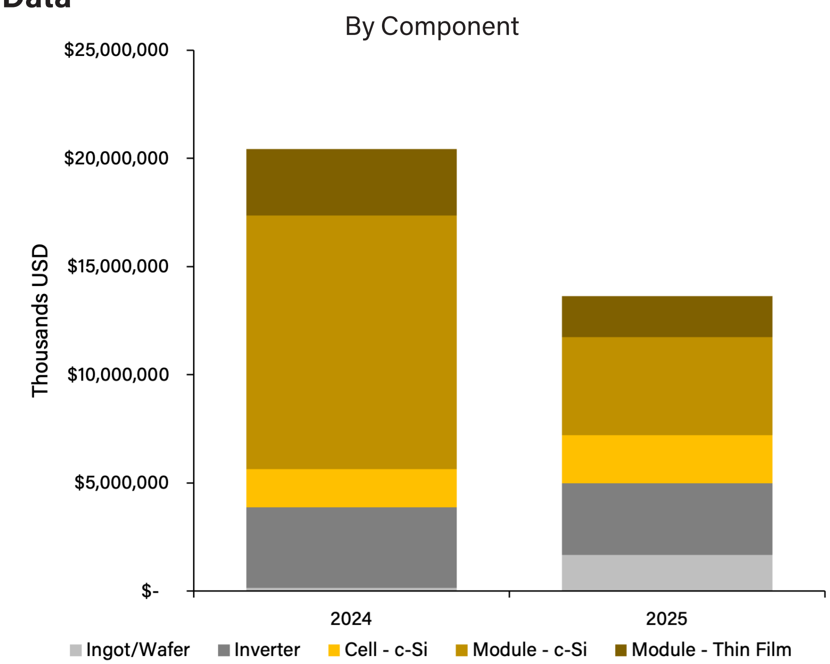
International Solar Imports

Increased solar manufacturing has led solar imports to fall 33%

- From quarter to quarter throughout 2025, solar component imports shifted drastically, both in value imported and origin countries. This variance is due to ongoing antidumping and counterveiling duty (AD/CVD) investigations and onshoring of domestic manufacturing.
- In 2025, solar imports are down an estimated 33% from 2024 levels.[1,2]
  - As domestic module manufacturing has scaled, there was a notable 57% decrease in module imports since 2024.
  - Conversely, cell imports increased by 27% from 2024 levels to satisfy growing demand for module inputs.
  - Inverter imports declined 11% from 2024 levels.
- There were notable sourcing shifts away from Thailand and Vietnam throughout 2025 due to the April 2025 "Solar 3" AD/CVD determination.[3]
- Later in the year, the industry then shifted away from Laotian and Indian imports because of the "Solar 4" AD/CVD pending investigation.
- Despite tariffs between 86 – 104%, Indonesian imports for module and cell continued throughout 2025.
- In an effort to shift away from highly tariffed markets, imports from countries not yet subject to AD/CVD investigations tended to trend upward.

Solar Import Data





1 USITC Dataweb.2026.Imports By Customs Value.
2 Note: Because domestic cell manufacturing is in its nascency, it likely contributed a negligible amount to overall ingot and wafer imports in 2025.
3 Note: While cell imports from Thailand dropped over 95% from their Q2 peak, the country remained a significant import source in 2025.

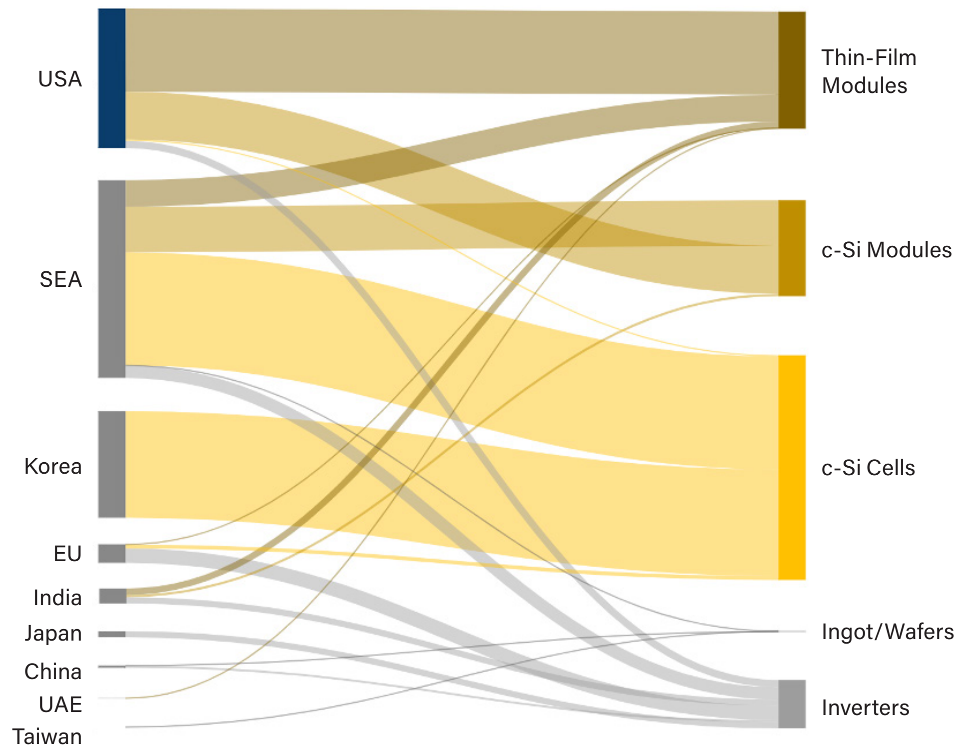
Note import values are based off of total ITC reported customs value as opposed to export quantity as not all countries share the later. As such customs value is the more robust data set. However, it will be influenced by the cost of the components from their origin. That is, one should not interpret this to mean custom value share = quantity share.

International Solar Supply Chain

Federal policy action has shifted where imported solar components are sourced

- It is estimated that 2025 module installations followed a one-third thin-film and two-thirds crystalline silicon split.[1]
- Domestic manufacturing capacity of thin-film solar modules was able to satisfy the bulk of installation demand in 2025 with the remainder being filled by Indian and Southeast Asian imports.
- American c-Si module manufacturing capacity in 2025 was able to satisfy greater than half of installation demand. Southeast Asian imports supplied most of the demand unmet by domestic capacity.
- Nascent U.S. cell manufacturing is estimated to have satisfied about 1% of manufacturing demand in 2025, with Southeast Asia (SEA) and Korea counting as the largest cell suppliers to the growing domestic module manufacturing demand. Domestic cell manufacturing would present a major value contribution to module manufacturing and is set to rapidly scale.
- While domestic ingot and wafer capabilities are growing, U.S. cell manufacturers will require wafer imports in the near term until domestic capabilities increase. The majority of wafer imports in 2025 were sourced from Southeast Asia.[2]
- Solar inverters are sourced globally, with the most substantial volume coming from Southeast Asia, the EU and Japan. It is estimated that over one-sixth of solar inverters were sourced domestically in 2025. Developers are actively seeking to increase the percentage of domestic inverters in 2026 and beyond.

Domestic vs. Imported Market Shares by Key Solar Components



1 Intertek CEA
2 Note: As discussed in the Upstream Solar section, domestic polysilicon exports that are reimported as wafer or cell are captured within the other component trade flows.

ACP has leveraged ITC trade data, confidential membership information, contracted work with Intertek CEA, and our in-house manufacturing database to develop a view on the domestic value of major components and applied it to the total spend on installed solar capacity in 2025.

Domestic Manufacturing In Action: Solar Steel

JM Steel is Producing American-made Steel Components for Utility-Scale Solar Projects

On the banks of the Ohio River, about 20 miles northwest of Pittsburgh, a steel plant that once supplied material for World War II naval vessels is now producing American-made steel components for large-scale solar energy projects.

In April 2022, Nextpower partnered with steel manufacturer JM Steel to reopen the historic Bethlehem Steel manufacturing plant in Leetsdale, Pennsylvania, producing torque tubes used in Nextpower's solar arrays. Bethlehem Steel established the Leetsdale facility in 1904. The plant sat largely dormant for decades, with dirt floors still visible as recently as 2022. Today, it has been rebuilt to manufacture steel components for solar energy projects nationwide, bringing new industrial activity back to a historic American steel town. The recent expansion increased the facility's dedicated solar manufacturing lines to 4 GW of annual production capacity—enough to support millions of solar panels deployed each year.

At JM Steel's Leetsdale and Sinton facilities, workers operate forming machines, inspect finished torque tubes, and prepare components for shipment to solar projects across the country. The reopening and expansion of the plant has created new manufacturing opportunities in communities long defined by steel production.

Economic Stimulus and Job Creation

Facilities: Leetsdale, Pennsylvania; Sinton, Texas

What It Produces: Steel torque tubes for solar tracker systems

Investment: $40M (Sinton); $100M (Leetsdale)

Pennsylvania Jobs: 70+ employees

Texas Jobs: 70+ employees

"[JM Steel] and Nextpower are in a powerful partnership focused on advancing the energy transition and American manufacturing. This is a win at the convergence of two industries that are pivotal to southwestern Pennsylvania — energy and manufacturing — and we're proud that our region is a key part of the supply chain."

Matt Smith, *Allegheny Conference on Community Development*

Finished torque tubes ready for utility-scale solar deployment.

Domestic Manufacturing In Action: Solar & Storage EBOS

Shoals Technologies Group is Producing American-made EBOS, Growing the Domestic Solar and Storage Supply Chains

Just north of Nashville, in Portland, Tennessee, Shoals is producing the electrical infrastructure that connects grid-scale solar and battery energy storage (BESS) projects to the grid.

For three decades, Shoals has manufactured electrical balance-of-system (EBOS) components—the wiring, combiners, and assemblies—that link panels, inverters, and substations into a single operating network. These systems are essential to the safe and reliable flow of electricity from generation to load, forming the backbone of clean power projects deployed nationwide.

At the center of that work is Shoals' new 638,000-square-foot facility, part of a $30+ million expansion that, once complete, will increase production capacity by more than 50 percent and support about 1,400 jobs in the region. The facility also houses Shoals' first dedicated BESS production line, which came online earlier this year – extending the same production approach into the rapidly growing U.S. storage market. As surging electricity demand from data centers and artificial intelligence reshapes grid planning and compresses project timelines, the role of EBOS has become increasingly critical. Developers have strong business incentives to depend on reliable, domestically-produced components to reduce delays, manage costs, and ensure projects perform as expected.

Economic Stimulus and Job Creation

Facilities: Muscle Shoals, AL; Portland, TN

What It Produces: Electrical Balance of System (EBOS)

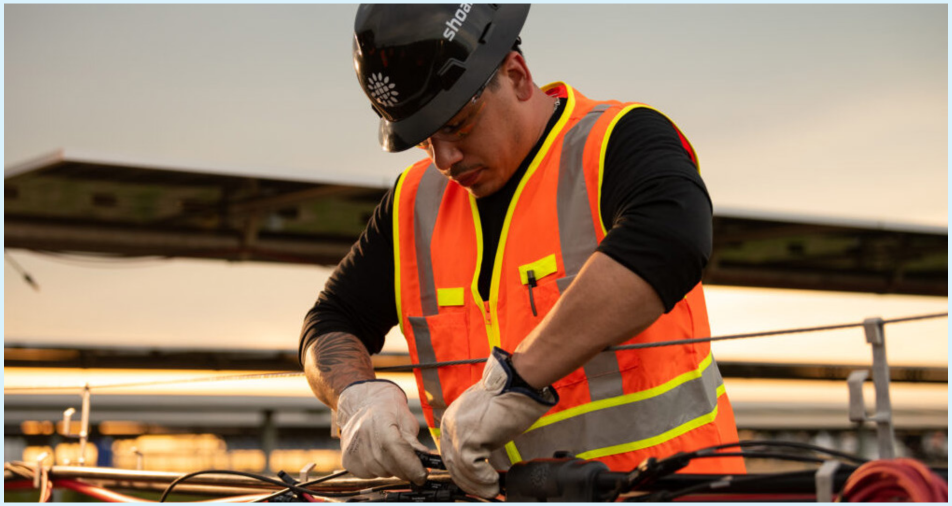
Investment: $30M+

Alabama Jobs: 280

Tennessee Jobs: 1,400

"Solar has traditionally relied heavily on overseas materials, but we see a huge advantage in reshoring. When we manufacture more of what we need right here in the U.S., we gain flexibility, strengthen our sourcing options and improve our responsiveness to customer needs."

Kirsten Moen, *Chief Operating Officer, Shoals*



BATTERY STORAGE MANUFACTURING

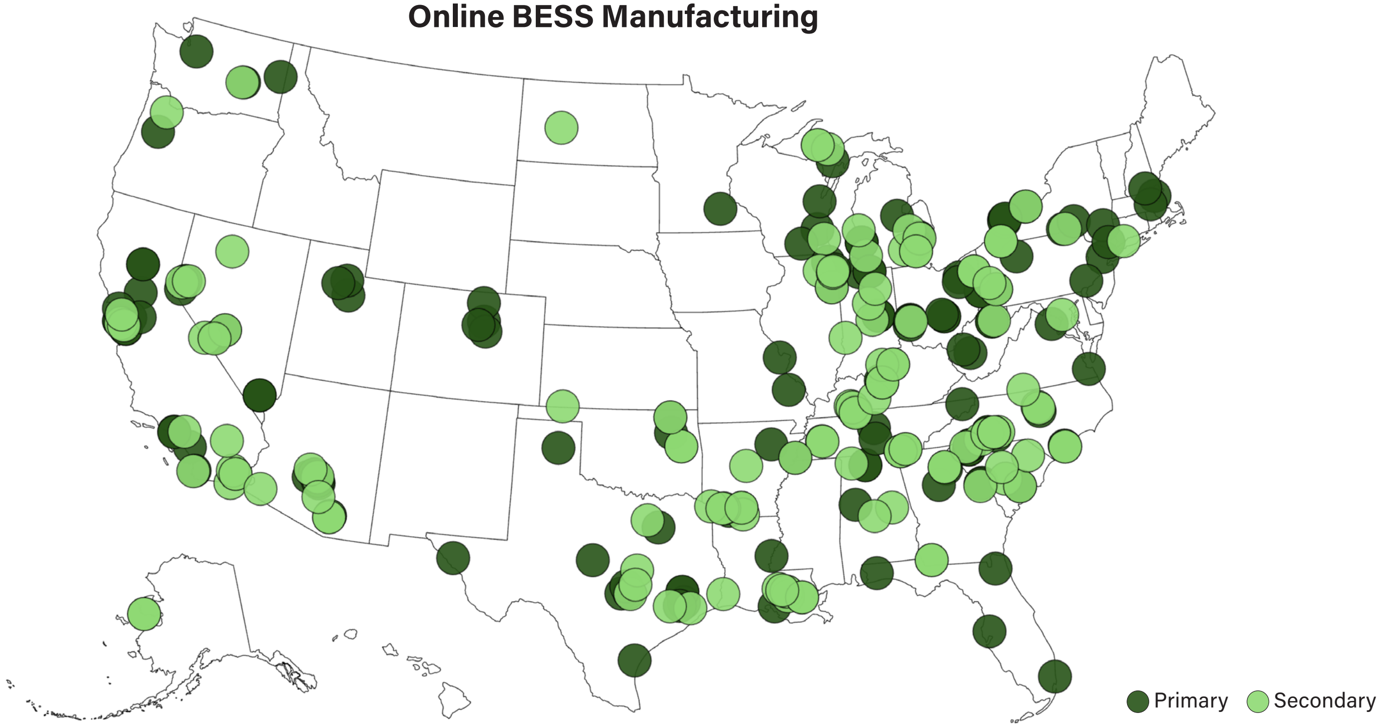
Photo credit: Recurrent Energy

State of the Battery Storage Manufacturing Industry

More than 30 new battery manufacturing facilities came online in 2025, pushing the industry to over 140 facilities

- Domestic BESS manufacturing is booming. After 30+ facilities came online in 2025, an equal wave of expansion is set to hit by the end of 2026. As data centers proliferate, power demand is expected to surge, fueling a corresponding spike in BESS demand.
- Over 140 manufacturing facilities supporting the BESS supply chain are online. Spanning 33 states, each facility improves supply chain and energy security by supporting reliable, base-load power.
- Of these, more than 80 facilities in 28 states produce primary components for the BESS supply chain.
- The majority of battery storage components ACP tracks are Lithium-Iron-Phosphate (LFP) - graphite batteries given they dominate installed energy storage in the U.S.[1]
- Should all facilities scale as planned, the U.S. is on track to be able to meet battery demand via domestic module, cells, and lithium production as early as this year.

Online BESS Manufacturing



Number of Storage Facilities by Component[2]

Module & System	Cell	AAM (Gr)	CAM (LFP)	Li & Gr Processing	Other
7	3	2	2	6	130+

1 Nickel-Manganese-Cobalt (NMC) is standard for domestic electric vehicles; Form Energy's iron-air offers a niche 100-hour battery storage alternative.

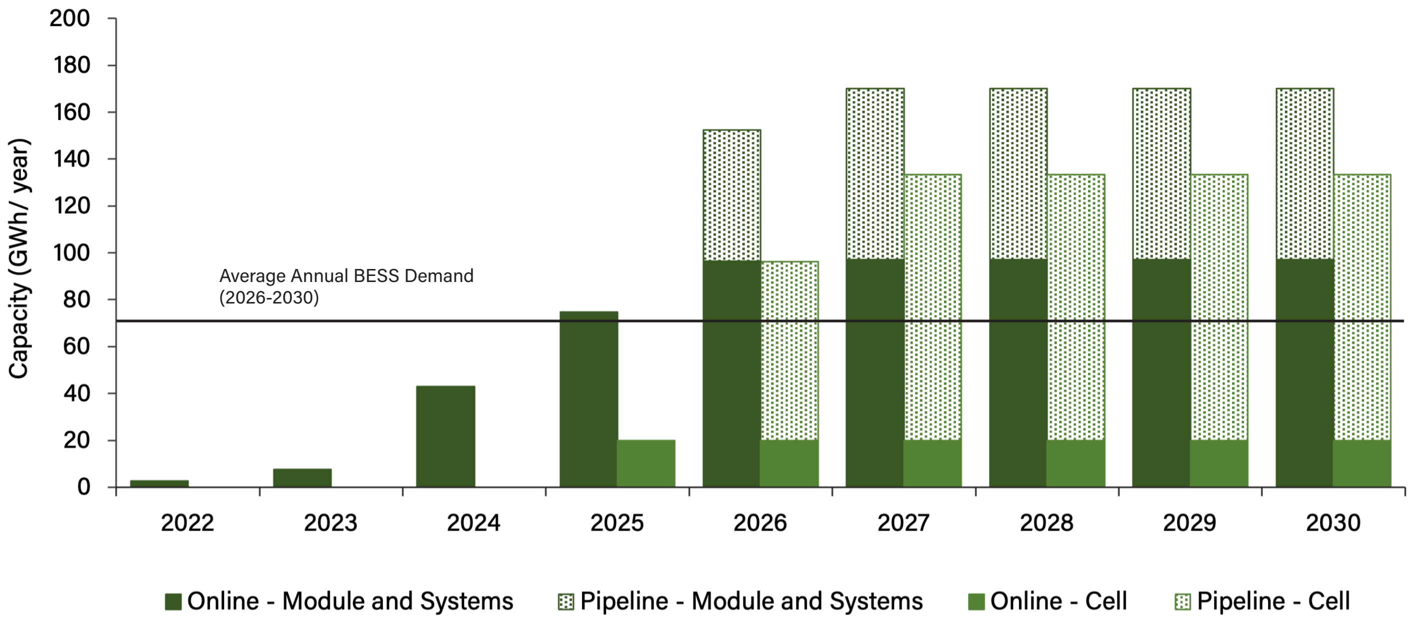
2 Number of cell and module facilities include LFP and iron-air storage chemistries only, AAM facilities only include graphite, and CAM only consider lithium-iron-phosphate (LFP). Number of facilities broken out by component type represent ACP's estimate of projects producing viable material at scale.

Downstream Battery Storage Facilities

The U.S. can fully meet battery demand with domestic modules and is positioned to do so with domestic cells by the end of 2026

- 7 BESS module and integrated storage systems manufacturing facilities were online as of 2025 with 3 more expected by year-end-2026.
- The U.S. now has a cumulative capacity of 75 GWh/year of LFP module and battery systems manufacturing capacity, enough to satisfy 100% of domestic demand. Expansion of operational facilities push the total over 95 GWh, with a potential to exceed 150 GWh/year if all announced facilities commission by year-end 2026.
- 3 LFP BESS cell manufacturing facilities were producing as of year-end 2025 with 7 more expected by the end of 2026, raising domestic cell manufacturing capacity above expected U.S. BESS demand.
- BESS enclosure manufacturing has rapidly emerged in the U.S. with 9 plants in operation and one more announced. Growing domestic battery enclosure manufacturing is providing stimulus for U.S. steel, highlighting a cross-sectoral relationship.

Domestic System, Module and Cell Manufacturing Pipeline[1]



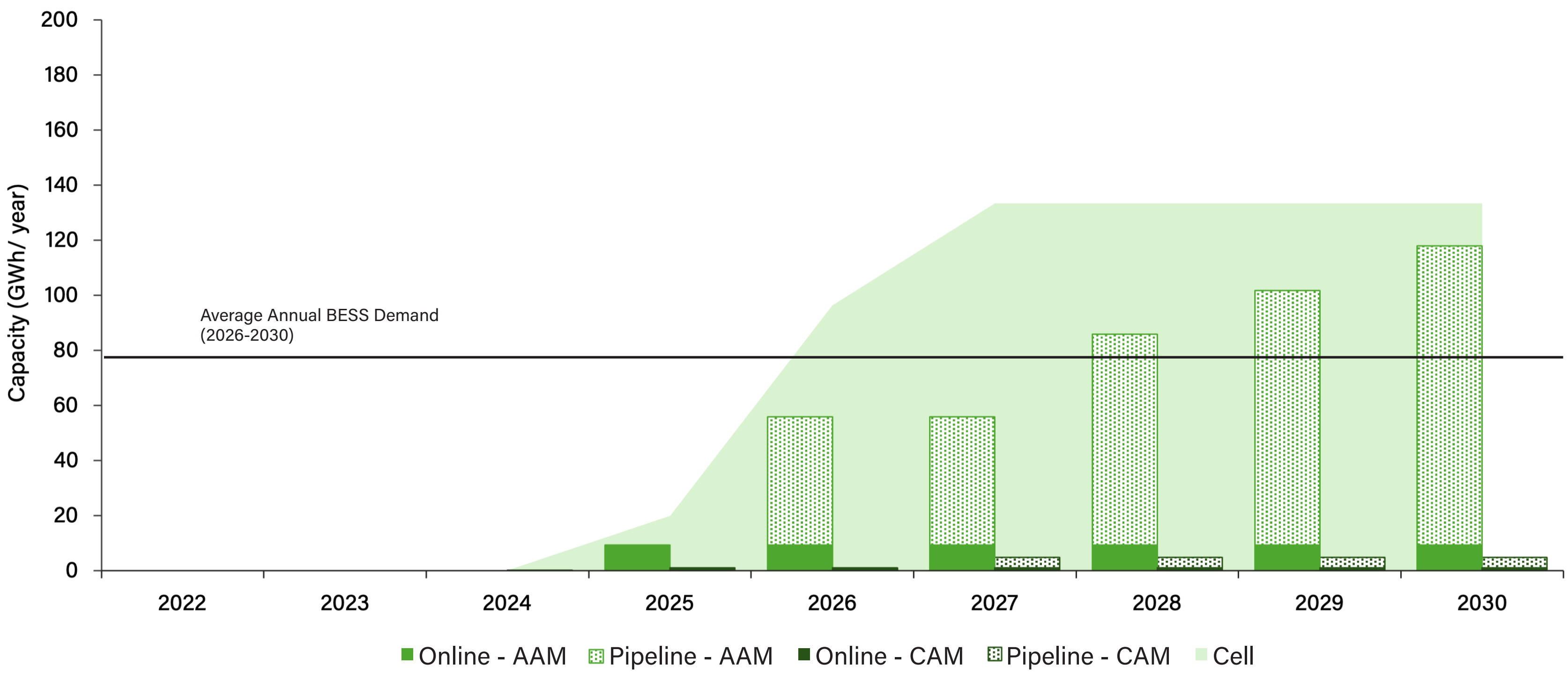
1 While the number of cell and module facilities include LFP and iron-air storage chemistries, cumulative cell and module capacity is indicative of ONLY LFP manufacturing capacity.

Midstream Battery Storage Facilities

Anode active material production capacity is expected to expand from 1 plant to 5 by year-end 2026

- 1 U.S. synthetic graphite anode active material (AAM) plant is active, with 4 expected to commission in 2026. If these projects can meet necessary quality specifications, AAM capacity could meet BESS demand by 2028.
- Given domestic cell production is likely to surpass BESS demand, additional AAM may still be imported to fill cell manufacturing needs.
- 1 company in 2 California locations is producing LFP cathode active material (CAM) and at least one plant is under construction. To maintain production, cell manufacturers will rely on CAM imports for the foreseeable future.
- Battery electrolyte is currently manufactured at 5 factories across the country and at least 2 additional plants are under construction.
- Production of battery binder occurs at 5 existing facilities and 2 under construction. Domestic binder manufacturing is rapidly scaling to meet supply chain demand. U.S. capabilities are likely to meet demand in the near-term.

Domestic AAM and CAM Manufacturing Pipeline

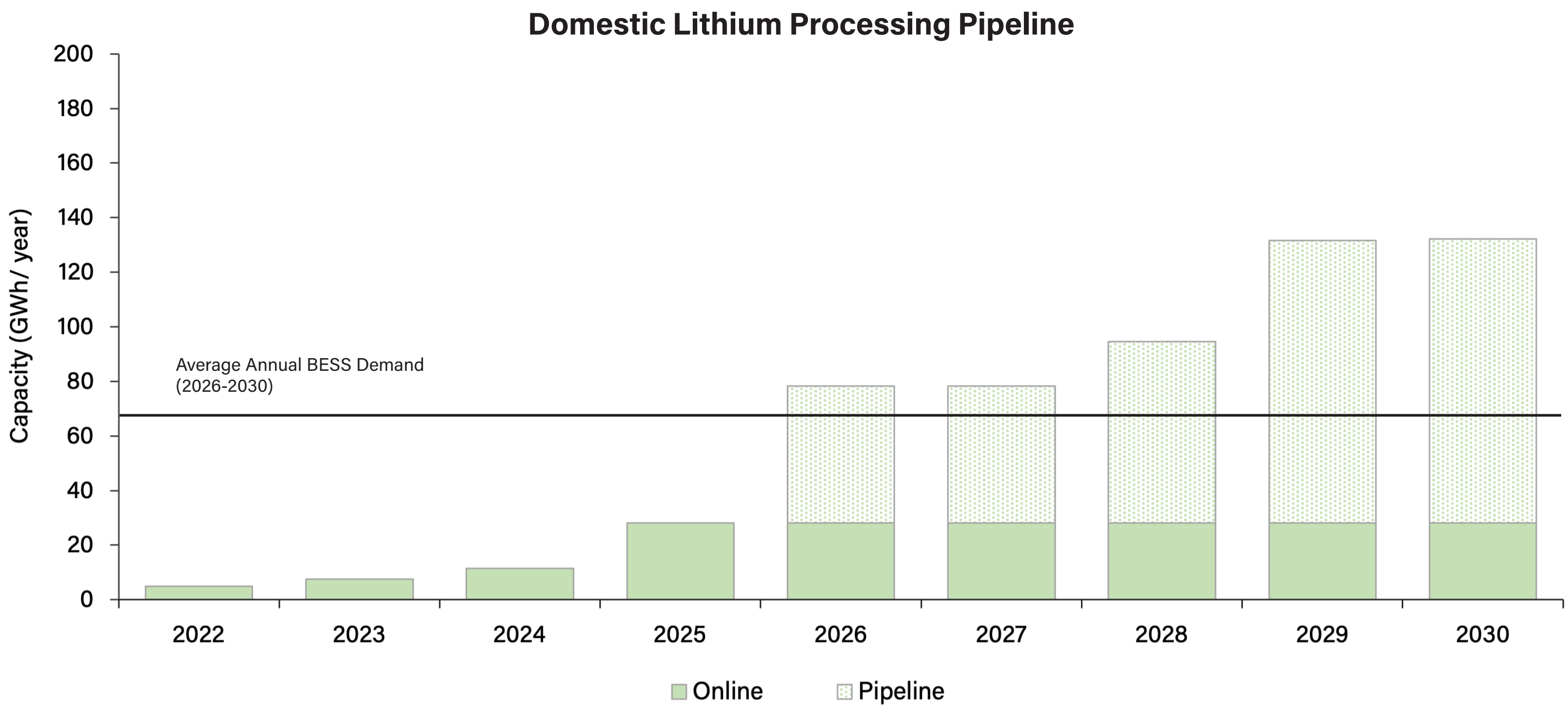


A shortage of capital investment and financing—largely as the result of DOE's cancelation of project support—have stunted the growth prospects of CAM, AAM, and electrolyte manufacturing. Without resolving structural gaps in domestic manufacturing economics and demand risk, domestic cell suppliers will rely on foreign, non-China imported materials.

Upstream Battery Storage Facilities

Commissioning of a full-scale lithium processing plant in 2025 doubled domestic process capability

- Lithium for the battery supply chain can be mined from naturally occurring lithium deposits or it can be extracted from clay or brine reservoirs. Lithium is then refined and processed into an ultrapure form.
- Until 2025, Albemarle's Silver Peak Mine Project in Nevada was America's only at-scale lithium operation. Further expanded over the last four years, they now have an annual production capacity of 7,500 metric tons of lithium carbonate equivalent (LCE). The company's existing processing facility in North Carolina further supports this capacity.
- In 2024, 2 pilot projects expanded U.S. lithium capabilities. Then in 2025, Telsa commissioned a full-scale plant that more than doubled domestic processing capacity. The U.S. now has a production capability of over 28 GWh/year.
- ACP anticipates that at least 5 announced lithium extraction projects could add 140,000 metric tons LCE to the domestic landscape by 2030. If planned capacity holds, U.S. processed lithium could meet BESS demand by year end. However, some portion of this supply will flow to the electric vehicle (EV) supply chain.
- As of mid-March 2026, the U.S. Department of Energy announced $500 million of available funding for domestic critical mineral processing and derivative battery manufacturing and recycling projects.[1] While upstream growth is a supply chain success, the demand-pull gap from cathode manufacturing remains an open opportunity to address.

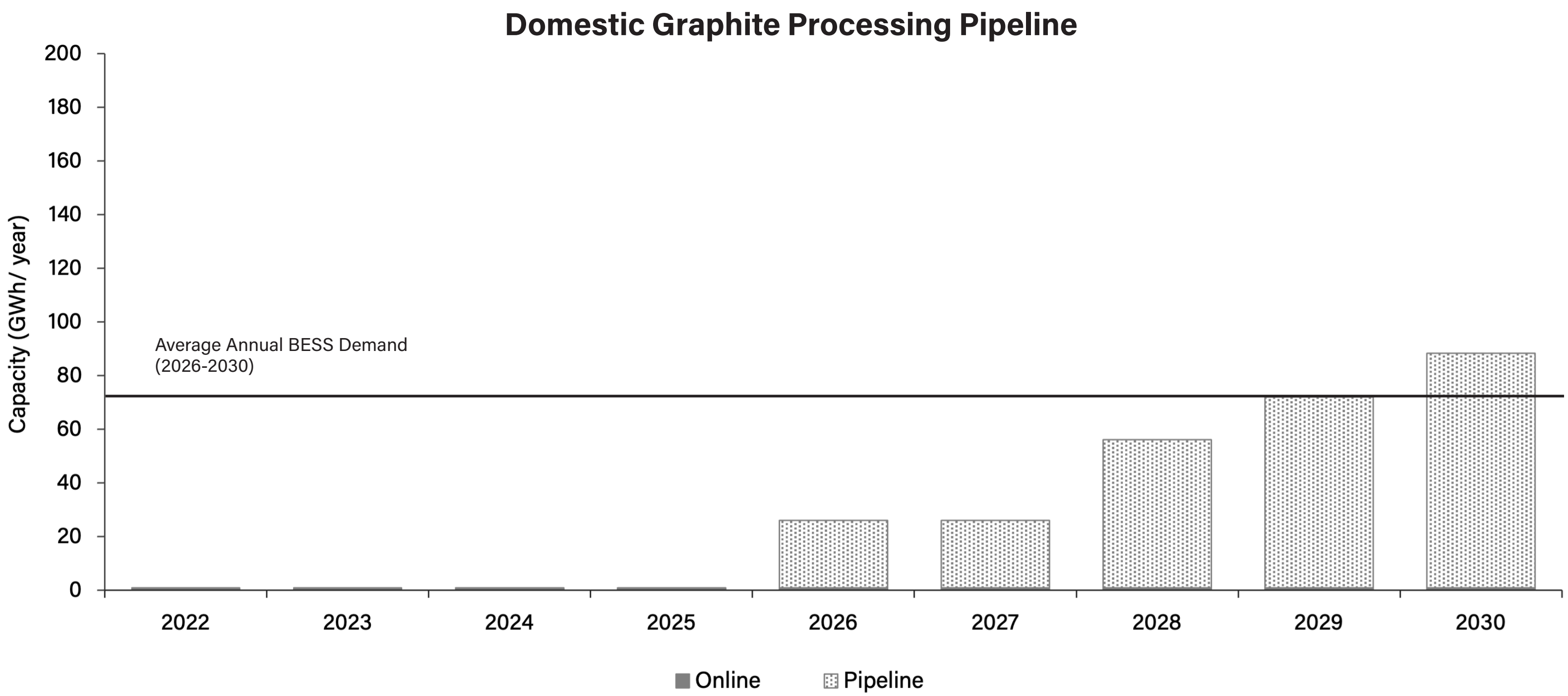


1 U.S. DOE. 2026. Critical Mineral Processing and Manufacturing. Available from: https://www.energy.gov/articles/energy-department-announces-500-million-strengthen-domestic-critical-materials-processing
2 Phases of Mining are defined in the manufacturing section of the Appendix.

Upstream Battery Storage Facilities

The U.S. is fast tracking the federal permit for its only graphite mine in Alaska and a processing plant in Ohio

- Graphite for use in the battery supply chain can be mined from natural ore deposits or derived as a synthetic graphite from crude, coal or a mixture of the two. To meet high battery cell quality standards, the graphite must be further processed into highly purified, anode-grade graphite.
- The U.S. is fast-tracking the federal permit for its only graphite mine: Graphite One's Graphite Creek Project in Alaska. The site will extract 175,000 tons of natural graphite annually for processing at its Ohio facility.[1]
- There are over 10 companies that have announced extraction and processing projects in the U.S., with plans to produce anode-grade material in 11 states.
  - 4 of the 10 companies have operations that will process natural graphite to produce anode active material. One of these facilities is currently operating, processing imported natural graphite from a mine in Mozambique.
  - The remaining 6 announced facilities intend to produce anode active material through synthetic graphite processing. With only a single facility producing at scale, limited domestic processed graphite is available to support the BESS supply chain.
- Cumulative processed graphite capacity could exceed 120 GWh/year by the end of the decade should announced capacity commission, though battery-grade qualification of domestic material remains a challenge.

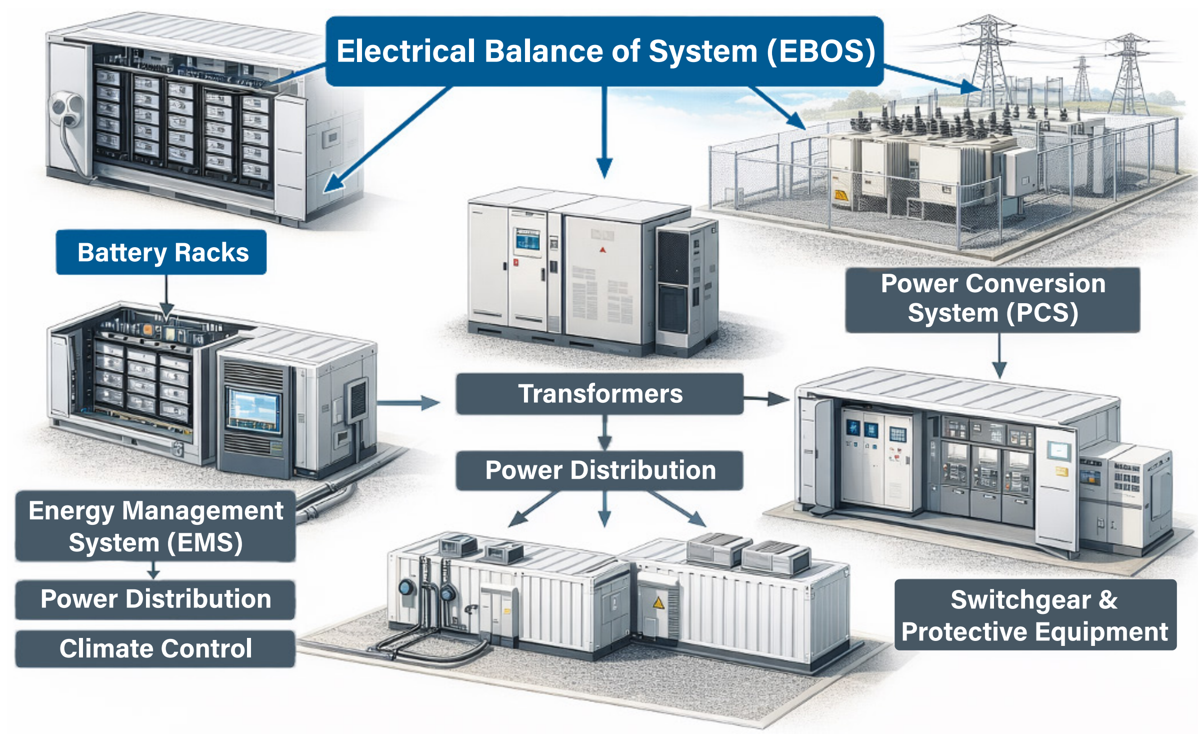


1 Graphite One. 2025. Graphite Ones Graphite Creek Project Approved for FAST-41. Available from: https://www.graphiteoneinc.com/graphite-ones-graphite-creek-project-approved-for-fast-41-federal-permitting-dashboard/#:~:text=FAST%2D41%20status%20follows%20publication,322%25%20of%20the%20PFS%20resource.

Balance of System Battery Storage Facilities

The importance of system security has sparked a rapid onshoring of electronic balance of system component manufacturing

- Energy security is national security. As battery storage and energy generation expand, demand for domestically sourced electrical balance of system (E-BOS) components has grown rapidly. These include the inverters, cables, safety, and electronic controls.
- Domestic inverter manufacturing is growing. In 2025, the country met over one-third of demand with domestic inverters and is expected to meet installation needs by 2030.
- U.S.-made control systems are already a strength of the BESS supply chain. Domestically produced battery management systems (BMS), thermal management, and safety controls met over two-thirds of domestic demand in 2025 and are projected to reach near-100% availability.
- Some secondary components of E-BOS are still imported. Items like climate control systems and insulated gate bipolar transistors (IGBTs) had limited U.S. manufacturing in 2025. Domestic availability is expected to increase significantly by 2030 as the domestic BESS supply chain matures.
- Because U.S. manufacturing costs are higher, companies tend to prioritize onshoring the manufacturing of high-value components like battery modules and cells. International sourcing of lower-value subcomponents, such as temperature sensors with the energy managements system, is likely to continue as there is little business case for onshoring.

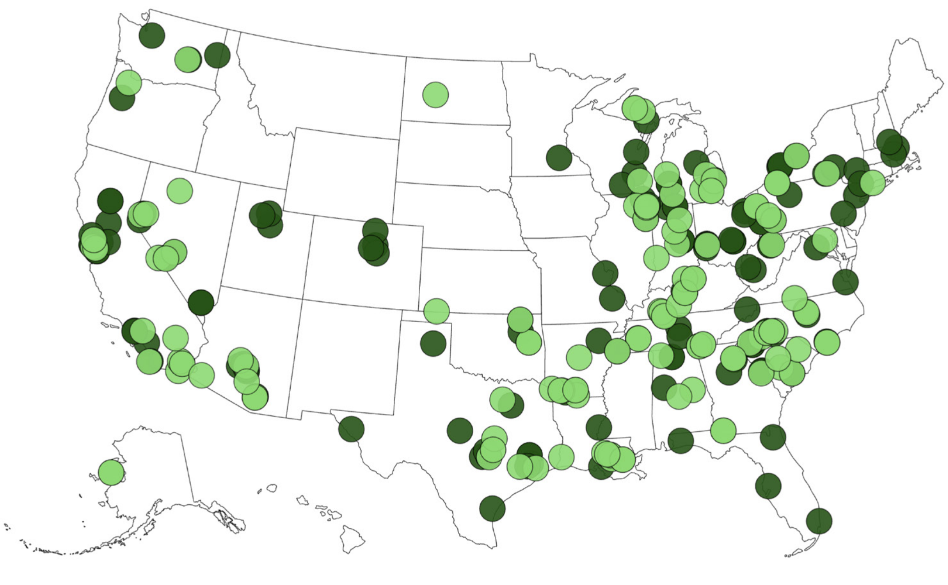


U.S. Battery Storage Manufacturing Pipeline

Domestic BESS supply chain growth is accelerating, with the largest potential growth in AAM production and mineral processing

- There are over 100 additional sites across 28 states either planned or under construction that aim to support the BESS supply chain.
- If realized, these 100 projects, in combination with existing plants, would represent a domestic supply chain capable of meeting annual demand for domestic battery storage systems. The U.S. would be in a position to domestically source a significant portion of battery storage system components while preserving the flexibility and benefits of international sourcing.
- Battery module, cell and processed lithium capacity could satisfy demand by year-end 2026. Domestic AAM and processed graphite could meet storage demand as early as 2028.
- Expected CAM capacity is expected to satisfy less than 7% of demand by 2030. A concerted public-private effort will be necessary to grow LFP CAM supply.

BESS Manufacturing Pipeline



Top States by Number of Potential Future Facilities

Rank	State	Number of Facilities	GDP ($mil)
1	California	9	$868
2	Louisiana	8	$285
3	Arkansas	7	<$50
3	South Carolina	7	$490
3	Texas	7	$1,998

Number of Battery Storage Facilities by Component

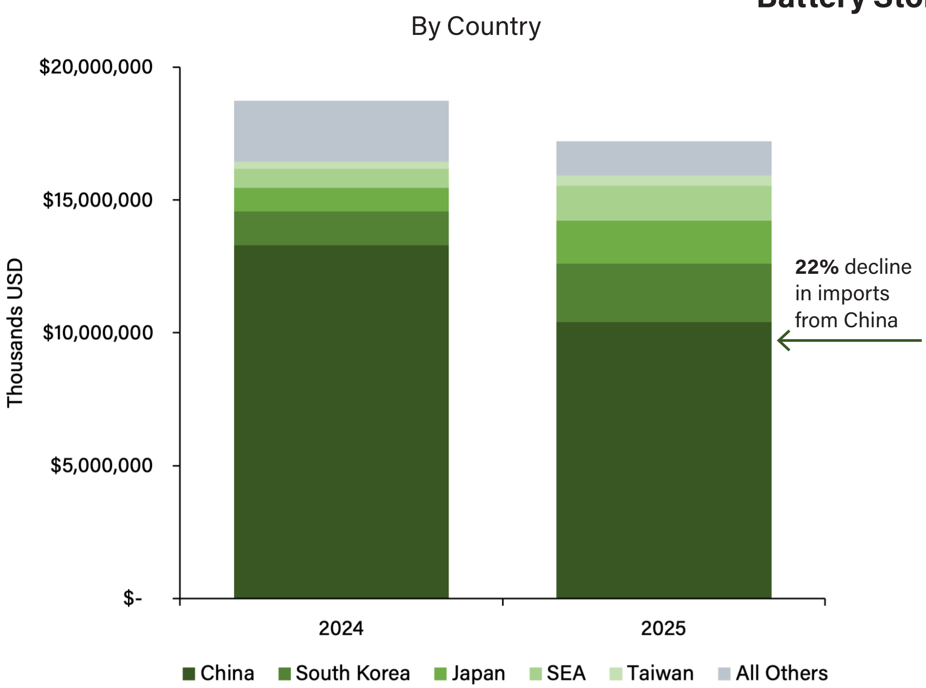
Status	Module & System	Cell	AAM (Gr)	CAM (LFP)	Li & Gr Processing	Other
Under Construction	3	3	3	2	9	60+
Announced	1	3	2	0	4	10+

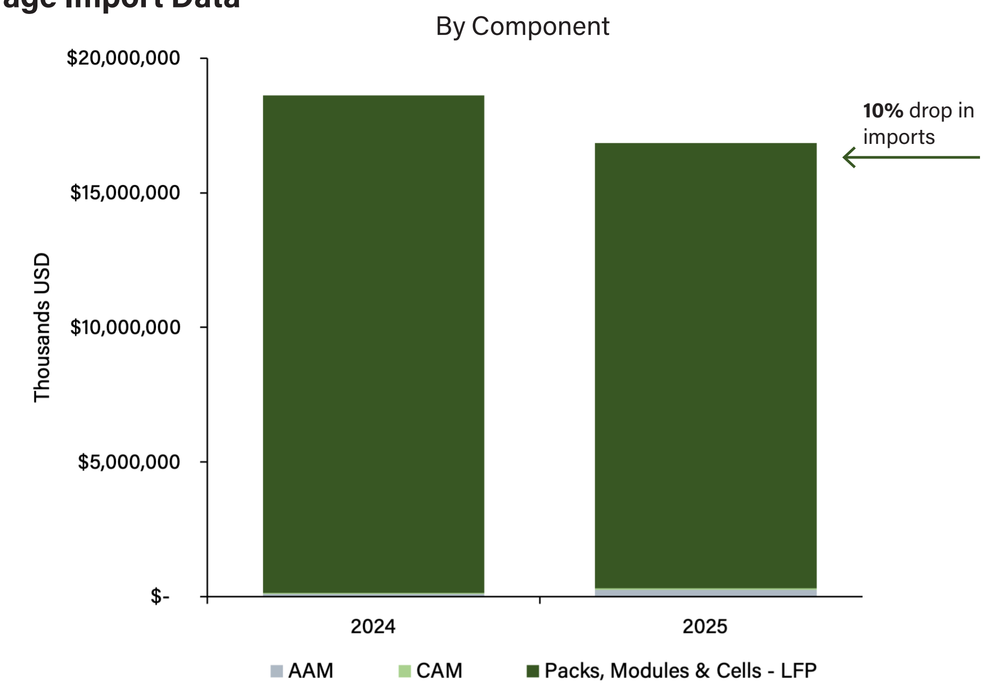
International Battery Storage Imports

Despite record battery storage deployments, increased domestic manufacturing has led battery storage imports to fall over 10%

- In 2025, major BESS imports are down an estimated 10% from 2024 levels, even as BESS installations surged 41%.[1] Chinese imports have fallen more than twice as quickly, down 22% from 2024.
- Driven by scaling domestic manufacturing, imports of packs, modules, and cells have dropped 11% since 2024. The year-over-year decrease in module imports likely runs deeper, but because ITC HTS codes group modules and cells together, the full impact of domestic growth remains partially obscured.
- As noted in the Solar Trade Section, inverter imports declined 11% from 2024 levels. Inverters across technology verticals share an HTS code.
- While midstream battery storage components remain a much smaller portion of overall component imports, the trend line for AAM and CAM imports had opposite directionality to that of the downstream components, with imports of both more than doubling from 2024 and 2025. Imports will continue to rise alongside domestic cell manufacturing due to increasing demand for inputs such as CAM, which is not available at scale in the U.S.
- After the May 2025 AD/CVD preliminary determinations for AAM Chinese suppliers were announced, imports from the country declined precipitously throughout the year. However, in March 2026 the investigation was terminated, resulting in no tariffs being collected on this product.

Battery Storage Import Data





1 USITC Dataweb.2026.Imports By Customs Value. Available from: https://dataweb.usitc.gov/trade/search/Import/HTS

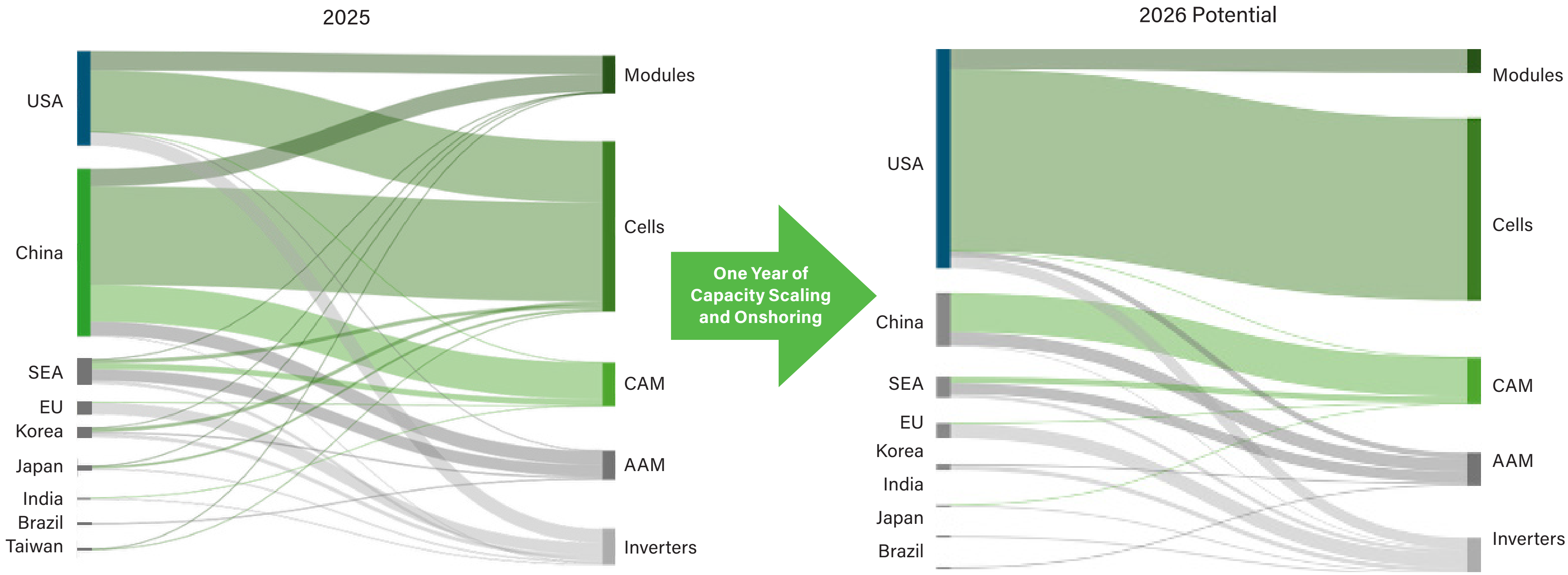
Note: import values are based off of total ITC reported customs value as opposed to export quantity as not all countries share the later. As such customs value is the more robust data set. However, it will be influenced by the cost of the components from their origin. That is, one should not interpret this to mean custom value share = quantity share.

International Battery Storage Supply Chain

Historic onshoring of battery storage manufacturing is shifting global trade flows

- As the battery storage supply chain rapidly onshores, import reliance continues to decrease. In one year's time, both battery module and cell manufacturing capacity in the U.S. could satisfy demand. By the end of 2026, announced domestic anode active material could fulfill over 15% of domestic demand. This onshoring success stands to reduce battery imports by 58% and Chinese imports by over 70%.
- Cathode active material demand from new storage cell manufacturing will increase, requiring imports to keep domestic operations afloat. While the Chinese dominate global market share, U.S. companies are involved in intensive research and development efforts to solve this supply chain gap.
- Cell manufacturing demand will also require active anode material imports in the near term as meaningful domestic capacity is not likely to deploy before 2029. Even as AAM capacity onshores, material qualification and the challenge of scalability will take time.
- BESS developers and manufacturers have been diversifying their sourcing for inverters for the past few years. These trade flows are likely to continue to evolve and prioritize domestic sourcing as availability increases.

Domestic vs. Imported Market Shares by Key BESS Components



ACP has leveraged ITC trade data, confidential membership information, contracted work with Intertek CEA, and our in-house manufacturing database to develop a view on the domestic value of major components and applied it to the total spend on installed storage capacity in 2025. The potential is based off announced production capability.

Domestic Manufacturing In Action: BESS Cells, Modules, and Systems

LG Energy Solution Vertech is Building a Domestic Energy Storage Supply Chain

When LG Energy Solution (LG) Holland, Michigan facility began producing lithium iron phosphate (LFP) cells for grid-scale storage in 2025, it marked the first time an American plant had manufactured LFP cells for energy storage systems (ESS) at commercial scale. That milestone, years in the making, now anchors a multi-facility footprint creating high-quality jobs and catalyzing procurement of American-made batteries for domestic energy storage projects.

A $1.4 billion investment retooled and expanded the Holland campus — where LG Energy Solution has manufactured batteries since 2010 — to produce ESS-grade LFP cells for integration and commissioning by its U.S. energy storage division, LG Energy Solution Vertech. Cell and module production in Holland now feeds into a broader domestic network spanning four U.S. plants across the Battery Belt, culminating in final system assembly in Phoenix, Arizona at LG's new facility under construction. LG Energy Solution's domestic manufacturing footprint is now projected to reach approximately 50 GWh of North American ESS manufacturing capacity in 2026.

LG Energy Solution is investing in the next generation of battery manufacturing talent and reinforcing its partnership with regional communities across its footprint. In Arizona, through partnerships with local colleges and universities, the company has engaged hundreds of students with engineering and sustainability backgrounds to cultivate a local talent pipeline into one of the fastest-growing advanced manufacturing sectors in the U.S. economy.

Economic Stimulus and Job Creation

Facilities: Holland, MI; Jeffersonville, OH; Lansing, MI; Phoenix, AZ; Springhill, TN

What They Produce: Lithium Iron Phosphate (LFP) Cells, Modules and Integrated Storage Systems

U.S. Investments: $25B

U.S. Jobs: 11,000

Investment Highlight - Holland: $1.4B

Jobs Highlight - Holland: 1,800

"Scaling American battery production creates a range of high-quality jobs for Americans all over the country. Grid-scale storage goes beyond delivering affordable power to American homes and businesses, it's driving investment in secure, domestic manufacturing necessary for a resilient energy grid."

Tristan Doherty, *Chief Product Officer, LG Energy Solution*

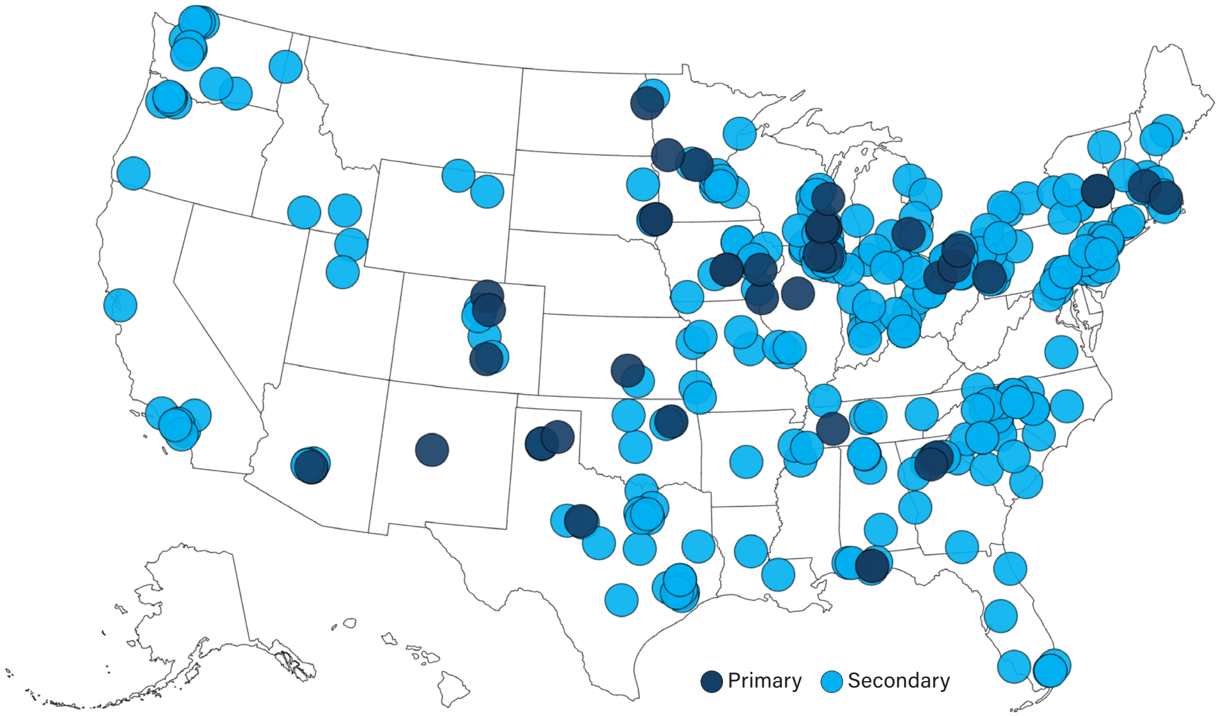
LAND-BASED WIND MANUFACTURING

State of the Wind Manufacturing Industry

For over a decade, over 300 American wind manufacturing facilities have supported domestic energy security and economic stimulus

- U.S. manufacturing is foundational to the domestic wind industry, supplying a significant portion of the components for land-based turbines.
- Blade, towers, and nacelles are the most identifiable components of a wind turbine, but the 300+ facilities also produce drivetrains, bearings, cables, hubs, steel, wind-specific lubricant, and more. Wind's diverse domestic supply chain is resilient among broader global supply chain pressures.
- Nearly 20 facilities produce primary components including blades, nacelles, and towers.
- All four major wind OEMs supplying the U.S. market – GE Vernova, Nordex, Siemens Energy and Vestas – have domestic manufacturing capacity with 8 facilities across 7 states.
- The wind supply chain primary manufacturing and economic activity is anchored in the middle of the U.S., aligning with the country's strongest wind potential and highest concentration of wind projects.
- The wind industry brings expanded manufacturing opportunities to the industrial heartland of the county, as well as the Southeast. While most wind projects are located in the center of the country, manufacturing clusters in the Rust Belt and Southeastern states.

Domestic Land-Based Wind Manufacturing Facilities



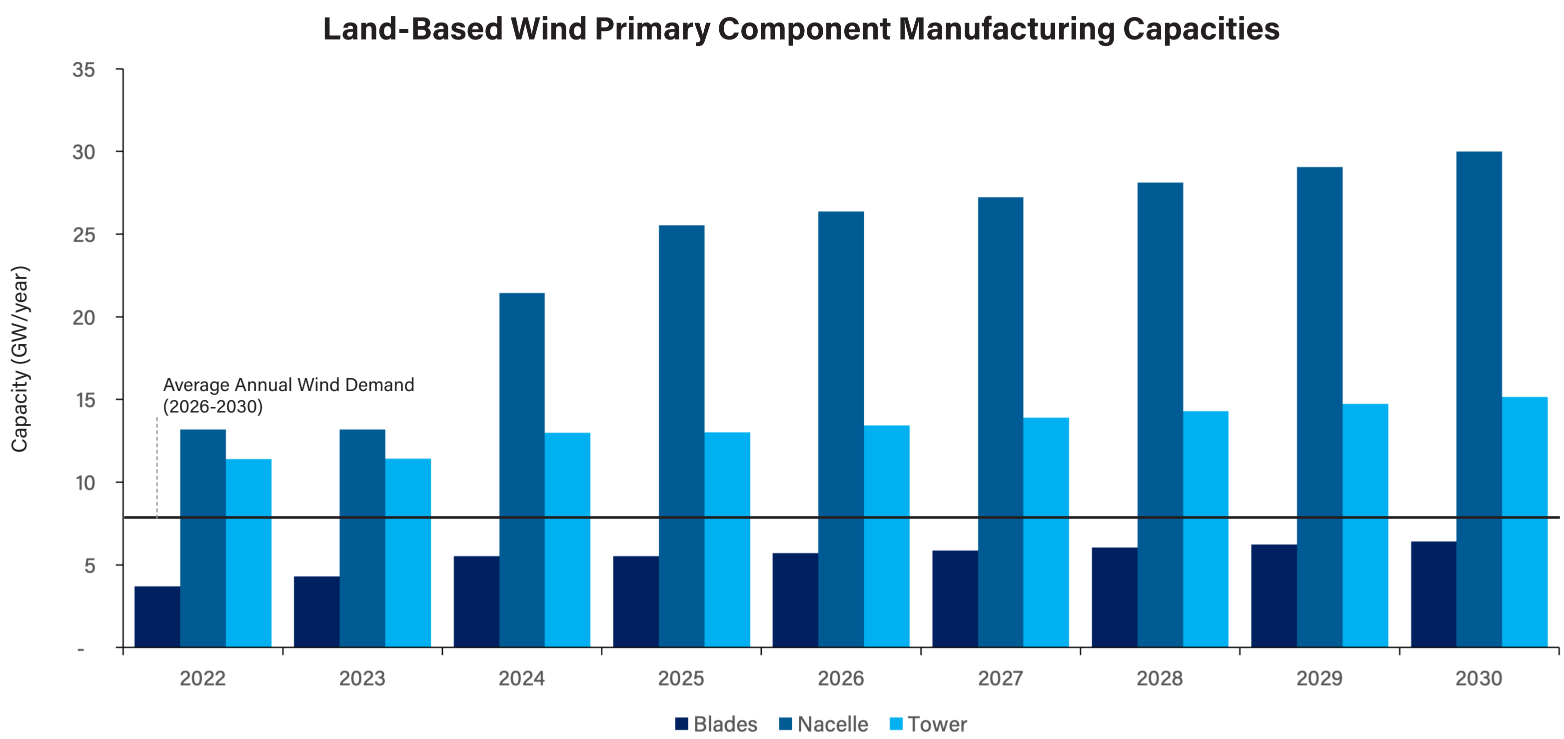
Number of Wind Facilities by Component

Blades	Nacelle	Towers	Other
4	5	10	300+

Downstream Wind Manufacturing Facilities

Nacelle and tower capacity continues to exceed projected wind installations

- Domestic blade capacity has risen over the last several years, exceeding 5 GW/year as of Q1 2026. Despite these increases, demand still outpaces capacity. This highly technical manufacturing process requires millimeter-precision to ensure generation efficiency and safety. As such, growing blade manufacturing capacity is a capital-intensive process.
- American nacelle manufacturing capacity is approximately 26 GW/year as of Q1 2026. With plenty of available manufacturing capacity, most wind turbines in the U.S. use American-made nacelles.
- Tower capacity in the U.S. is approximately 13 GW/year as of Q1 2026. The vast majority of wind turbine tower sections are sourced domestically and manufactured from domestic steel.
- Blades, nacelles, and towers account for roughly 60% of total turbine installation value, and strong domestic supply chains result in high levels of U.S.-made content.
- The increase in wind manufacturing capacity is largely the result of technology advancements in turbine efficiency and power output. Average land-based wind turbine capacity in 2022 was 3.2 MW per turbine. By 2024, output increased to 3.4 MW per turbine.[1] ACP assumes average power output growth continued at 3% in 2025, and each year thereafter.



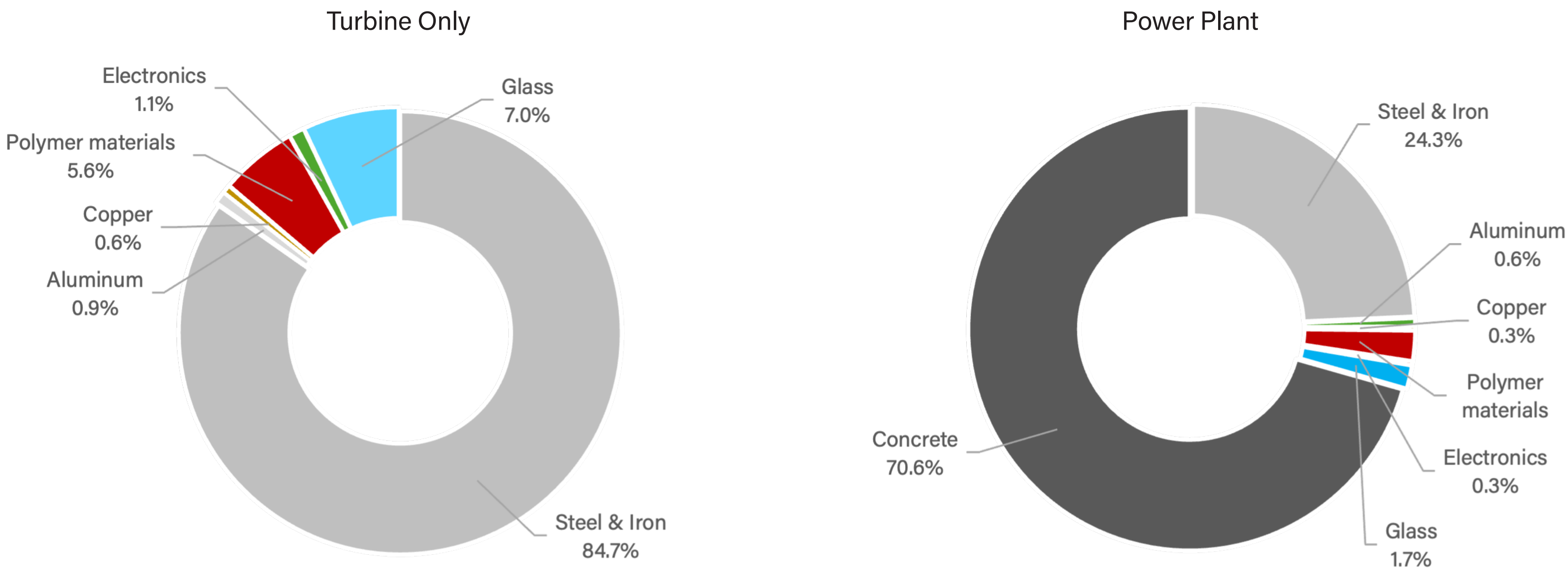
1 Lawrence Berkley National Laboratory.2025.Land-Based Wind Energy Technology 2025 Data Update.

Upstream Wind Manufacturing Facilities

Steel and concrete dominate the material weight of wind blades, towers, and nacelles

- American steel and local concrete makers supply the U.S. wind industry. Wind turbines are comprised almost entirely of steel by weight. When considering the entire power plant footprint, the concrete foundation makes up over 70% of the material by weight.[1]
- The world's largest wind tower facility in Pueblo, Colorado utilizes over 200,000 metric tons of American steel per year and benefits from a local trade school partnership. The plant employs over 260 welders.
- Because of the materials used in wind turbines, they have a life-cycle recyclability between 85 – 95%. Currently, there are at least 2 active recycling facilities in the U.S. and several labs across the country piloting cutting-edge recycling practices to process wind parts.[2] Improving the circularity of upstream materials diverts material from landfills and bolsters the availability of domestic input materials.

Wind Materials Breakdown (%mass)



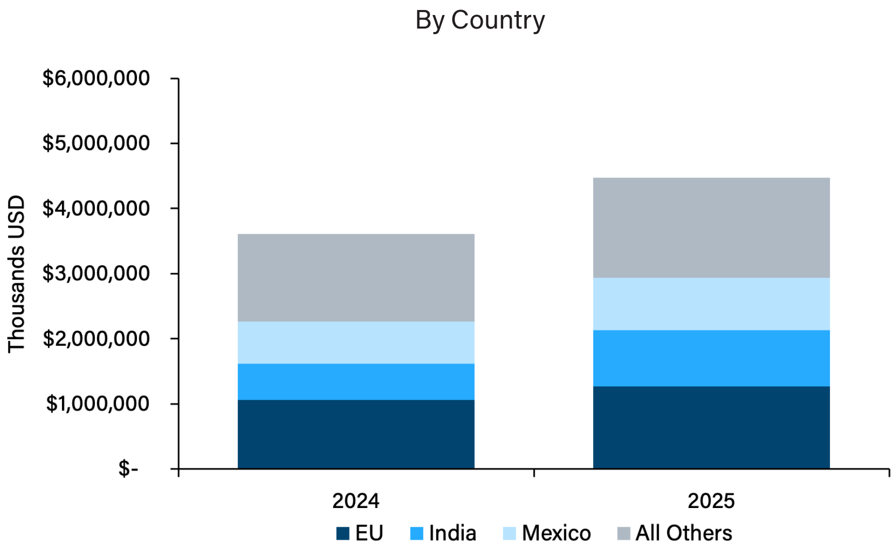
1 Vestas.2025.LifeCycleAssessment of electricity production from an onshore V163-4.5 MW wind plan
2 U.S. Department of Energy. 2025. Recycling Wind Systems in the United States

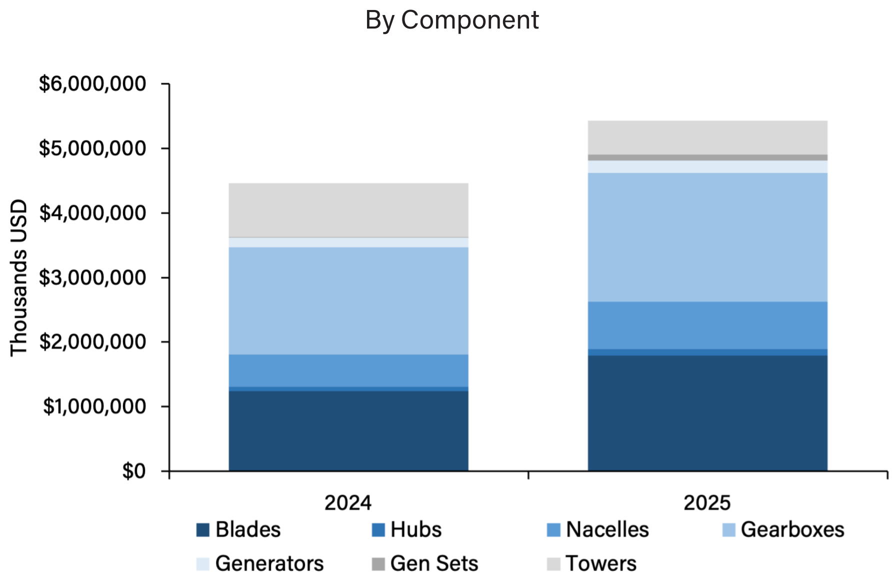
International Wind Imports

Trade flows remain consistent as the industry prepares for 232 investigation determination

- In 2025, tracked wind imports are up over 20% from 2024 levels due to high-valued offshore wind components as well as increased onshore wind deployment.[1]
  - Given the nascency of domestic offshore wind, industry-specific components are still predominantly sourced outside the U.S. Once the offshore wind projects currently under construction are completed, ACP expects to see a further decline in total imports.
  - Onshore wind deployment has picked up and still requires some level of imported components. This is expected to continue and will likely place a small but upward trend on imports moving forward.
- Similar to solar, imports within the wind industry increased in anticipation of OBBBA. As a result, imports peaked in Q2, increasing by 53% over Q1. Q3 saw a decline in tracked imports which remained constant through Q4 2025.
- Wind turbine gearboxes and blades are the top two imported components by value.
- Limited domestic production necessitates imports of wind gearboxes, which have been consistently sourced from Italy, India, and Poland. In 2025, India surpassed Poland for the second-place position it held in 2024.
- As noted in the Downstream Wind Manufacturing Facilities discussion above, domestic blade capacity is insufficient to meet land-based wind demand. Top sources for 2025 remained consistent with 2024: Mexico and India for land-based turbines and Denmark for offshore wind turbines.

Wind Import Data





1 USITC Dataweb.2026.Imports By Customs Value.

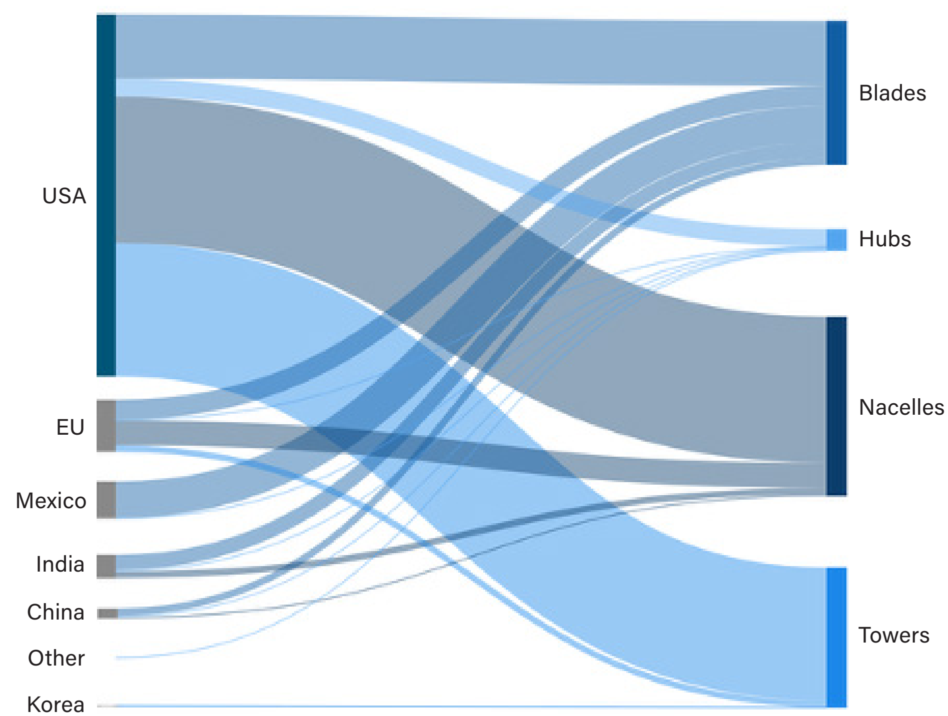
Note import values are based off of total ITC reported customs value as opposed to import quantity as not all countries share the later. As such customs value is the more robust data set. However, it will be influenced by the cost of the components from their origin. That is, one should not interpret this to mean custom value share = quantity share. Values displayed include land-based and offshore wind imports.

International Wind Component Trade Flows

Domestic manufacturing and assembly ensure that the vast majority of wind components are not reliant on imports

- The vast majority of nacelles and towers seen on a land-based wind farm installed in 2025 came from manufacturing facilities in the U.S.
- Roughly half of the blades and hubs are also procured from U.S. facilities.
- India and Mexico play the largest role among component source countries but still make up less than 15% of the spend combined. Mexico primarily provides blades while India supplies a mix of nacelles and blades.
- European Union countries deliver another 6% of primary components. Offshore wind turbines source the majority of their components from Europe: nacelles from France and Germany, towers from Denmark and Portugal, and blades from France and Denmark in 2025.[1]
- A minimal share of Chinese component imports are utilized in turbine repowerings where the domestic manufacturer no longer operates in the country. Companies are actively seeking alternatives to Chinese components for repowerings, which will likely result in full turbine overhauls.

Domestic vs. Imported Market Shares by Key Wind Components



ACP has leveraged ITC trade data, confidential membership information, contracted work with Intertek CEA, and our in-house manufacturing database to develop a view on the domestic value of major components and applied it to the total spend on installed solar capacity in 2025.

Domestic Manufacturing In Action: Wind Primary Components

Vestas is Powering a Thriving U.S. Wind Manufacturing Supply Chain

In 2008, Vestas began producing wind turbine blades in Windsor, Colorado. The 666,000 square-foot facility remains in operation today and, in 2010, a second plant producing nacelles, drivetrains, and hubs opened in Brighton, Colorado. Vestas now employs more than 1,830 manufacturing workers across both facilities and has invested over $1 billion in Colorado to establish a manufacturing footprint to serve the U.S. wind energy market.

Vestas' U.S. factories produce core components for wind turbines deployed nationwide. In 2023, Vestas invested $50 million to expand both facilities, quadrupling their manufacturing workforce. In 2025 alone, the company spent approximately $600 million across more than 140 suppliers in the state to support their operations.

Since 2009, Vestas also operated a tower factory in Pueblo—the largest of its kind in the world. In 2021, Vestas sold the facility to CS Wind under a long-term supply agreement, enabling the site to expand production capacity and operate around the clock. Together with Windsor and Brighton, Pueblo completes a wind manufacturing corridor running the length of Colorado's Front Range along Interstate 25, producing the blades, nacelles, and towers that make up modern utility-scale turbines.

The connection extends into the local community. To build the next generation of the wind industry's workforce, Vestas works with local schools to educate students on renewable energy and career pathways in the industry.

Economic Stimulus and Job Creation

Facilities: Windsor, CO; Brighton, CO

What It Produces: Blades, nacelles, hubs, and drivetrains

Investment: $1.05B+

Windsor Jobs: 1,200+

Brighton Jobs: 600+

"I love the fact that we are moving large products, not just fabricating. Building something from nothing. These turbines are made in America, for America. It feels good to be a part of that."

Miguel Banuelos, *Vestas Employee*

OFFSHORE WIND MANUFACTURING

State of the Offshore Wind Manufacturing Industry

Over $25 billion invested into the offshore wind supply chain, including ports, vessels, and staging facilities[1]

- Offshore wind requires a specialized maritime industrial ecosystem, representing a new domestic manufacturing frontier.
- Not only are the turbines larger than their onshore counterparts but they require steel-based fixed foundations that anchor to the sea-floor, long sea cables to connect to mainland grid, and direct drive motors.
- Ports near offshore wind installations must be capable of operating and maintaining the facility as well as receiving, storing, and assembling any new offshore wind installation (i.e. a "marshalling port").
- Finally, offshore wind requires four unique vessel types: survey, construction, cable laying, and operation & maintenance.

Offshore Wind Maritime Ecosystem

Operations & Maintenance Port

Marshalling Port

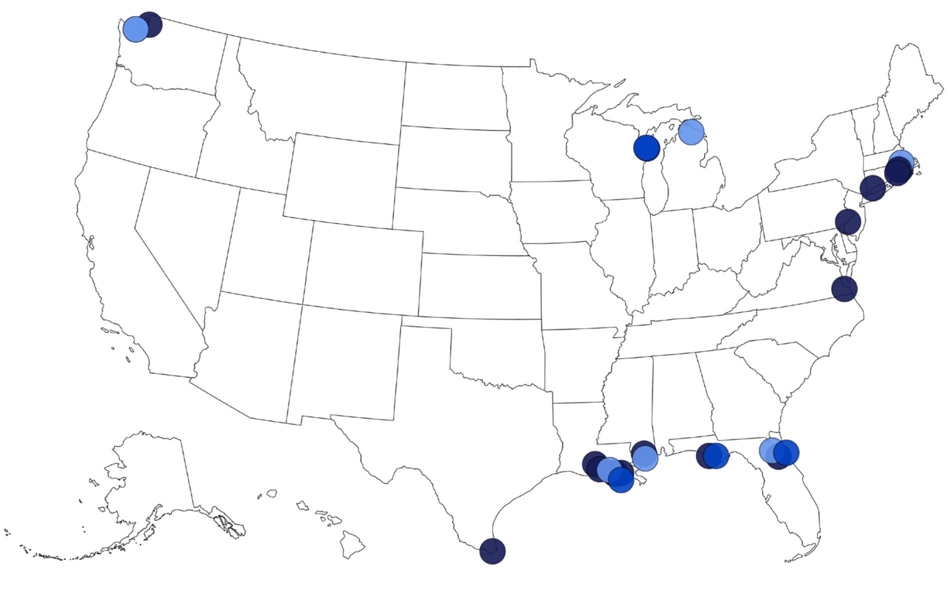
1 Oceantic Network. 2026. Offshore Wind Can Drive $42 Billion in U.S. Steel Demand.

Offshore Wind Vessel Manufacturing

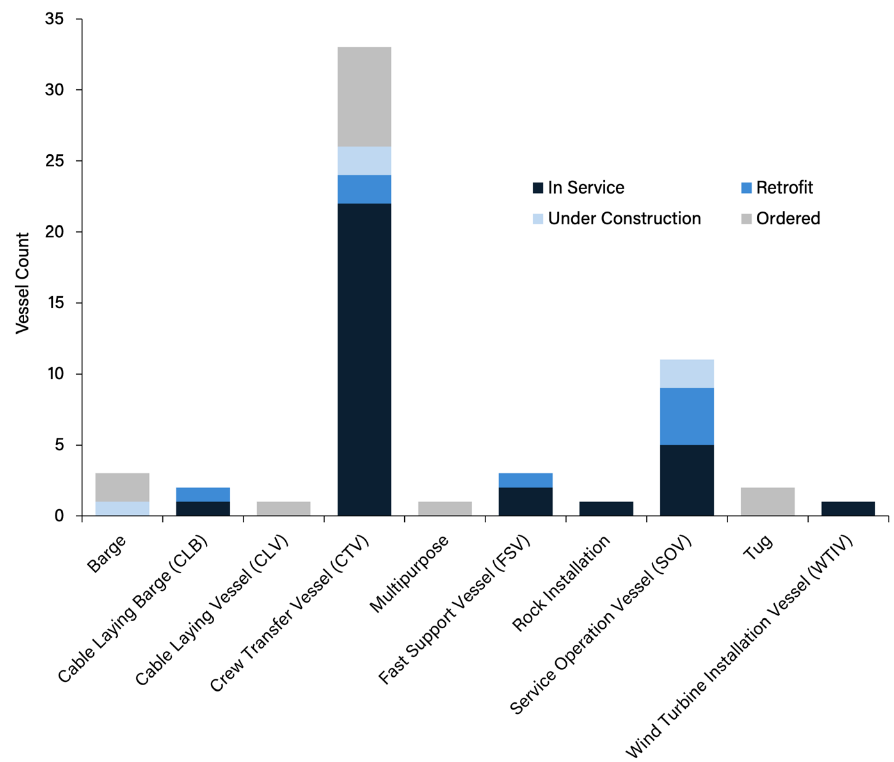
Existing offshore wind investments have ignited a new era of American vessel manufacturing

- 6 offshore wind vessels were placed in service in 2025, with another 5 vessels under construction. Each vessel represents an average investment of $155 million. Recent vessel construction occurred in Florida, Louisiana, Texas, Pennsylvania, and Wisconsin.
- Domestically manufactured or refurbished offshore wind vessels now total over 30.
- Investments in port infrastructure and offshore wind vessels are creating dual-purpose assets for the oil and gas sector. Over 90% of the barges, cable layers, and support vessels utilized for offshore wind are industry-agnostic, offering support for both offshore wind and traditional energy operations.[1]
- 13 vessels remain on order with shipyards in Florida, Louisiana, Massachusetts, Michigan, Mississippi, and Washington State.

Offshore Wind Vessel Shipyards



U.S. Manufactured, U.S. Flagged Offshore Wind Vessels

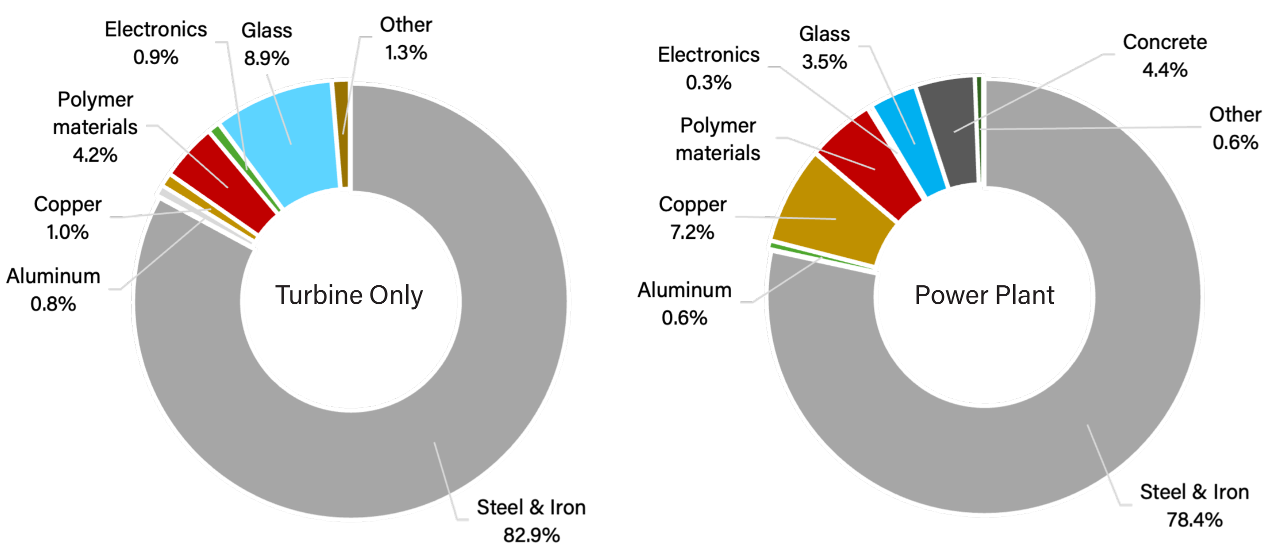


Upstream Offshore Wind Manufacturing Facilities

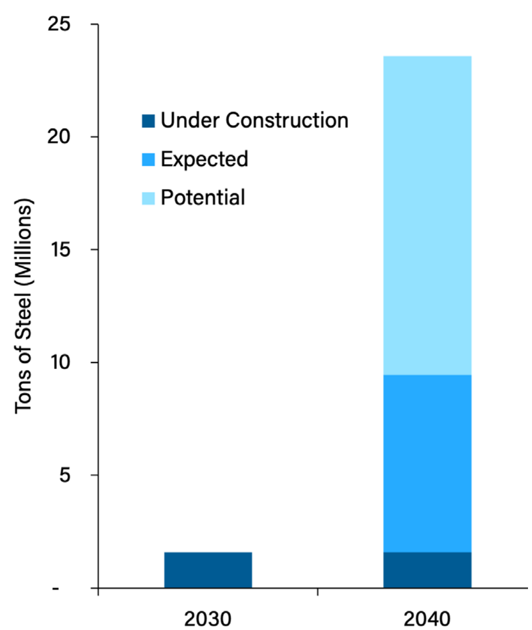
Offshore wind requires over 300 tons of steel/MW, over 80% of which is steel plate, largely driven by the massive steel monopiles, towers, and submersible platforms

- Through billions in upgrade investments, U.S. steel mills can now produce the ultra-thick plates required for most offshore wind steel demand. Mills that now produce ultra-thick plate operate in Kentucky, Ohio, and Texas.
- New plate manufacturing success is the start of an even larger opportunity to expand steel fabrication in the country. If all potential offshore wind came online by 2040, it would create 1.6 million tons of steel demand per year. That's a third of the entire U.S. energy sector's steel requirement.

Offshore Wind Materials Breakdown[1] (% mass)



Cumulative New Steel Demand from Offshore Wind



1 Vestas.2025.LifeCycleAssessment of electricity production from an offshore V236-15 MW wind plan

02 CLEAN ENERGY MANUFACTURING ECONOMIC IMPACT

Photo credit: NextPower

Existing Facilities Breakdown

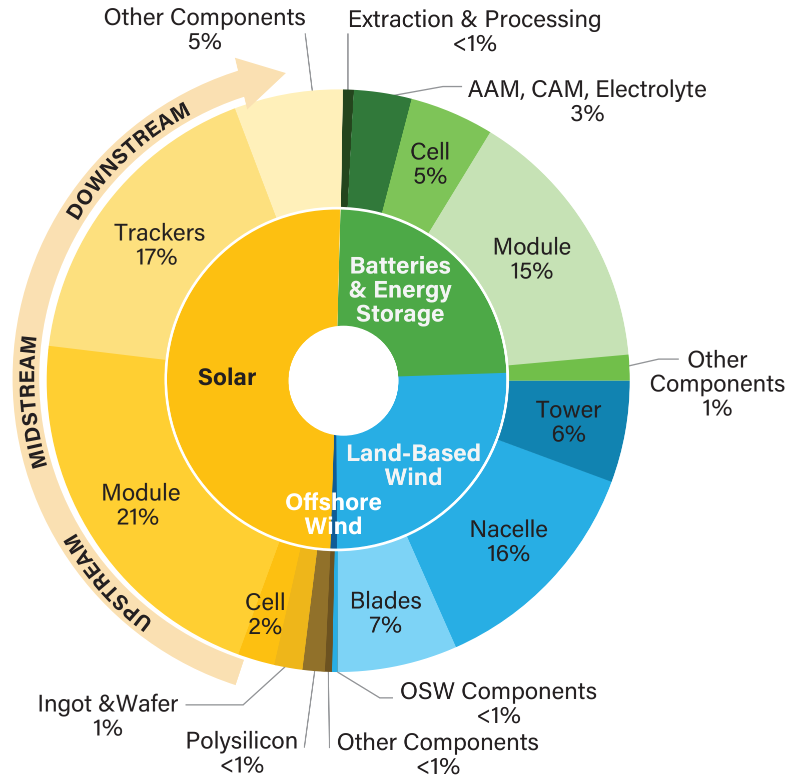
Domestic clean energy manufacturing grew rapidly in just one year, supporting over 215,000 jobs

- Operating clean energy manufacturing facilities support over 215,000 jobs, generate almost $16B in earnings, contribute $31B to Gross Domestic Product (GDP), and represent over $61B in spending across the U.S. economy.
- Of domestic clean energy impacts, the solar supply chain represents almost 50% of total employment, over 50% of earnings and GDP, and 45% of output—largely driven by domestic module and tracker component manufacturing.
- Land-based wind and battery storage each contribute roughly a quarter of the total economic impacts.
- Nacelle manufacturing facilities make up 50% of the economic impact of the primary wind component facilities.
- Battery modules account for 60% of the economic impact of the primary storage component facilities.

Existing Clean Energy Manufacturing Annual Economic Impact

Tech Vertical	Employment	Earnings (2025 $B)	GDP (2025 $B)	Output (2025 $B)
Solar	106,200	$8.10	$15.60	$27.90
Batteries & Energy Storage	53,100	$3.70	$7.70	$16.70
Land-Based Wind	55,200	$3.80	$7.40	$16.50
Offshore Wind	1,400	$0.10	$0.20	$0.30
Total	**215,900**	**$15.80**	**$30.80**	**$61.50**

Existing Clean Energy Manufacturing Facilities Annual Employment Impact by Primary Component



Employment Impacts of Existing Facilities

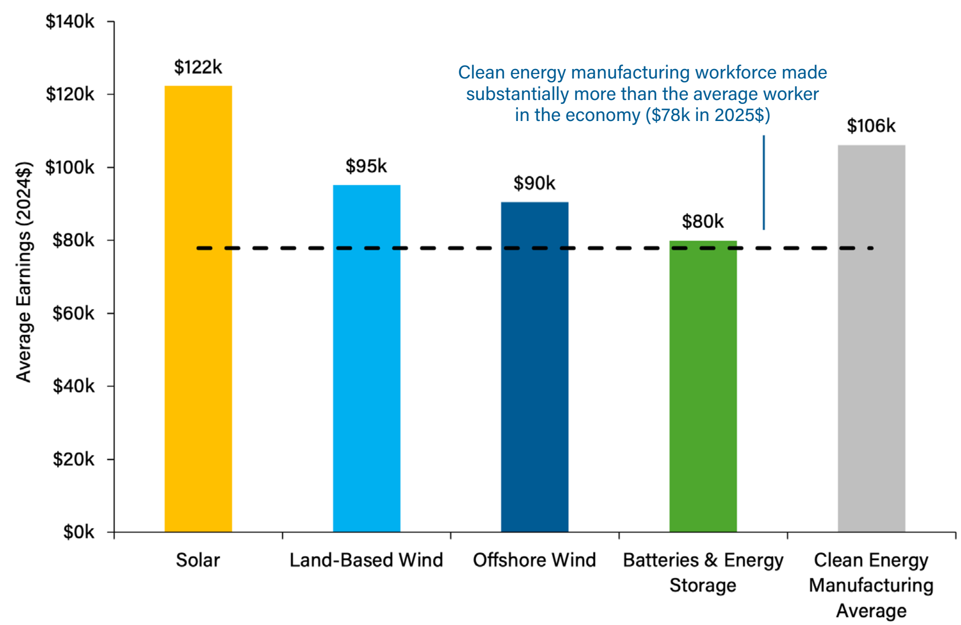
Every clean energy manufacturing job indirectly supports over 4 additional jobs in the U.S.

- Clean energy manufacturing directly employs 50,000 workers. This includes the people on the manufacturing floor as well as those office, supportive, and administrative jobs at the companies who own the facilities.
- On average for every direct job in clean energy manufacturing, 1 additional job is generated from upstream activities related to the initial economic activities (indirect jobs) and 3 additional jobs are generated from household spendings on income earned by these workers (induced jobs).
- Land-based wind has the highest employment multiplier because turbine and turbine subcomponent manufacturing have a high level of interdependencies with other industries.
- Jobs associated with the operating and maintenance of online clean energy manufacturing facilities is a high value-added sector. These jobs offer salaries on average of $106,000, well above the national average by almost $30,000 or 36%.
- Solar has the highest average salary, driven in large part by higher salaries in the semiconductor and related sectors.

Existing Clean Energy Manufacturing Annual Employment Impact

Tech Vertical	Direct	Indirect	Induced	Total	Multiplier Ratio
Solar	27,000	24,000	55,100	106,100	3.9
Batteries & Energy Storage	12,100	16,000	25,000	53,100	4.4
Land-Based Wind	10,500	18,700	26,000	55,200	5.3
Offshore Wind	400	300	600	1,300	3.3
Total	**50,000**	**59,000**	**106,700**	**215,700**	**4.3**

Average Earnings of Clean Energy Manufacturing Workforce Compared to the Average of all Workers



Under Construction Facilities Breakdown

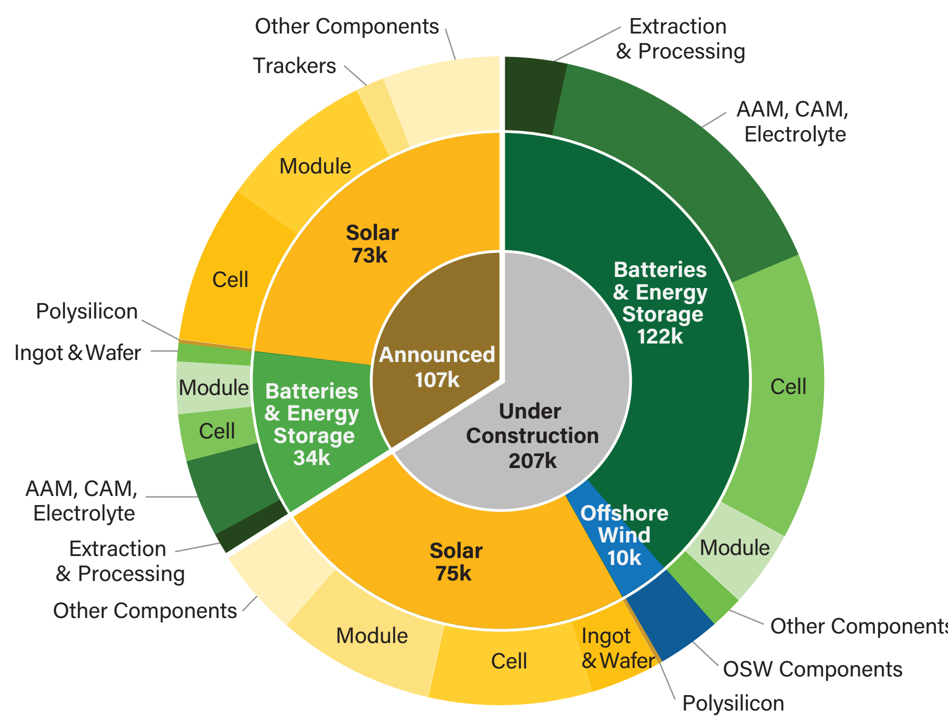
Construction of new or expanded facilities have generated 207,000 jobs and over $20B in GDP

- Construction of new or expanded clean energy manufacturing facilities in 2025 support 207,000 jobs.[1]
  - Over 120,000 of these jobs stem from the construction of battery storage component manufacturing facilities. Solar manufacturing facilities under construction support another 75,600 jobs.
  - By component type, construction activities for battery storage cell manufacturing facilities contribute the most jobs (44,900), followed by battery storage anode and cathode active materials manufacturing (44,600), solar PV cell manufacturing (26,300), and solar PV module manufacturing (23,900).
- Given land-based wind's well-established manufacturing industry, they have limited facilities under construction.
- If materialized, manufacturing facilities that are announced but have not begun construction would add another 107,100 jobs, $7.0 billion in wages, $10.4 billion in GDP, and $19.2 billion in output during the construction phase.
- These announced facilities include both solar PV component manufacturing—which would support 72,900 jobs during construction—and battery storage component manufacturing, which would support 34,200 jobs in the construction phase.

Under Construction Clean Energy Manufacturing Economic Impact

Tech Vertical	Employment	Earnings ($B)	GDP ($B)	Output ($B)	Investment ($B)
Solar	75,500	$4.90	$7.30	$13.50	$9.52
Batteries & Energy Storage	121,500	$7.90	$11.80	$21.80	$65.22
Land-Based Wind	100	$0.00	$0.00	$0.00	$0.03
Offshore Wind	9,800	$0.60	$1.00	$1.80	$1.00
Total	**206,900**	**$13.50**	**$20.10**	**$37.10**	**$75.80**

Under Construction and Announced Clean Energy Manufacturing Facilities Annual Employment



AMERICAN CLEAN POWER

Employment Impacts of Under Construction and Recently Online Facilities

Every construction-phase clean energy manufacturing job supports over 2 additional jobs

- The completed or ongoing construction of new manufacturing facilities created almost 140,000 direct jobs in 2025.
  - Facilities that are under construction contribute 84,600 direct jobs and those that recently came online contributed 52,100 direct job-years.
- These jobs supported an additional 49,500 jobs indirectly from upstream activities related to the initial economic activities and 148,000 jobs from household spending on income earned by these workers.
- On average, for every direct job in the construction of clean energy manufacturing facilities, 2 additional jobs are generated either upstream from the activity (indirect jobs) or downstream from household spending on other areas of the economy (induced jobs).
- The actual construction of these facilities makes up the largest share (40%) of total "construction phase" employment impacts. Real estate, retail trade, and health care and social assistance followed, each with 5% to 7% of total job impacts.

Construction Phase Clean Energy Manufacturing Annual Employment Impact

Tech Vertical	Direct	Indirect	Induced	Total	Multiplier Ratio
Solar	59,800	21,700	64,800	146,300	2.4
Batteries & Energy Storage	69,900	25,300	75,700	170,900	2.4
Land-Based Wind	2,700	1,000	2,900	6,600	2.5
Offshore Wind	4,300	1,500	4,600	10,400	2.4
Total	**136,700**	**49,500**	**148,000**	**334,200**	**2.4**

Credit: Vestas

Future Facilities Breakdown

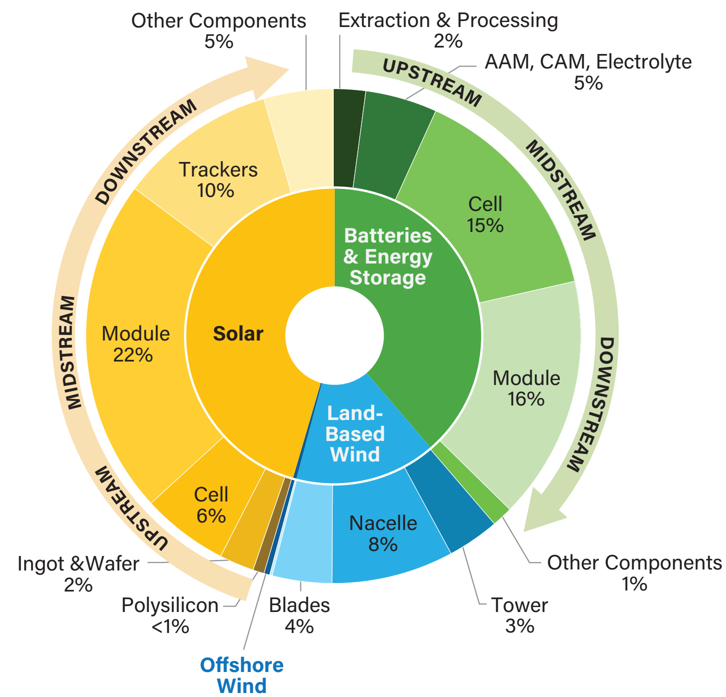
Expected clean energy manufacturing could increase the number of operating and maintenance jobs by more than 70%

- If all under construction and expected clean power manufacturing facilities came online, the total industry would support almost 373,000 jobs. This is 70% more than the existing 215,000 jobs.
- They would in total generate almost $28B in earnings, contribute $55B to GDP, and over $107B in spending across the U.S. economy.
- The domestic solar supply chain would support over 45% of total economic impact (employment, earnings, GDP, and output), largely due to module facilities.
- Battery storage facilities would account for 39% of total clean energy manufacturing economic impact. Cells and modules making up the brunt of it.
- Land-based wind would keep a near-equivalent economic impact given that much of the capabilities are already onshored.

Future Clean Energy Manufacturing Annual Economic Impact

Tech Verticals	Employment	Earnings ($B)	GDP ($B)	Output ($B)	Investment ($B)
Solar	169,500	$13.50	$26.30	$44.80	$9.52
Batteries & Energy Storage	144,400	$10.00	$21.00	$45.40	$65.22
Land-Based Wind	57,500	$4.00	$7.70	$17.30	$0.03
Offshore Wind	1,400	$0.10	$0.20	$0.30	$1.00
Total	**372,800**	**$27.70**	**$55.20**	**$107.80**	**$75.80**

Future Clean Energy Manufacturing Facilities Annual Employment Impact by Primary Component



Employment Impacts of Future Facilities

Every clean energy manufacturing job could support over four additional jobs

- If all under construction and expected clean power manufacturing facilities came online then they, in conjunction with those already online, would directly support 87,300 jobs.
- These jobs would support an additional 98,200 jobs indirectly from upstream activities related to the initial economic activities and 187,200 jobs from household spendings on income earned by these workers.
- On average, for every future direct job in clean energy manufacturing, 1 additional job is generated from upstream activities related to the initial economic activities (indirect jobs) and 3 additional jobs are generated from household spendings on income earned by these workers (induced jobs).

Future Clean Energy Manufacturing Annual Employment Impact

Tech Vertical	Direct	Indirect	Induced	Total	Multiplier Ratio
Solar	43,000	34,900	91,600	169,500	3.9
Batteries & Energy Storage	33,000	43,500	67,900	144,400	4.4
Land-Based Wind	10,900	19,500	27,100	57,500	5.3
Offshore Wind	400	300	600	1,300	3.3
Total	**87,300**	**98,200**	**187,200**	**372,700**	**4.3**

Photo credit: Nextracter

03

APPENDIX

ACP's Manufacturing Components Tracked

Primary	Secondary	Additional Subcomponents*
Module – c-Si & Thin-Film	Backsheet	Adhesives
c-Si Cell	Backrail	Concrete
Ingot/ Wafer	Bus Ribbon	Silver Paste
Polysilicon	Cables	Solar Panel Recycling
Trackers/ Racking	Circuit breaker	
Inverter	Combiner box	
Junction box	E-BOS Other	
Frame	Insulated Gate Bipolar Transistor	
Glass	Switchgear	
Encapsulant	Seals	
DC Electric Balance of System (E-BOS)	Transparent Conductive Oxide	

Primary	Secondary	Additional Subcomponents*
Battery Storage System	Separator	Concrete
Enclosure	Encapsulant	Lithium Ore
Module	Insulated gate bipolar transistors	Graphite Ore
Cell	Printer circuit board assemblies	Battery recycling
Anode	Aluminum and copper foil	Battery second life
Cathode	Solvents and salts	Engineered materials
Electrolyte	Busbar	Insulation
Binder	Thermal management systems	Sensors
Lithium Hydroxide / Carbonate	Battery management systems	
Processed Graphite	Safety systems	
Inverter	Casing	
E-BOS	Cables	

Primary	Secondary	Additional Subcomponents*
Blade	Bearings	Composites
Hub	Bedplate	Concrete
Nacelle	Brakes	Lubricants
Tower	Gearbox	Flanges
Cables	Generator	Steel Casting
Controls & Electrical Systems	Rotor	Other Steel Components
Inverters	Shaft	Wire
Drive train	Pitch System	Engineered Materials
	Yaw System	Recycling
	Ladders, doors	Refurbishment
Inverter	Casing	Sensors
E-BOS	Cables	

*ACP recognizes that this is not an exhaustive list of supply chain components, however, it highlights components considered in ACP's data and analysis.

Definitions: Components

A guide to ACP's data tracking and analysis methodology

Anode Active Material (AAM) – the electrochemically active material within a battery's negative electrode that accepts and releases electrons during charge and discharge. As of 2026, natural and synthetic graphite is the most common battery anode material and is the focus of this report.

Battery System – the fully integrated storage battery that includes the system enclosure and module as well as the inverter, electrical balance of system, batter, safety and thermal management systems. Also referred to as a battery pack.

Bedplates – the large, cast-iron or steel foundation frame for a wind turbine's nacelle, supporting the drivetrain components.

Binder – the "glue" that holds the battery storage active materials and additives together within the electrode; typically made from polymeric material.

Blades – the aerodynamic structures, acting as propellers for the wind turbine, engineered to harness kinetic energy from wind for energy generation.

Cables – durable conductors, typically copper or aluminum, designed to transmit electricity from the turbine generator to the grid. For wind generation, cables are categorized into two types: inter-array and export cables. Inter-array cables connect turbines within a wind farm, while export cables then transmit power from the wind farm to the grid or sub-station. Tower cables within a wind turbine and cables used for at solar and storage projects are not explicitly tracked by ACP.

Cathode Active Material – the electrochemically active material within a battery's positive electrode that accepts and releases electrons during charge and discharge. As of 2026, lithium-iron-phosphate cathode chemistry is the most common cathode material used in battery storage and is the focus of this report.

Cell – c-Si – a photovoltaic crystalline structure made up of high-purity polysilicon, used to capture sunlight to be converted into electricity.

Cell – LFP – the battery component that stores chemical energy through the electrode – negatively charges anode, positively charged cathode, and electrolyte- and converts it to electrical energy. Several battery cells are connected to create a battery module.

Drivetrain – the "powerhouse" of a wind turbine that consists of the main rotor, gearbox, shafts, couplings, etc. This system sits on top of the turbine bedplate within the nacelle, converting low-speed kinetic energy from the turbine blades to high-speed mechanical energy.

E-BOS (Electric Balance of System) – all components of a solar project system, except the panel itself and the main inverter, that control the transport, regulation and management of electricity generation.

Electrolyte – the chemical medium within the battery electrode that transfers charge-carrying ions between the anode and cathode during charging and discharging cycles.

Encapsulant – the protective polymer material used to bind photovoltaic cells within the solar module.

Enclosure – the outer housing of a battery, typically a steel structure, designed to protect battery modules from environmental and physical damage, ensuring thermal management and electrical safety.

Extraction & Processing – the removal of a mineral from subsurface deposits, clay, or brine to be refined or enhanced to produce a lucrative material for subsequent supply chain stages. This report focuses on mineral extraction of 1) lithium from a variety of sources and its processing into lithium hydroxide or carbonate to be utilized in battery electrodes and 2) graphite via mining or processing of crude or coal to produce synthetic graphite to be used in battery anodes.

Frame (solar module) – the rigid boarder, typically of aluminum or steel, that surrounds the solar module that provides structural strength, mounting points and protection.

Gearboxes – a critical component within land-based, and in some instances offshore wind, turbine drivetrains that converts low-speed rotation from the blades to high-speed rotation needed by the generator to produce electricity.

Definitions: Components (continued)

A guide to ACP's data tracking and analysis methodology

Generators – the wind turbine component that converts mechanical energy into electrical energy, typically powered by the high-speed rotation of the gearbox which creates electromagnetic induction to generate electricity.

Generator Sets – often referred to as the "powertrain" of a wind turbine that consists of the drivetrain which converts slow speed mechanical energy from the blades into high-speed rotational energy to power the generator. Together, the drivetrain and generator drive electricity generation from the wind turbine.

Glass – specialized light-trapping material that differs in specification requirements between traditional c-Si solar PV and thin-film PV. The former requires low iron oxide content, tempering, and patterning to minimize absorption and maximize solar energy transmittance. The latter requires slightly fewer technical specifications so long as the silica-derived material offers low reflection, high transmissivity and high strength.

Hub – the single rotating assembly that anchors the wind turbine rotor blades, transferring their mechanical energy to the low-speed shaft within the nacelle.

Ingot/Wafer – the high-purity crystalline silicon cylinders, pulled from molten polysilicon which are then shaped and cut into thin slices for use as the substrate in solar cells.

Inverter - a power electronics component that converts direct current (DC) electricity into alternative current (AC) electricity to be used by the electrical grid.

Junction Box – a component mounted to the back of a solar panel within a protective enclosure, that manages electricity flow from the solar panel to external cables.

Medium Voltage Transformer – the electrical component engineered to step-up the AC voltage from a clean energy project (typically ranging from 1,500 kVA to an estimated 7,500 kVA but can be in excess of 10,000 kVA) to distribute power to the grid. This same component type is used by utilities to step-down AC voltage before delivering power to the end users.

Module (c-Si) – a photovoltaic device is comprised of high-purity, crystalline silicon cells that convert energy from the sun into electricity.

Module (LFP) – a chargeable energy storage device, comprised of many battery cells, containing a positively charged cathode with a lithium-iron-phosphate chemistry.

Module (thin-film) – a photovoltaic device in which a thin layer of photovoltaic material (Cadmium Telluride is the focus this report), is deposited onto a sold substrate such as glass.

Nacelle – the wind turbine component that connects the blades and hub to the turbine tower, acting as the "brain" of the turbine - housing the drivetrain components.

Polysilicon – a super-pure form of silicon, processed and refined from silica sand into multiple, fused crystal grains.

Racking – the aluminum or steel structural system that mounts solar modules to rooftops, facades or in the case of most utility-scale projects, the ground.

Tower – the structural support of a wind turbine, comprised of steel sections that house the ladders used by turbine technicians, platforms that support various internal components, cables that transport power from the drivetrain down tower, and the turbine system controls.

Trackers – the mechanical device that angles solar panels towards the sun throughout the day, improving energy generation. A common alternative to this system type is a fixed-tilt mounting system that remains in a fixed position instead of changing the angle of the panel.

Vessels (offshore wind) – various specialized marine crafts that are used for preparation of the offshore wind project, installation of turbines, transport of large components, transport of crew members or maintenance personal, and the general operations and maintenance of the wind farm.

Definitions: Mining Stages

A guide to ACP's data tracking and analysis methodology

ACP uses the following definitions when discussing the various phases of a mining project:[1]

- **Exploration and Discovery (3-8 years)** – the search and successful identification of mineral deposits through geological surveys
- **Pre-Feasibility (1-3 years)** –The justification period for a full feasibility study once the mineral grades are deemed satisfactory. This involves engineering and economic analysis for extraction and mineral processing.
- **Feasibility (1-3 years)** – The period of comprehensive economic and technical evaluation once an economically viable option for extraction is determined. This requires advanced metallurgical testing, ESG studies and often pilot testing. In this stage mineral resources move to defined mineral reserves.
- **Financing & Permitting (1 – 7 years)** – The stage of raising capital and acquiring all necessary permits for the construction and mineral extraction operation. The permitting stage can take upwards of 7 years to navigate local, state and federal requirements.
- **Construction (1-3 years)** – The construction phase of the extraction and processing facility as well as any road building or necessary infrastructure for the mine to operate.
- **Operation (10-27 years)** – The production phase of the mine. The operating life of a mine varies greatly on the resource, annual capacity and replenishment or expansion plans.
- **Closure (1-5 years)** – The period in which the mine, always a temporary asset, closes as the resource is depleted and land restoration begins.

Capacity and Facility Count Methodology

A guide to ACP's data tracking and analysis methodology

For this report, ACP has focused on specific components across the utility-scale solar, battery energy storage, and wind supply chains to offer insight into key components necessary for clean energy manufacturing. The table refers to the components within each supply chain that are discussed in greater detail in the report. Given the complexity and detail of the supply chain ACP has only focused on the most important components and/or those in which data on them is more readily available. The listed components are categorized as primary components and all other tracked components are bucketed into the secondary components category.

ACP uses a combination of public and private member data as well as public government data (as of March 31, 2026) to inform its manufacturing capacity estimates and economic impact analysis. ACP uses pre-determined multipliers to convert original manufacturing capabilities units into GW or GWh units. Note this analysis represents **capacity**, not production. Therefore, ACP does not estimate capacity utilization or track actual manufacturing output year over year.

If announcements indicate an increase in capacity over time, linear scaling applies e.g., facility commissions in 2025 with 1 GW capacity growing to 10 GW by 2030 assumes 1.8 GW/year growth.

For the solar supply chain, ACP has focused on capacity specific to utility-scale solar. This means that demand and manufacturing capacity dedicated for residential- or commercial-scale solar is not considered. In this 2026 report, ACP does not apply a manufacturing capacity reduction for polysilicon to consider the demand competition for the semi-conductor supply chain. Instead, this report shows the entire available and expected polysilicon capacity. It is understood that the domestic PV sector will compete with the semi-conductor industry for this available supply.

For the battery mid- and up-stream supply chain capacity, 100% is assumed to be available to satisfy BESS demand. ACP does not make an assumption as to how this capacity will be divided between BESS and the competing EV manufacturing market. For downstream components, ACP has identified capacity available to utility-scale energy storage that is distinct from electric vehicle capacity. Thus, no capacity reduction is applied. It is assumed that manufacturing capacity for integrated storage systems is equivalent to module capacity from 2026 onward. 2025 tracked module supply exceeds battery system integration thus the 2025 figure represents integrated systems.

For the land-based wind supply chain, capacity by units of output is assumed to remain consistent from 2025 levels through 2030. However, average turbine size is expected to continue to increase over time as it has for the past decade. Based on historic data from LBNL, ACP assumes a 3% increase in the average MW capacity from 2024 through 2030.

Demand represented in each chart is representative of average projected demand from 2026 through 2030.

Tech Vertical	Primary Components	
Solar PV	Module Frame Junction Box Trackers Racking Inverter	Cell Glass Encapsulant Ingot/Wafer Polysilicon
Batteries & Energy Storage	Battery System Battery Inverter E-BOS Enclosure Module Cell Anode Active Material (AAM)	Cathode Active Material (CAM) Binder Electrolyte Extraction & Processing – Lithium Extraction & Processing – Graphite
Land-Based Wind	Nacelle Blades Tower	Drivetrain Cables
Offshore Wind	Vessel	Cables

1 Resource Capital Funds. 2024. Phases of Mining. Available from: https://resourcecapitalfunds.com/insights/mining-and-minerals-101/phases-mining/

Economic Impact Methodology

A guide to ACP's economic analysis modeling

The Regional Input-Output Modeling System (RIMS II), developed by the Bureau of Economic Analysis, is an input-output (I-O) model used to quantify the economic impact (i.e., direct, indirect and induced effects) generated during the construction phase of the project and the impacts produced by the annual operations once the manufacturing facility is operational.

Final demand and direct multipliers are used to produce for the following economic metrics: Employment, earnings, GDP, and output, which are generally defined as follows:

- **Employment:** A full-time equivalent (FTE) job is 2,080 hours/year. For employment impact related to the construction phase of the analysis, it is expressed in job-years as the construction timeline varies considerably for each project.
- **Earnings:** Compensation of employees plus the net earnings of sole proprietors and partnerships excluding personal contributions to social insurance programs and employee pension plans.
- **GDP:** Gross domestic product, also referred to as value-added, is the market value of final goods and services produced in an economy.
- **Output:** The total market value of industry sales, which is equal to GDP plus intermediate inputs.
- **Direct impact:** The initial change in economic activity in a specific final-demand industry or industry sector.
- **Indirect impact:** Also referred to as the upstream effect, results from industry-to-industry transactions required to support direct activity.
- **Induced impact:** Change in economic activity resulting from the changes in spending by workers whose earnings are affected by a final-demand change.

Actual impacts may vary, depending on endogenous (e.g., production levels) and exogenous (e.g., final demand) factors and some impacts may not materialize due to unanticipated events and changing circumstances.

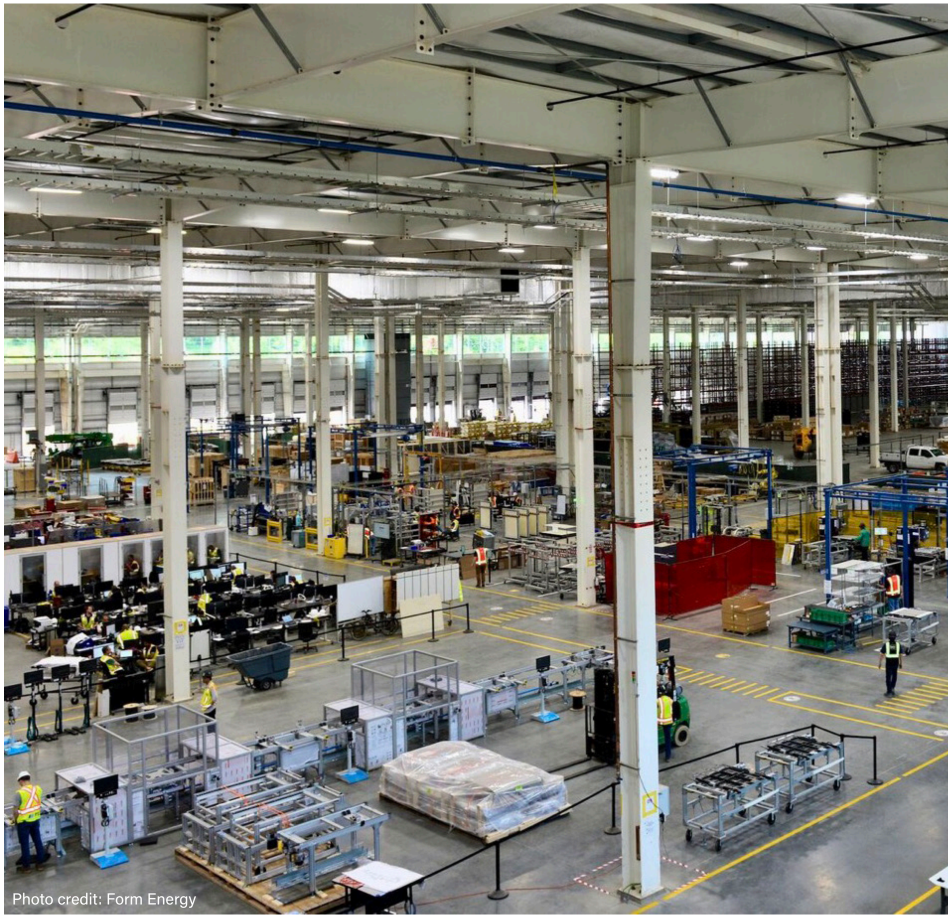


Photo credit: Form Energy

Trade, Import and Tariff Methodology

A guide to ACP's trade data tracking and analysis methodology

To initiate ACP's import analysis, U.S. International Trade Commissions (USITC) data, imports for consumption is leveraged for a variety of harmonized trade codes (HTS). All trade codes that are analyzed and their associated supply chain component are listed in the table.

ACP elicited member feedback on USITC data analysis to land on a more accurate representation of sector specific imports by country. As a result, the final analysis shown is this report are a combination of publicly available data and ACP member feedback. Member feedback was weighted based on 2025 manufacturing capacity or 2025 installation volume, based on member type.

Import percentages were adjusted to show each country's share of the total U.S. 2025 sourcing, which includes both imports and domestic production. For example, it was assessed that 60% of c-Si modules were sourced domestically in 2025. Therefore, the import total is taken as 40%. This reduces Indonesia's 43% of c-Si imports to 15% of the 2025 sourcing market share.[1]

Technology	Components Assessed	HTS Codes Assessed
Solar	Module – thin-film	8541.43.0080
	Module – c-Si	8541.43.0010
	Cell – c-Si	8541.42.0010
	Ingot/Wafer	3818.00.0010, 3818.00.0020, 3818.00.0030, 3818.00.0095
	Inverters	8504.40.9570
	Polysilicon	2804.69.1000, 2804.61.00002
Storage	Packs & Modules - LFP	8507.60.0020, 8507.60.00303
	Cell - LFP	8507.60.0020
	AAM	2504.10.5000, 3801.10.5010, 3801.90.0000
	CAM	2842.90.9000, 2835.10.0000, 3801.90.0000
	Inverters	8504.40.9570
Wind	Blades	8412.90.9081, 8412.90.90702
	Hubs	8412.90.9081, 8412.90.90752
	Nacelle	8503.00.9570
	Bedplate	8412.90.9085
	Generators	8501.64.0121, 8501.64.01102
	Generator Set	8502.31.0000
	Gearboxes	8483.40.5020, 8483.40.7000
	Towers	7308.20.0020, 7308.20.00352
Grid	Medium Voltage Transformer	8504.22.0000, 8504.23.0000

1 ACP has leveraged ITC trade data, confidential membership information, contracted work with Intertek CEA, and our in-house manufacturing database to develop a view on the domestic value of major components and applied it to the total spend on clean energy components by technology.
2 New HTS code beginning with Q3 2025 USITC data
3 New battery HTS 8507.60.0030 available as of Jan. 1, 2026. ACP's understanding is that cells will remain under 8541
4 Only non-NTR countries: Cuba, North Korea, Russia and Belarus

Trade, Import and Tariff Methodology

A guide to ACP's trade data tracking and analysis methodology

- Tariff analysis across the clean energy supply chains is continually evolving. As such, several assumptions were made to complete ACP's 2025 analysis.
- ACP selected key components across each technology's supply chain that were material to a sector-wide impact study. These components are described in the table in the prior slide.
- Throughout 2025, ACP has collected data from the ITC and has elicited feedback from key industry players to analyze the average domestic and imported market share across key supply chain components. Derived market shares by country for each component are shown in the Sankey diagrams or tables in each section.
- Tariff impacts on the key components assessed by ACP are described by technology vertical on the subsequent pages.

Trade, Import and Tariff Methodology: Solar

Solar tariffs have been assessed per component and by date range in which the given tariffs applied. The following is a brief description of each applicable tariff impacting the solar supply chain:

- **Base Tariffs:** Generally, there are no base tariffs across the solar components assessed. Base tariffs for polysilicon imports vary based on HTS code used and import country. No base tariffs are applied to 'Normal Trade Relations' (NTR) countries for polysilicon with greater than 99.99% purity, while a 5.3% base tariff is applied to polysilicon with purity between 99% and 99.99%.
- **Section 122:** Section 122 tariffs were imposed on February 24, 2026 by the Administration as a reaction to the Supreme Court striking down the IEEPA tariffs. These 10% tariffs will remain in effect for 150 days, until July 24, 2026. Mexican and Canadian imports pay 0% tariff if the goods are USMCA compliant.
- **Section 201:** Beginning in 2018, Section 201 tariffs applied a 30% tariff, declining by 5% each year over four years on imported crystalline silicon (c-Si) modules and cells after a 2.5 GW quota of allowable imports was met. These tariffs were then extended in 2022 at a rate of 14.75%, declining at a rate of 0.25% per year over four years, expiring in February 2026. The expansion increased the tariff-rate quota (TRQ) from 2.5 to 5 GW for solar cell imports and then again in 2024 to 12.5 GW annually to support growing domestic module manufacturing. Section 201 tariffs applied to all c-Si module and cell imports, except most Generalized System of Preference Beneficiary countries like Indonesia and Thailand.
- **Section 232:** As of April 6, 2026, solar components such as steel tracker parts, piles, racking, and junction boxes are all categorized under Annex I-A of the Steel, Copper and Aluminum 232 tariffs. This annex is subject to a 50% tariff, applied to the full value of the imported product. The tracker drive is classified under Annex I-B, subject to a 25% tariff on the full value of the product. Aluminum solar module frames are on Annex II, thus exempted from these 232 tariffs. As of Q1 2026, there is an active 232 investigation on polysilicon imports with determinations expected in summer 2026. Note: At present any imported polysilicon is not being used to supply the solar supply chain because domestic ingot & wafer capacity has yet to scale. The limited existing ingot production utilizes domestic polysilicon.
- **Section 301:** As of March 11, 2026, Section 301 investigations are underway for several countries including: China, the E.U., Singapore, Switzerland, Norway, Indonesia, Malaysia, Cambodia, Thailand, Korea, Vietnam, Taiwan, Bangladesh, Mexico, Japan and India. These tariffs are intended to replace the temporary section 122 tariffs.
- **AD/CVD:** There have been four distinct Antidumping and Countervailing Duty investigations focused on the solar supply chain dating back to 2011. To date, countries impacted include Cambodia, China, India, Indonesia, Laos, Malaysia, Thailand, and Vietnam. Rates are set country-wide for both modules and cells. For company specific solar cells, tariffs range from 1.92% to 3,403.96%. In the case of both solar modules and cells, the relevant country of origin is the manufacturing country of the cell.
- **IEEPA:** International Emergency Economic Powers Act tariffs were initially implemented in February 2025 for Canadian, Mexican and Chinese imports. In April 2025, tariffs were extended to countries across the globe. These tariffs ranged between 18% and 48% for top solar import countries. As of February 2026, the U.S. Supreme Court ruled that the IEEPA tariffs imposed by the Trump Administration exceeded statutory authority. Therefore, the IEEPA tariffs no longer remain in effect in 2026 and the $160 billion of collected tariffs are due refunds to be processed by the lower courts.
- **Total Impacts:** Cumulative tariff impacts vary drastically between components and import countries, and 2025 cumulative rates differ from rates in 2026. In 2025, tariff totals for top import nations were 20% at a minimum for European inverters and an estimated 412% at a maximum for solar cells from Thailand. To date in 2026, analyzed components from top import nations, faced 10% tariffs at a minimum and an approximate 385% at a maximum.

Trade, Import and Tariff Methodology: Storage

Tariffs on battery storage components were assessed per component and by date range in which the given tariffs applied. The following is a brief description of each applicable tariff impacting the battery storage supply chain:

- **Base Tariffs:** There are no applicable base tariffs for most battery components assessed. Base tariffs for AAM depend on the HTS code that the AAM is imported under. Under code 3801.90.0000, the MFN rate is 4.9%. Other codes have a 0% MFN rate. Base tariffs for CAM vary depending on the HTS code that the CAM is imported under. For HTS code 2842.90.9000 – MFN 3.3%, for code 2835.10.0000 – MFN 3.1%, and for 3801.90.0000 – MFN 4.9%.
- **Section 122:** Section 122 tariffs were imposed on February 24, 2026 by the Administration as a reaction to the Supreme Court striking down the IEEPA tariffs. These 10% tariffs will remain in effect for 150 days, until July 24, 2026. Mexican and Canadian imports pay 0% tariff if the goods are USMCA compliant.
- **Section 232:** As of April 2026, battery enclosures imported under harmonized tariff code 7309, copper foil used in battery anodes and aluminum foil used in battery cathodes are all categorized under Annex I-A of the Steel, Copper and Aluminum 232 tariffs. This annex is subject to a 50% tariff, applied to the full value of the imported product.
- **Section 301:** As of March 11, 2026, Section 301 investigations are underway for several countries including: China, the E.U., Singapore, Switzerland, Norway, Indonesia, Malaysia, Cambodia, Thailand, Korea, Vietnam, Taiwan, Bangladesh, Mexico, Japan and India. These tariffs are intended to replace the temporary section 122 tariffs. There is an existing China 301 tariff regime dating back to 2018. Under this 301 tariff regime, battery modules and cells are subject to an existing 25% tariff.
- **AD/CVD:** As of March 2026, the U.S. ITC voted against the final injury determination phase of the AD/CVD Graphite (Active Anode Materials) case. This terminates the investigation and results in no AD/CVD tariffs on AAM (or any derivative products) going forward. Tariffs already collected as duty deposits since the preliminary determination will be refunded.
- **IEEPA:** International Emergency Economic Powers Act tariffs were initially implemented in February 2025 for Canadian, Mexican and Chinese imports. In April 2025, tariffs were extended to countries across the globe. These tariffs ranged between 19% and 34% for top battery storage import countries. As of February 2026, the U.S. Supreme Court ruled that the IEEPA tariffs imposed by the Trump Administration exceeded statutory authority. Therefore, the IEEPA tariffs no longer remain in effect in 2026 and the $160 billion of collected tariffs are due refunds to be processed by the lower courts.
- **Total Impacts:** Cumulative tariff impacts vary drastically between components and import countries, and 2025 cumulative rates differ from rates in 2026. In 2025, tariff totals for top import nations were 20% at a minimum for European inverters and an estimated 39% at a maximum for Chinese anode and cathode active material. To date in 2026, analyzed components from top import nations, faced 10% tariffs at a minimum and an approximate 15% at a maximum for Indonesian anode active material, as well as Chinese anode and cathode active material.

Trade, Import and Tariff Methodology: Grid

Tariffs on medium voltage transformers (MVT) ranging from 1,500 kVA to 7,500 kVA, have been assessed by date range in which the given tariffs applied. Mexico and Korea were consistently the top two countries of origin for MVT imports in 2025. The following is a brief description of each applicable tariff impacting transformers imported under HTS code 8504.22.0000 and 8504.23.0000:

- **Base Tariffs:** There are no applicable base tariffs for Mexican transformer imports, nor for Korean imports.
- **Section 122:** Section 122 tariffs were imposed on February 24, 2026 by the Administration as a reaction to the Supreme Court striking down the IEEPA tariffs. These 10% tariffs will remain in effect for 150 days, until July 24, 2026. Mexican and Canadian imports pay 0% tariff if the goods are USMCA compliant.
- **Section 232:** As of April 2026, MVTs imported under harmonized tariff code 8504.22.0000, as well as transformer cores and laminates are all categorized under Annex I-B of the Steel, Copper and Aluminum 232 tariffs. This annex is subject to a 25% tariff, applied to the full value of the imported product. MVT's imported under 8504.23.0000 are categorized under Annex III and are subject to a 15% tariff, applied to the full value of the imported product.
- **Section 301:** As of March 11, 2026, Section 301 investigations are underway for several countries including: China, the E.U., Singapore, Switzerland, Norway, Indonesia, Malaysia, Cambodia, Thailand, Korea, Vietnam, Taiwan, Bangladesh, Mexico, Japan and India. These tariffs are intended to replace the temporary section 122 tariffs.
- **IEEPA:** International Emergency Economic Powers Act tariffs were initially implemented in February 2025 for Canadian, Mexican and Chinese imports. In April 2025, tariffs were extended to countries across the globe. These tariffs ranged between 0% and 25% for top battery storage import countries. If imported goods from Mexico were USMCA complaint, there was no IEEPA tariff applied. As of February 2026, the U.S. Supreme Court ruled that the IEEPA tariffs imposed by the Trump Administration exceeded statutory authority. Therefore, the IEEPA tariffs no longer remain in effect in 2026 and the $160 billion of collected tariffs are due refunds to be processed by the lower courts.
- **Total Impacts:** Cumulative tariff impacts vary drastically between components and import countries, and 2025 cumulative rates differ from rates in 2026. In 2025, tariff totals for top import nations were 0% at a minimum for Mexican imports and 25% at a maximum for Korean transformer imports. Currently in 2026, MVTs from Mexico (which are USMCA-compliant) face 0% tariffs, while similar imports from Korea face an approximate 12.4% tariff.

Trade, Import and Tariff Methodology: Wind

Tariffs on wind components have been assessed per component and by date range in which the given tariffs applied. The following is a brief description of each applicable tariff impacting the wind supply chain:

- **Base Tariffs:** There are no applicable base tariffs for most wind components assessed. Base tariffs for turbine gearboxes vary depending on the HTS code that the gearbox is imported under. For HTS code 8483.40.5010– MFN 2.5% and 8483.40.7000 – MFN $0.25ea + 3.9%.
- **Section 122:** Section 122 tariffs were imposed on February 24, 2026 by the Administration as a reaction to the Supreme Court striking down the IEEPA tariffs. These 10% tariffs will remain in effect for 150 days, until July 24, 2026. Mexican and Canadian imports pay 0% tariff if the goods are USMCA compliant.
- **Section 232:** As of April 2026, wind towers, offshore wind monopiles, steel monopile foundations, steel substation foundations, transition pieces, anode cages, boating landing platforms, and aluminum cables are categorized under Annex I-A of the Steel, Copper and Aluminum 232 tariffs. This annex is subject to a 50% tariff, applied to the full value of the imported product. Wind hubs, nacelles, generators, generator parts, generator sets, and gearboxes all are classified under Annex I-B which applied a 25% tariff to the total value of the imported product. On August 13, 2025, the U.S. Department of Commerce began its 232 probe into imported wind turbines and components. ACP anticipates the results of this report in early summer 2026.
- **Section 301:** As of March 11, 2026, Section 301 investigations are underway for several countries including: China, the E.U., Singapore, Switzerland, Norway, Indonesia, Malaysia, Cambodia, Thailand, Korea, Vietnam, Taiwan, Bangladesh, Mexico, Japan and India. These tariffs are intended to replace the temporary section 122 tariffs.
- **IEEPA:** International Emergency Economic Powers Act tariffs were initially implemented in February 2025 for Canadian, Mexican and Chinese imports. In April 2025, tariffs were extended to countries across the globe. These tariffs ranged between 19% and 34% for top battery storage import countries. As of February 2026, the U.S. Supreme Court ruled that the IEEPA tariffs imposed by the Trump Administration exceeded statutory authority. Therefore, the IEEPA tariffs no longer remain in effect in 2026 and the $160 billion of collected tariffs are due refunds to be processed by the lower courts.
- **Total Impacts:** Cumulative tariff impacts vary drastically between components and import countries, and 2025 cumulative rates differ from rates in 2026. In 2025, tariff totals for top import nations were 0% at a minimum for Mexican blade import and an estimated 80% at a maximum for Vietnamese generator imports. In 2026, analyzed components from top import nations, faced 0% tariffs at a minimum and an approximate 60% at a maximum for steel and aluminum components from various nations.

Detailed Solar Supply Chain – Module

Raw Materials	Processed Materials	Tertiary Component	Secondary Component	Primary Component	Category
Bauxite	Aluminum		Frame & Backrail	Module (both)	Module
Iron Ore	Steel				
Coal					
Limestone					
Soda Ash			Glass (Float or Rolled)		
Silica Sand					
Limestone					
Crude (hydrocarbon)	Matrix Polymers		Encapsulant		
Crude (hydrocarbon)	Laminated Polymer		Backsheet		
Crude Oil	Thermoplastic Polymer	Housing/Enclosure	Junction box		
Silica Sand	Silicon	Diodes			
	Silicon gel	Potting			
Copper Ore	Copper	Metal contacts			
		Terminal blocks			
		Cables/Connectors			
Latex	Rubber	Sealants/Gaskets			
Crude Oil	Plastics	Edge seals, pottants, adhesives	Seal		
Silica Sand	Silicon				
Copper Ore	Copper	Copper ribbon	Bus ribbons		
Silica Sand	Polysilicon	Ingots/ Wafers	Cells (c-Si)	Module (c-Si)	
Copper	Silver Paste				
Gold					
Lead					
Zinc Ore					
Zinc Ore	Indium	Indium Tin Oxide (ITO)	Transparent Conductive Oxide (TCO)	Module (CdTe)	
Cassiterite	Tin				
Cadmium Sulfide	Cadmium Sulfide		n-layer (CdS)		
Cadmium Telluride	Cadmium Telluride		p-layer (CdTe)		

Detailed Solar Supply Chain – Module

Raw Materials	Processed Materials	Tertiary Component	Secondary Component	Primary Component	Category
Bauxite	Aluminum		Mounting Hardware	Racking	Structural Balance of System (SBOS)
			Rails		
			Clamps		
			Brackets		
Iron Ore+	Steel		Rebar	Piles/ Foundation	
Limestone	Cement		Concrete		
Iron ore+	Steel		Torque tube	Tracker	
			Fasteners		
			Bearings		
Bauxite	Aluminum		Frames/backrail		
Iron Ore+	Steel				
			Drive Motor		
Silica Sand	Silicone	Photodiode or	Sensors		
Gallium	Gallium Arsenide				
Arsenic					
Germanium Ore	Germanium				
Indium	Indium				
Cadmium	Cadmium Sulfide	Light-dependent resistor			
Sulfide					
Silica Sand	Silicon	Microprocessor	Microcontroller		
		Transistor			
		Diode			
Silica Sand	Silicone	Photodiode or	Control Circuit		
Gallium	Gallium Arsenide				
Arsenic					
Germanium Ore	Germanium				
Indium	Indium				
Cadmium	Cadmium Sulfide	Light-depedent resistor			
Sulfide					
Soda Ash	Fiber glass		Enclosure	Inverter	Electrical Balance of System (EBOS)
Silica Sand					
Limestone					
Bauxite	Aluminum				
Iron Ore+	Steel				
Silica Sand	Silicone wafers	Diode	Insulated Gate Bipolar Transitors (IGBT)		
Silica Sand	Silicone wafers				
Bauxite	Aluminum	Capacitors	Passive Components		
Borate	Electrolyte				
Crude Oil	Polymers				
Copper Ore	Copper	Inductors			
Silica Sand	Silicon wafers	Micocontroller/Digital Signal Processor	Control Electronics		
Silica Sand	Silicone	Gate Drivers			
		Sensors			
Bauxite	Aluminum	Heatsinks	Cooling		
Copper Ore	Copper	EMI Filters			
Soda Ash	Fiber glass	FR-4 Substrate	Printed Circuit Board (PCB) Assemblies		
Silica Sand					
Limestone					
	Epoxy resin binder				
Copper Ore	Copper	Copper Foil			
				Combiner Box	
Iron Ore +	Steel		Transformer Core	Medium Voltage (Step-Up) Transformer	
Copper Ore	Copper	Copper Wire	Windings		
Copper Ore	Copper	Copper Wire		Cables	

Detailed Storage Supply Chain – Module

Raw Materials	Processed Materials	Tertiary Component	Secondary Component	Primary Component	Category
Iron Ore	Iron	Cathode Active Material	Cathode	Cell	Module
Phosphate Rock	Phosphorus				
Lithium Brine, Clay, or Spodumene	Lithium Hydroxide, Lithium Carbonate				
Bauxite	Aluminum	Alumnium Foil			
Natural Graphite	Graphite	Anode Active Material	Anode		
Crude Oil or Coal	Synthetic graphite				
Copper Ore	Copper	Copper Foil			
Crude Oil	Ethylene	Solvent	Electrolyte		
Lithium Brine, Clay, or Spodumene	Lithium Hydroxide, Lithium Carbonate	Salt (Lithium)			
Fluorspar	Fluorine	Salt (Fluorine)			
Crude Oil	Plastic		Separator		
Copper Ore	Copper		Foil	Casing	
Bauxite	Aluminum				
	N-Methyl-2-pyrrolidone (NMP)	Polyvinylidene (Di)fluoride (PVDF) Resins	Binder		

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Detailed Storage Supply Chain – Balance of System

Raw Materials	Processed Materials	Tertiary Component	Secondary Component	Primary Component	Category
Iron Ore	Steel			Enclosure	Electrical Balance of System (EBOS)
Bauxite	Aluminum				
Silica Sand	Silicon		Printed circuit board assemblies	Inverter	
Crude Oil	Plastic		Enclosure		
Bauxite	Aluminum				
Iron Ore	Stainless steel				
Gallium, Arsenic	Gallium arsenide	Diode	Insulated Gate Bipolar Transistors		
Germanium Ore	Germanium	Chip wafer			
Silica Sand	Silicon	Silicon Wafer/Ingot			
	Chemicals + Solvent	Photoresist Coating			
Iron Ore	Steel	Diamond Saw			
Carbon	Diamond				
Indium (Byproduct of Zinc mining)	Indium	Foil			
Air or Water		Coolant	Climate control		
	Platinum or nickel thin film		Sensors	Battery Management System	
Silica Sand	Silicon		Control electronics		
	Ceramics	Passive (resistors)	Balancing Circuits		
Soda Ash	Fiberglass	Active (circuits)			
Silica Sand					
Limestone					
Soda Ash	Fiberglass	CAN Bus/Modbus	Communication Interface		
Silica Sand					
Limestone					
Iron Ore	Steel		Cooling Hardware (fans, pumps, pipes, etc)	Thermal Management System	
Copper Ore	Copper				
Bauxite	Alumnium				
Gylcol	Glycol-water mixture	Liquid Cooling	Coolants		
Water					
Carboxylic Acid	Synthetic ester	Dietlectric coolant			
Alcohol					
			Temperature Sensors		
			Controllers		
	Polyeurethane foam		Insulation		
Crude Oil	Plastic	Smoke dectors	Detection	Fire Suppression	
	Tin Oxide	Gas Sensors			
	FM-200, Novec 1230	Clean agents	Suppression		
	N_2, CO_2, argon blend	Inert gases			
		Water mist			
Iron Ore	Steel		Distribution system		
Iron Ore	Steel (or Bronze/Brass)	Valves	Control panel		
Silica Sand	Silicon	Cicuit boards			
Iron Ore+	Electrical Steel	Copper Wire	Transformer Core	Medium Voltage Transformer	
Copper Ore	Refined Copper				
Copper Ore	Refined Copper	Copper Wire		Cables	
Bauxite	Aluminum	Aluminum Wire			
Iron Ore	Steel	Rebar		Foundation	Structural Balance of System (SBOS)
Limestone	Cement	Concrete			

Detailed Wind Supply Chain

Raw Materials	Processed Materials	Tertiary Component	Secondary Component	Primary Component	Category
Soda Ash	Fiberglass		Cover	Nacelle	Turbine
Silica Sand					
Limestone					
Bauxite	Aluminum				
Iron Ore+	Steel		Frame		
Silica Sand	Fiberglass				
Wood and Crude Oil	Lumber		Yaw Bearing		
Crude Oil	Plastic				
Carbon	Carbon Fiber				
	Cooling System, Sensors, and Power Converter		Cooling System		
Ire Ore+	Magnetic Steel	Generator	DriveTrain		
Copper Ore	Copper				
Iron Ore+	Cast Steel	Gear Box			
	Stainless Steel	Shaft			
		Couplings			
Bauxite	Aluminum		Hydraulics		
Iron Ore+	Stainless Steel				
Copper Ore	Copper				
Cassiterite	Tin				
	Chrome				
Crude Oil	Plastic				
Ire Ore +	Steel	Steel Tubular Sections		Tower	
		Flanges/bolts			
Ire Ore +	Steel	Access Ladders, platforms			
Bauxite	Aluminum				
Soda Ash	Fiberglass		Blades	Rotor System	
Silica Sand					
Limestone					
Carbon	Carbon Fiber				
Balsa Wood	Balsa				
Crude Oil	Plastic Resin				
Iron Ore +	Steel and Cast Iron	Casting	Hub		
		Pitch Mechanism			
Silica Sand	Silicon Wafers	Diode	Switching Devices	Control and Electrical System	Electrical Balance of System (EBOS)
Silica Sand	Silicon Wafers	Insulated Gate Bipolar Transistors (IGBT)			
Copper Ore	Refined Copper		Control Units (PLCs, SCADA, Sensors)		
Bauxite	Aluminum				
Crude Oil	Plastic				
Iron Ore +	Electrical Steel		Transformer Core	Medium Voltage Transformer	
Copper Ore	Refined Copper	Copper Wire	Windings		
Copper Ore	Refined Copper	Copper Wire		Cables	
Bauxite	Aluminum	Aluminum Wire			
Iron Ore +	Steel	Rebar	Concrete Base	Foundation	Structural Balance of System (SBOS)
Limestone	Cement	Concrete			

The American Clean Power Association (ACP) is the leading voice of today's multi-tech clean energy industry, representing energy storage, wind, utility-scale solar, clean hydrogen, and transmission companies. ACP is committed to meeting America's energy and national security goals and building our economy with fast-growing, low-cost, and reliable domestic power.

Learn more at **www.cleanpower.org.**

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