THIRD WAY

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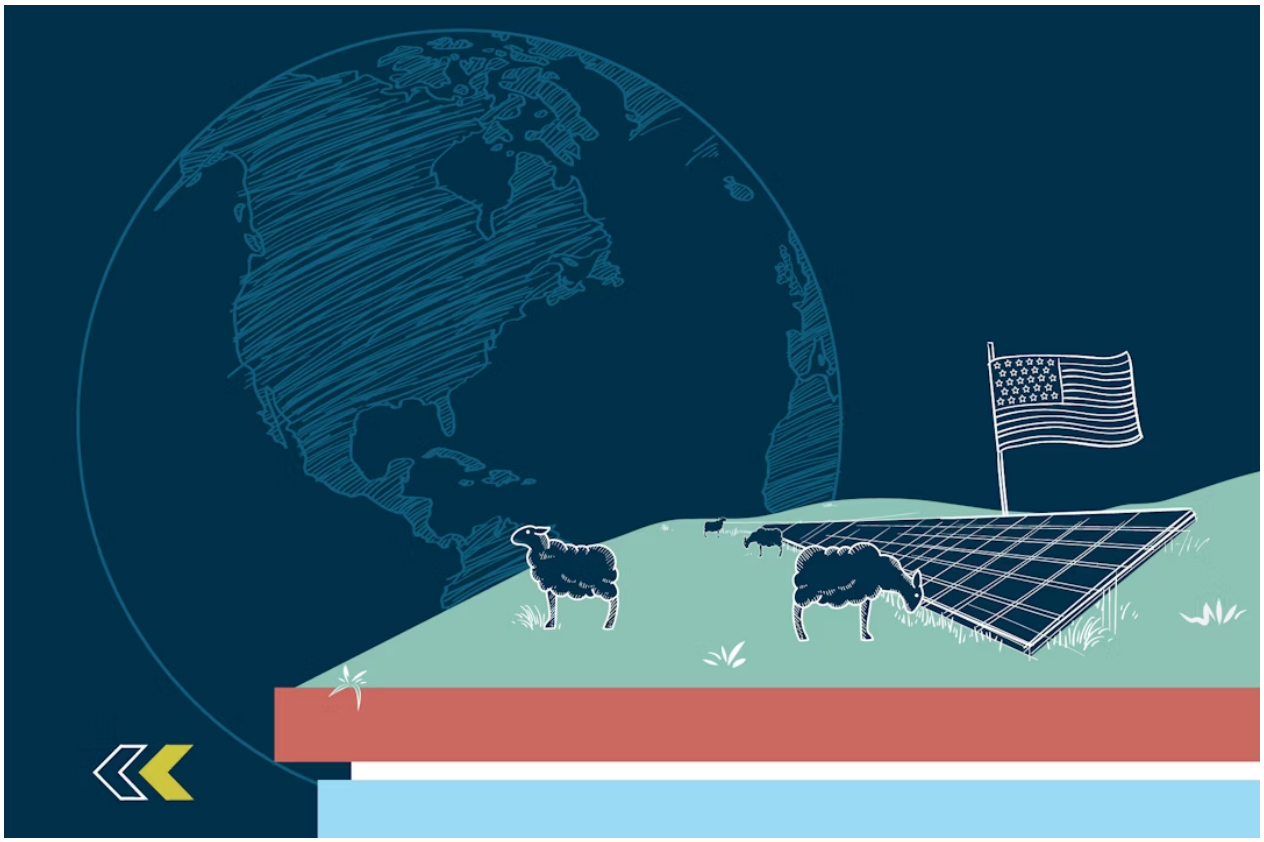
Status Report: America's Competitive Advantage in Solar Energy



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Renewable energy sources like solar are crucial to the clean energy transition. But today, just one country dominates the global solar industry: China. In the 1970s and 80s, the United States pioneered solar technologies, leading the world in research, development, and manufacturing of solar panels. Because of inconsistent federal support for renewables, the United States ceded market dominance to China, and the country surged to dominate market. Last year alone, China installed more solar panels than the US has in its entire history, cut panel prices nearly in half, and saw exports of solar components skyrocket.

Left unchecked, China's success will leave the US entirely dependent on its industries. By investing in our domestic solar supply chain, the US can make itself less vulnerable to the whims of the

Chinese government and claim a larger share of the global solar market, valued at up to $4.5 trillion between now and 2050.

The US may have ceded ground to foreign competitors in the past, but we have the expertise, workforce, and policies needed to compete in the global solar industry and retake market share. We cannot be deterred by China's lead—we must boost our manufacturing capabilities and strengthen our domestic supply chain.

This memo spotlights key federal policies that are helping the US rebuild its edge in the evolving solar energy industry and showcases milestones that prove America is slowly reclaiming its leadership position in global markets.

How Federal Investments are Boosting America's Solar Industry

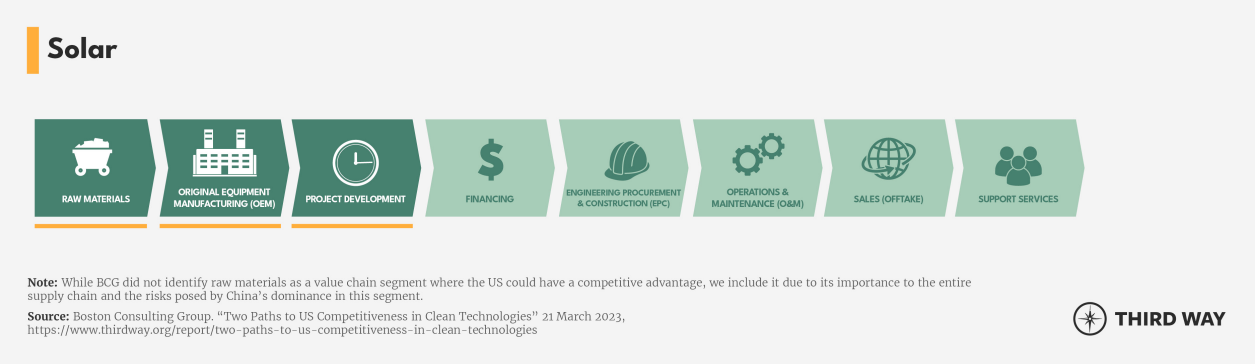
Landmark provisions across the Bipartisan Infrastructure Law (BIL), CHIPS and Science Act, the Inflation Reduction Act (IRA) are playing a pivotal role in establishing a domestic solar energy supply chain. These federal incentives are a game-changer, providing the certainty and confidence investors and private firms need to dive into early-stage projects and plan for the long term.

These incentives and programs, which are designed to be distributed over several years, provide long-term stability, strengthen America's supply chain dominance, and help the US re-establish itself as a valuable player in the global solar industry. Some of the most impactful federal incentives include:

- Over $60 billion in Production Tax Credits to incentivize electricity generation through clean sources like solar energy; [1]
- Over $64 billion in Investment Tax Credits to support clean electricity generated from qualifying sources like solar energy; [2]
- Over $40 billion in Manufacturing Tax Credits to help re-equip, expand, or establish manufacturing facilities to produce equipment and components for solar and other technologies; [3]
- $22 billion in tax credits to help Americans install residential solar technology to produce electricity at home; [4] and
- And $19 billion in grant funding to support facilities producing solar technologies, accelerate solar research, development, and deployment programs, and expand solar projects that support local economic development and public school facilities. [5]

These federal investments will pay dividends over the next the decade. And based on our analysis of Rhodium Group and MIT CEEPR's Clean Investment Monitor, it's clear that these policies are already working. Public and private investment in energy storage technologies in just the past three years has exceeded $103 billion. [6]

Road to Victory: Building on US Leadership in Solar Technologies



Navigating global solar energy markets will not be easy, especially when facing formidable competitors like China. Decades of government investment into solar panel producers, hefty subsidies, and access to government bank credit have propelled China to the forefront of the solar industry. While we must be realistic—acknowledging that we won't dominate the market overnight—we can make bold moves to capture key segments of the value chain that bring us closer to the finish line.

The US is well-positioned to regain a competitive edge in this evolving global market. By harnessing our existing strengthens, we can build on our advantages and catch up with our competitors. Third Way's landmark analysis, in partnership with Breakthrough Energy and Boston Consulting Group, found that there are three segments of the solar value chain where the US should make the most effort to build or maintain its advantage. These segments were identified based on their market size and the potential for American leadership—and we're already seeing significant progress in these key areas. Let's break this down:

Raw Materials

Polysilicon production is a critical component of the solar supply chain and a key determinant for achieving economies of scale in solar panel manufacturing. Currently, China dominates the market, producing 80% of the global polysilicon supply. However, given the abundant availability of silicon—and rising demand for domestically—produced polysilicon given new domestic content requirements for solar wafers and cells—the US has a significant opportunity to establish a competitive advantage. Mothballed US-based polysilicon plants can be restarted and expanded, and

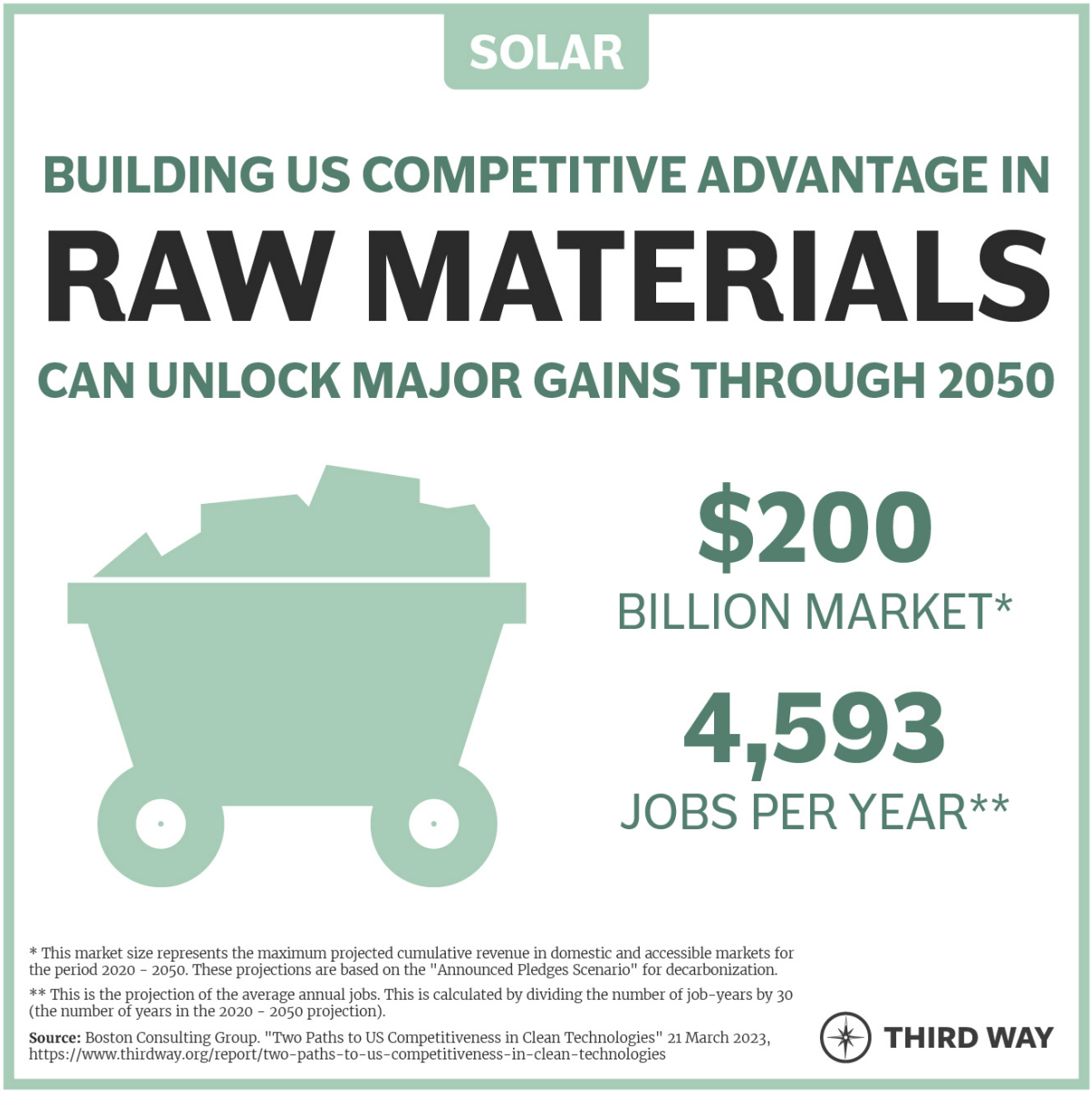
new facilities can be built to support the growing demand. To remain competitive, US producers can leverage advanced, low-energy, cost-effective process technologies, such as Fluidized Bed Reactor (FBR) technology, which is more efficient than the traditional processes. [7] Innovation can help reduce costs and enable US firms to compete effectively with Chinese manufacturers. Doing so will allow US firms to capture a portion of a global market valued at $200 billion and create nearly 5,000 jobs every year through 2050. Here's how we're already beginning to build our competitive muscles:

- **Onshoring Critical Supply Chains:** Korean-based PV cell manufacturer, QCells, committed $2.5 billion to build a complete solar supply chain in the US, including a new facility in Bartow County, Georgia. Their facility will manufacture 3.3 gigawatts of solar ingots, wafers, cells, and finished panels, respectively. This investment strengthens the US solar manufacturing ecosystem and reduces dependency on foreign supply chains.

- **Scaling Up Silicon Production:** Hemlock Semiconductor Operations, one of the longest-operating manufacturers of polysilicon in the world and the largest producer of high-purity polysilicon in the United States, has invested $375 million to expand operations in Michigan. This expansion will help meet the increasing demand for semiconductors in the growing American solar industry.

- **Revitalizing Industries:** REC Silicon, a leading global player in the production of high-purity silicon materials, has entered a 10-year agreement to provide high-purity FBR granular polysilicon to two panel manufacturers. To meet this demand, REC will restart their Moses Lake facility in Washington, bolstering US polysilicon production capacity.

- **Expanding Capacity:** Wacker Chemie is investing $200 million to expand their already $2.5 billion polysilicon facility in Tennessee. This expansion represents the company's single largest investment ever and will produce polysilicon needed for solar cells, creating local jobs and reinforcing the US position in the global solar market.



Original Equipment Manufacturing

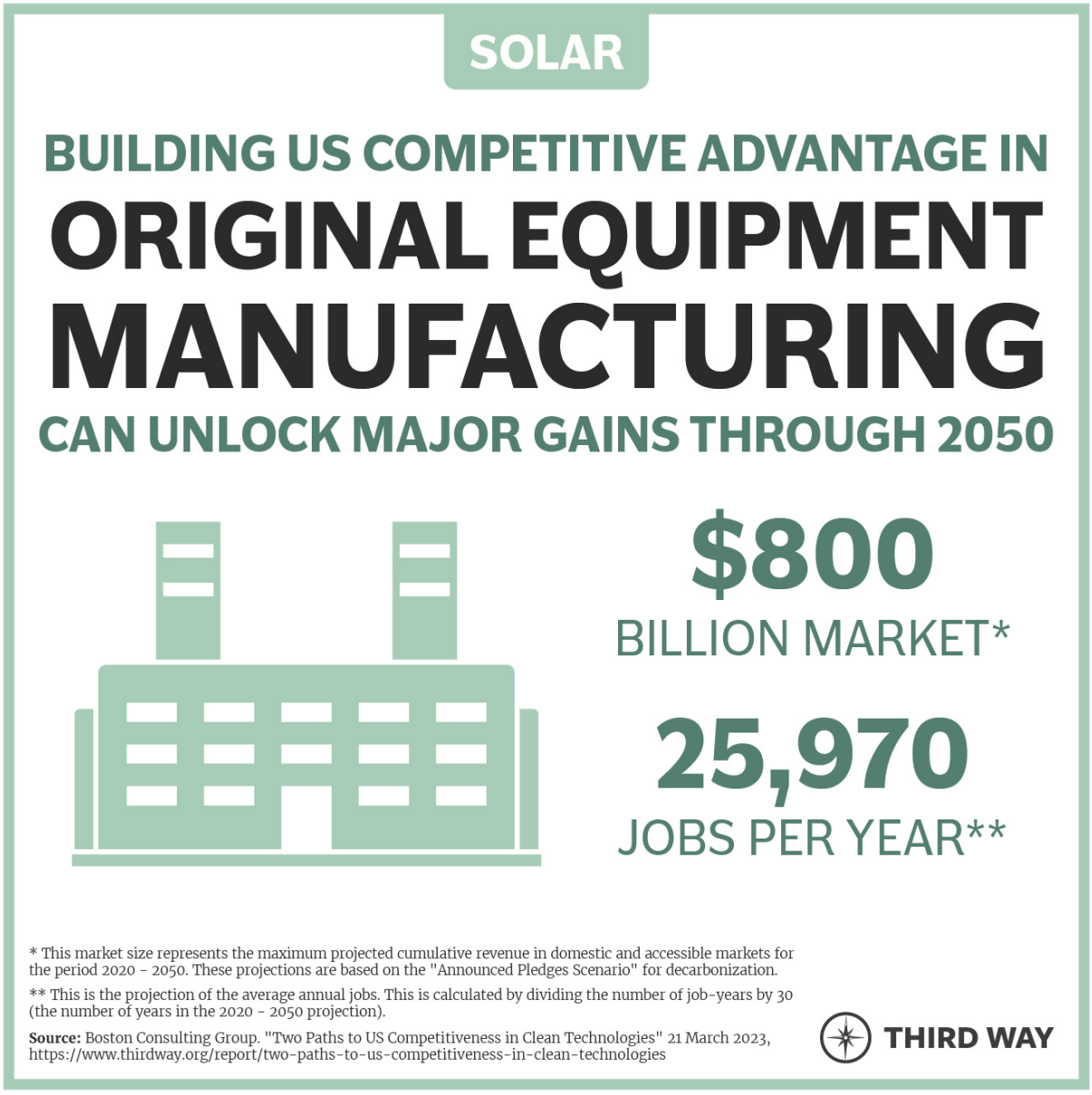
While the US leads in manufacturing certain solar technologies, like thin film cells, the majority of solar manufacturing remains highly concentrated in China, with approximately 97% of wafers, 85% of PV cells, and 75% of PV modules produced there. The US faces significant disadvantages—including higher labor costs, higher energy costs, and a shortage of skilled workers like factory technicians and engineers. Moreover, the US has lost its IP and technical leadership due to limited investment in research and development. Despite these challenges, diversifying the solar supply chain away from China is critical. Recent legislation is helping to lower the cost of US-produced solar goods and boost demand. By reshoring wafer, cell, and module manufacturing, US firms have

the opportunity to capture a portion of the $800 billion global market and create over 25,000 jobs per year through 2050. Here's how we're already starting to shift the tide:

- **Reshoring Supply Chains:** First Solar's $1.1 billion investment to build its fifth fully integrated factory in Louisiana marks a significant win for US solar manufacturing. This facility will increase the company's nameplate manufacturing capacity by 3.5 GW, reaching 14 GW in the US and 25 GW globally by 2026. The fully vertically integrated manufacturing facility, spanning over two million square feet, is designed to transform a sheet of glass into a ready-to-ship Series 7 module in approximately 4.5 hours, producing over a dozen new Louisiana-made solar panels every minute. This investment not only enhances domestic manufacturing capacity but showcases America's competitive muscles in the global solar industry.

- **Pioneering Next-Generation Technology:** Silfab Solar, a leading North American solar panel manufacturer, is investing $150 million to expand operations in York County, South Carolina. This investment will enable the production of next-generation solar cell technology, boosting US solar cell production and advancing the technological capabilities of the US solar industry. By staying at the forefront of innovation, the US is slowly regaining its technical leadership and enhance its competitive edge in the global market.

- **Forging Strategic Partnerships:** Minnesota-based solar panel manufacturer, Heliene, announced it will purchase silicon solar cells from Suniva under a $400 million, three-year contract. Suniva is expected to restart solar cell manufacturing at its Georgia factory to meet this agreement, creating jobs and reviving domestic production capabilities. This partnership exemplifies how collaboration between US companies can reduce dependency on foreign imports and build a more resilient and competitive solar industry.



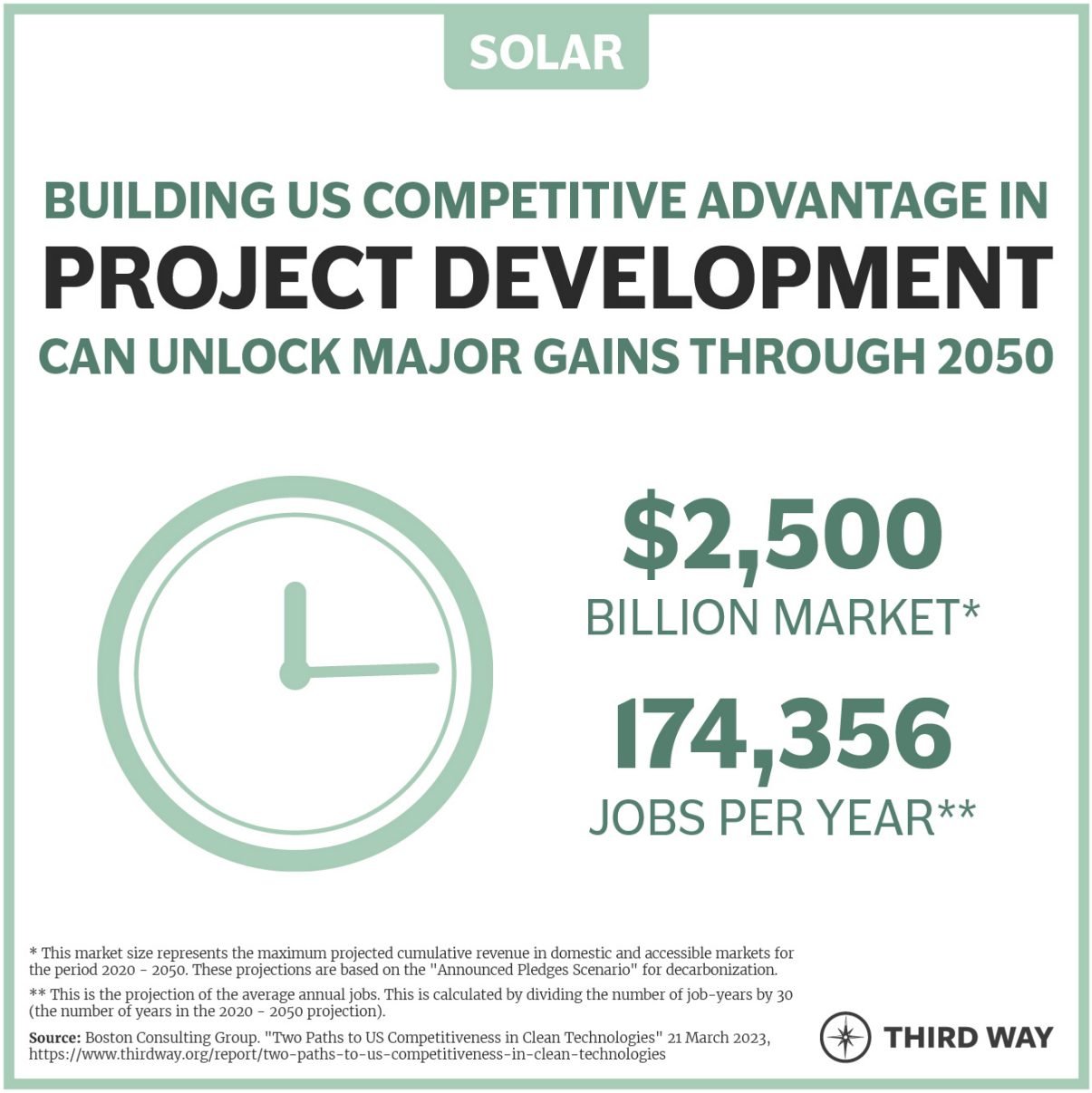
Project Development

Solar project development encompasses a wide range of activities—from site acquisition and solar resource analysis to permitting and interconnection to financing and construction. With an abundance of open, sunny land, supportive federal policies *and* ample experience in solar utility-scale projects, the US holds a distinct advantage in this segment. US-based solar developers possess the technical expertise, ability to navigate complex permitting and regulatory processes, and strong relationships with OEMs needed to expand both the domestic solar industry and succeed in foreign markets. By leveraging these strengths, US firms can capture a significant portion of the $2.5 trillion global market and create nearly 175,000 jobs annually through 2050. Here are some examples of how we're already carving out that edge:

- **Prioritizing Strategic Development:** The Department of the Interior announced the sale of leases in the Amargosa Desert, totaling 23,675 acres, to produce up to 3 GW of clean solar energy—enough to power 2 million homes. By identifying the Amargosa Valley as one of 17 nationwide solar energy zones, where solar projects are encouraged, the bureau is streamlining the development process and providing clear guidance to developers. This proactive approach not only accelerates project timelines but also reduces uncertainty and risk, making the US a more attractive and competitive environment for solar investment and development.

- **Building Expertise:** OCI Solar Power, alongside St. Phillip's College, Project QUEST, and the San Antonio Area Foundation established SolarJobs SA—a 3-year, $500,000 education and workforce initiative to help prepare students for careers in clean industries, like solar. By investing in education and training, SolarJobs SA is addressing the shortage of skilled workers and ensuring a steady pipeline of talent for the growing solar industry in the US.

- **Streamlining Local Permitting:** The residential solar permitting process can be challenging for homeowners and installers alike, often long and costly due to reliance on manual data entry and complex regulations. Aurora Solar's recent acquisition of a permit packaging software to help automate permit-ready design plants for solar projects is alleviating these challenges. By providing instant, permit-ready proposals, Aurora Solar is helping reduce permitting bottlenecks, lower installation costs, and accelerating project timelines. This not only streamlines operations for local solar installers and gives confidence in America's potential to deploy but demonstrates US leadership in innovation and efficiency when it comes to the solar industry.



Other Value Chain Segments

Broadly, the US has achieved significant progress in the solar energy sector. Here are some standout projects:

- **Boosting Competitiveness Through Trade Policy:** The Biden Administration reintroduced Section 201 tariffs on imported bifacial solar panels in a strategic move to respond to unfair practices by foreign competitors like China. Bifacial panels, previously exempt from these tariffs, have been surging in imports and captured nearly 98% of the US market share, undermining domestic manufacturers. By reinstating these tariffs, the Administration is leveling the playing field for American manufacturers in an important and growing industry.

- **Filling Gaps in the Supply Chain:** The Department of Energy's Silicon Solar Manufacturing and Dual-use Photovoltaics Incubator funding program is providing $27 million for 18 projects across the country. These projects are targeting gaps in the domestic solar supply chain—everything from equipment, ingots, wafers, and silicon—enabling cost reductions while developing next-generation solar technologies and boosting American solar manufacturing.

- **Expanding Solar Innovation:** Both the private and public sectors are driving the US solar industry toward increasingly more innovative technology. The Department of Energy's Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs are offering competitive funding opportunities to encourage US-based small businesses to engage in high-risk, innovative research and technology development with the potential for future commercialization. Meanwhile, the private sector is capitalizing on government support to push innovation further. For instance, Bila Solar recently unveiled a groundbreaking lightweight solar module that weighs about 30% less than traditional glass panels and 95% thinner, significantly expanding their potential applications. Bila's groundbreaking development allows solar energy to be harnessed in previously impractical places, opening up new markets and opportunities for solar technology.

So, What's Next?

The US faces tough competition to restore our leadership in the global solar market—but the stakes are too high *not* to compete. Retaking market share in solar would lead to massive economic growth, serious job creation, and improved national security from diversifying our supply chain.

With the right support, strategic, targeted investments, innovative policies, and a robust industrial strategy, the US can get domestic solar manufacturing back on track and reap the benefits of sustained solar leadership.

TOPICS

COMPETITIVENESS AND COMMERCIAL DIPLOMACY 30

ENDNOTES

1. This includes $51.062 billion in production tax credits under Section 45 of the Internal Revenue Code, extended and expanded by Section 13101 of the Inflation Reduction Act and $11.204 billion in Clean Electricity Production Tax Credits, allocated for qualified domestically produced clean electricity as authorized by the Section 13701 of the Inflation Reduction Act.

2. This includes $50.858 billion in tax credits for clean electricity generation as authorized through Section 13702 of the Inflation Reduction Act, $13.962 in tax credits for certain energy property, including solar generation, as extended and modified by Section 13102 of the Inflation Reduction Act, and additional credits for environmental justice solar capacity, as allocated by Section 13103 of the Inflation Reduction Act.

3. This includes $10 billion in tax credits allocated for qualifying investments in clean energy projects, as authorized by Section 48C of the Internal Revenue Code and extended by Section 13501 of the Inflation Reduction Act and $30.632 billion in tax credits to support manufacturing US-made solar components, as allocated by Section 13502 of the Inflation Reduction Act.

4. This includes $22.022 billion in tax credits for individual taxpayers who installed qualifying systems that use technologies like solar to produce electricity at home, as allocated by Section 25D of the Internal Revenue Code and modified and extended by Section 13302 of the Inflation Reduction Act.

5. This includes $750 million for qualifying advanced energy projects at eligible industrial, manufacturing, or recycling facilities as directed by Section 40209 of the Bipartisan Infrastructure Law, $500 million in grant funding for solar demonstration projects on current and previous mines as directed by Section 40341 of the Bipartisan Infrastructure Law, $3 billion in grant funding to support solar research, development, and demonstration activities as well as grid modernization and security research, development, and demonstration activities as directed by Section 10771 of the CHIPS and Science Act, $14 billion in grant funding for solar infrastructure through the Bipartisan Infrastructure Law, $250 million in grant funding to support establishing regional partnerships that promote economic development in diverse geographic areas of the US by support clean energy innovation as authorized by Section 40341 of the Bipartisan Infrastructure Law, and $500 million in grant funding for energy efficiency improvements and renewable energy improvements at public school facilities that help lower costs as authorized by Section 40541 of the Bipartisan Infrastructure Law.

6. Sourced from Rhodium Group/MIT-CEEPR Clean Investment Monitor data spanning from Q1 2021 to Q1 2024

7. Filtvedt, W. O., et al. "Development of fluidized bed reactors for silicon production." *Solar Energy Materials and Solar Cells* 94.12 (2010): 1980-1995.