Biden-Harris Administration Announces $82 Million Investment to Increase Domestic Solar Manufacturing and Recycling, Strengthen the American Clean Energy Grid

Nineteen Projects Across Twelve States Will Help Establish Domestic Solar Supply Chain, Increase Energy Security, and Build on Progress Made to Bring Solar Manufacturing to the United States

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WASHINGTON, D.C. — As part of President Biden's Investing in America agenda , the U.S. Department of Energy (DOE) today announced $52 million for 19 selected projects, including $10 million from the Bipartisan Infrastructure Law, to strengthen America's domestic solar supply chain, and $30 million in funding for technologies that will help integrate solar energy into the grid. The research, development, and demonstration projects aim to enhance domestic solar manufacturing, support the recycling of solar panels, and develop new American-made solar technologies. Additionally, this significant investment will help promote cheaper, more efficient solar cells and advance cadmium telluride (CdTe) and perovskite solar manufacturing—two technologies vital to diversifying the solar supply chain. Accelerating solar energy manufacturing, production, adoption, and integration across America is critical to growing an equitable clean energy economy and achieving the Biden-Harris Administration's goals of a 100% clean electricity grid by 2035 and net-zero carbon emissions by 2050. Since President Biden took office, over $5 billion in private sector domestic solar manufacturing investments have already been announced, and the United States is now on track to increase domestic solar panel manufacturing capacity 8-fold by the end of 2024.

"President Biden's Investing in America agenda is fueling a clean energy revolution right here at home with game-changing incentives for manufacturing and deployment," said **U.S. Secretary of Energy Jennifer M. Granholm.** "DOE is seizing that momentum by making some of our largest ever investments in research to strengthen our domestic solar supply chain—creating good-paying jobs and boosting economic opportunities in communities across America in the process."

As a result of President Biden's commitment to clean energy deployment and climate solutions—including investments made possible by the Bipartisan Infrastructure Law and Inflation Reduction Act—domestic solar module manufacturing capacity is expected to grow nearly eightfold from the start of the Administration. In February, DOE released the "Building a Bridge to a More Robust and Secure Solar Energy Supply Chain" white paper to outline potential

pathways to build a strong, ethical, domestic supply chain for solar energy, which could grow to as much as 100,000 new jobs and generate $20 to 40 billion in new investments.

Improving Panel Recycling through the Bipartisan Infrastructure Law
Eight projects to be selected for award negotiations because of President Biden's Bipartisan Infrastructure Law will focus on reducing the cost and increasing the efficiency of panel recycling processes. As solar deployment increases, the end-of-life of photovoltaic (PV) components needs to be considered. Although 95% of a PV module is recyclable, the current economics of managing panels at end-of-life are unfavorable to recycling, according to DOE's recent report . Modules designed for recycling will increase the percentage of materials that can be recovered during the recycling process and re-sold into the market. Increasing the amount of recovered materials such as silver and copper means these materials can contribute to the domestic supply chain.

- **Electroninks Incorporated** (Austin, TX): This project will explore the use of new metal "inks" for adding conductive metal contacts to solar cells, providing a cheaper method that is compatible with multiple common solar cell technologies, including silicon, CdTe, and perovskites. (Award Amount: $750,000)
- **Georgia Institute of Technology** (Atlanta, GA): This project aims to replace the silver in solar cell electrical contacts by developing new copper- and aluminum-based metal pastes that can be screen-printed onto silicon solar cells. These new pastes could reduce the cost of adding metal contacts to the cell by 50% and are compatible with common silicon solar cell technologies. (Award Amount: $1.5 million)
- **Locusview** (Chicago, IL): This project will develop standards for tracing solar modules through the entire supply chain from raw material manufacturing through end-of-life management, with a specific focus on recycling and reusing the materials in the module. (Award Amount: $750,000)
- **Solarcycle, Inc.** (Oakland, CA): This project aims to recover key materials from end-of-life solar panels with high purity by developing a mechanical method to concentrate the materials, followed by an environmentally friendly chemical process to recover them. (Award Amount: $1.5 million)
- **University of California Berkeley** (Berkeley, CA): This project team will develop materials to selectively remove a variety of metals from solar

photovoltaic panels for reuse and recycling. (Award Amount: $1.5 million)

- **University of California San Diego** (La Jolla, CA): This project will develop new materials to layer between the solar cell itself and the packaging layers of the solar module that can be "unzipped" to easily disassemble the module into its component materials for reuse and recycling. (Award Amount: $1 million)
- **University of Central Florida** (Orlando, FL): This project will develop a new, cheaper, scalable process for adding copper metal electrical contacts in place of silver on silicon solar cells, using a laser to print lines of a copper onto the silicon layer. (Award Amount: $1.5 million)
- **University of Kansas** (Lawrence, KS): This project team will develop a new process to remove the outer layers and separate out the valuable recyclable materials in CdTe solar cells using methods that maximize the quantity and quality of the recovered materials. (Award Amount: $1.3 million)

DOE has been a leader in CdTe research and launched, in partnership with the National Renewable Energy Laboratory and First Solar, a research consortium focused on making CdTe cells less expensive and more efficient.

Boosting Domestic Solar Manufacturing

The projects in the Solar Manufacturing Incubator program will accelerate commercialization of innovative product ideas to boost the U.S. solar supply chain. Two projects, located in Ohio, will leverage $16 million in funding to test and demonstrate solutions for increasing the domestic manufacturing of CdTe PV technologies. The U.S. is the leader in CdTe technology, the second most common PV technology after silicon. The selected projects are:

- **First Solar** (Perrysburg, OH): This project will develop a tandem module combining CdTe and silicon—a new residential rooftop product that is more efficient than silicon or thin-film modules on the market today. (Award Amount: $7.3 million)
- **Toledo Solar** (Perrsyburg, OH): This project will demonstrate the application of semitransparent cadmium telluride (CdTe) solar panels to windows, addressing a new market for thin-film solar devices. (Award Amount: $8.8 million)

In addition, seven projects will de-risk new technologies and manufacturing processes, bringing the solutions to the prototype stage, and on the path to commercial success:

- **BREK Electronics** (Broomfield, CO): This team is developing a new inverter technology based on a silicon carbide transistor and high frequency planar magnetics that can significantly lower the cost and size of grid-tied inverters. (Award Amount: $500,000)
- **Guardian Devices** (Albuquerque, NM): This team will produce self-extinguishing PV connectors that will prevent fires in PV systems. (Award Amount: $900,000)
- **LITESPEED Energy** (Livermore, CA): This project will improve floating PV systems, making them more resilient to wind and waves. (Award Amount: $1.6 million)
- **Makai Ocean Engineering** (Waimanalo, HI): This project aims to de-risk an innovative heat exchange for use in Generation 3 concentrating solar-thermal power systems. (Award Amount: $600,000)
- **Mirai Solar** (Mountainview, CA): This project will further develop and commercialize a foldable PV solar screen with variable shading and output power for controlled environment greenhouses. (Award Amount: $1.4 million)
- **Mission Drives Corp** (Potsdam, NY): Mission Drives is developing an inverter to switch electricity input 100 times faster than conventional products using silicon carbide and gallium nitride wide bandgap components. (Award Amount: $1.2 million)
- **Vitro Flat Glass** (Cheswick, PA): This team will improve the power output of CdTe modules through a high-performance superstrate, which is the glass on which a solar module is built. (Award Amount: $1.6 million)

Driving Innovation in Solar Technology

Two additional projects, totaling $18 million, in the PV Research and Development funding program will bring together teams of researchers from academia, industry, and national labs to address the issues in perovskite solar cell devices that limit their durability, scale-up, and efficiency. Perovskites are a promising next-generation technology with the potential for quicker production compared to crystalline silicon cells. Research to advance perovskite solar technologies will help scale domestic solar manufacturing capacity. These projects are:

- **Massachusetts Institute of Technology** (Cambridge, MA): This center will bring together industry and academic partners to design, build, and test commercially relevant tandem solar cells, which combine both silicon and perovskite PV materials. The project team will research efficient module

designs, create commercially relevant manufacturing methods, and perform durability testing. (Award Amount: $9 million)

- **University of Colorado Boulder** (Boulder, CO): This project team will design and build tandem silicon-perovskite solar cells, comparing different manufacturing methods for the perovskite layer to minimize cost and maximize efficiency and durability. The center will consist of four universities, the National Renewable Energy Laboratory, and three American perovskite companies. (Award Amount: $9 million)

New Funding for Grid Management Tools

The Operation and Planning Tools for Inverter-based resource Management and Availability in Future Power (OPTIMA) funding opportunity will award $30 million in funding for projects that address emerging challenges for grid planning operators and engineers to plan the future of the electric power grid and maintain its daily reliable operation.

"Every American deserves access to cost-saving solutions that will help us combat climate change," said **U.S. Senate Majority Whip Dick Durbin (IL).** "By building the solar energy supply chain here at home, we can create jobs, reduce our dependence on foreign critical minerals and fossil fuels, lower the cost of installing solar panels on homes and businesses, and protect our environment for generations to come. The important work of mapping the solar energy supply chain is happening in Illinois."

"When you invest in renewable energy you create good-paying American jobs and cleaner air for our children and grandchildren. This funding, supercharged by the historic investments I secured in the Bipartisan Infrastructure & Jobs Law, will bring solar manufacturing back to our shores to build America's clean-energy future, all while fighting climate change," said **U.S. Senate Majority Leader Charles E. Schumer (NY).** "With tremendous New York companies like Mission Drive leading the charge the future is sunny and bright for American-made solar technologies."

"Thanks to investments we made in the Bipartisan Infrastructure Law and the Inflation Reduction Act, we are in the midst of an American renewable energy boom that is creating jobs and driving innovation and opportunity for communities in Ohio," said **U.S. Senator Sherrod Brown (OH).** "With these investments we are continuing to position Ohio as leader in solar energy innovation and manufacturing – creating domestic energy supply chains and increasing American energy independence."

“For many decades, Southwestern Pennsylvania built much of the rest of America. Now with the help of the Biden Administration and Democrats in Congress, the region is leading the way into our clean energy future,” said **U.S. Senator Bob Casey (PA).** “With this funding, Vitro Flat Glass will improve the power output of solar panels, innovating solar manufacturing right here in Southwestern Pennsylvania.”

“We need to do everything we can to invest in America’s solar industry, secure our supply chains, and accelerate our transition to a clean energy economy – and I’m grateful that Colorado’s businesses and universities are leading the way,” said **U.S. Senator Michael Bennet (CO).** “These investments will help us compete on the global stage with countries like China by supporting the long-term growth of America's solar industry at every stage, from research to deployment,”

“To meet our country’s full potential as a global leader in solar energy development, we need to supercharge our domestic manufacturing. That’s true for everything from silicon wafers to tracking systems and new technologies that will help integrate more solar generation into the grid. I am proud to welcome this major federal investment in American companies that are manufacturing critical solar technologies here at home, including Albuquerque’s Guardian Devices,” said **U.S. Senator Martin Heinrich (NM).** “This company is a real success story for the Department of Energy’s Laboratory Directed Research and Development program. Using knowledge gained from polymer materials research at Sandia National Labs, Guardian produces innovative in-line, self-extinguishing connectors that will make the next generation of solar panels safer and more reliable at higher voltages.”

“Our clean energy future requires a domestic and secure solar supply chain, and Massachusetts is the heart of that innovation,” said **U.S. Senator Ed Markey (MA).** “I am pleased that the Department of Energy has awarded $9 million to the Massachusetts Institute of Technology, using funds appropriated by Congress, that will help us develop efficient and innovative tandem solar cells using next-generation perovskite technology right here in the U.S.”

“Everyone—including those who are most impacted by climate change and environmental injustices—should have the opportunity to participate in and benefit from the growing clean energy economy,” said **U.S. Senator Tammy Duckworth (IL).** “I’m glad that the DOE is working to invest in Illinois to help

increase access to solar power infrastructure, and I'm proud that the Bipartisan Infrastructure Law continues pushing us toward a cleaner future."

"We're accelerating towards a clean energy future by spurring domestic manufacturing, establishing a resilient supply chain, and creating jobs – all with a 'Made in America' sticker on it. Giddy-up!" said **U.S. Senator John Hickenlooper (CO).**

"As we continue to grapple with the impacts of climate change, it is critical that we invest in domestic clean energy projects that improve our energy grid resilience and strengthen our energy independence," **said U.S. Senator Alex Padilla (CA).** "The funding for these California projects will help create the smart and accessible solutions we need to grow our clean energy production in order to help us meet President Biden's goal of a 100 percent clean electricity grid by 2035 and net-zero carbon emissions by 2050."

"I am proud to continue to lead the fight for American energy manufacturing and an all of the above energy strategy to bring good-paying jobs and economic growth to our region," said **U.S. Congresswoman Marcy Kaptur (OH-09), Ranking Member of the House Appropriations Subcommittee on Energy and Water Development.** "This additional federal investment in First Solar and Toledo Solar is an investment in Ohio workers and Ohio companies that are the lifeblood of our local economy—this will continue to allow us to build America's energy future in the Heartland."

"Today, thanks to the Bipartisan Infrastructure Law, Colorado will receive nearly $9 million to support projects that enhance our domestic solar manufacturing and recycling systems, and strengthen the clean energy grid," said **U.S. Congressman Joe Neguse (CO-02).** "I'm proud to have championed these provisions in Congress, and am excited to see the many ways in which Colorado continues to lead the way in renewable energy development."

"This federal funding to enhance our solar manufacturing and promote a clean energy economy is welcome and much needed in the Massachusetts 7th," said U**.S. Congresswoman Ayanna Pressley (MA-07).** "Thank you to the Biden-Harris Administration for its continued commitment to combatting the climate crisis and investing in clean energy. I am proud of the innovation and climate justice work underway in Massachusetts."

"America can once again be the manufacturing giant of the world, and investing in our solar supply chain can help us get there," said **U.S. Congressman Chris**

Deluzio (PA-17). "From component supply chains to production to recycling, solar panels – and the jobs they create – will be a huge part of our nation's energy future. I am thrilled that Western Pennsylvania's Vitro Flat Glass in Cheswick, in my district, is slated to receive $1.6 million in federal funds to strengthen our domestic solar panel industry through the development of new technologies and processes."

If an application is selected for award negotiations, the selection is not a commitment by DOE to issue an award or provide funding. DOE and the applicants will first undergo a negotiation process. Applicants do not receive funding until award negotiations are completed and the Contracting Officer executes the funding agreement. Before a funding agreement is executed, DOE may cancel award negotiations and rescind the selection for any reason.

Learn more about DOE's Solar Energy Technologies Office and its research in Manufacturing and Competitiveness, Photovoltaics, and the benefits of solar energy for individuals and communities.

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Media Inquiries:

(202) 586-4940 or
DOENews@hq.doe.gov

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