



Left to Right: Photo by Dennis Schroeder; NREL/PIX 19176, Photo by Forest County Potawatomi Tribe, NREL/PIX 20107, Photo by Dennis Schroeder; NREL/PIX 21546

Photovoltaics

The U.S. Department of Energy (DOE) works with industry, academia, national laboratories, and other government agencies to advance solar photovoltaics (PV) domestically. The SunShot Initiative aims to achieve widespread, unsubsidized cost-competitiveness through an applied research and development (R&D) portfolio spanning PV materials, devices, and manufacturing technologies.

DOE's structured R&D funding enables efforts along the entire PV technology development pipeline, from new devices and processes, through prototype design and pilot production, to systems development and manufacturing.

DOE funds projects to advance all major PV module technologies and emerging next-generation PV technologies.

Current PV Portfolio

DOE issues competitive solicitations to fund targeted research projects along the entire technology pipeline. Financial awards in the following programs allow key partners—industry, laboratories, and universities—to help DOE advance SunShot Initiative goals.

The Bridging Research Interactions through collaborative Development Grants in Energy (BRIDGE) program enables research teams to access tools and staff expertise at DOE Office of Science research facilities, including major facilities for x-ray and neutron scattering, nanoscale science, advanced microcharacterization, environmental molecular sciences, and advanced scientific computing. This collaborative program, which funded 12 projects, enables fundamental scientific discoveries to be rapidly transitioned to existing product lines and accelerates innovations that lower the cost of solar technologies.

Since the SunShot Incubator program was launched in 2007, \$92 million in government funds have leveraged more than \$1.7 billion in venture capital and private equity investment.

Photovoltaic Highlight

SUNPATH funding, which enables high-tech companies to accelerate cost reductions and commercialization of solar PV technologies, is expected to support approximately 600 direct American manufacturing jobs and thousands more throughout the solar industry.

The DOE SunShot Initiative is a collaborative national effort to make solar energy technologies cost-competitive with other forms of energy by reducing the cost of solar energy systems by about 75% by the end of the decade. Reducing the total installed cost for utility-scale solar electricity to roughly 6 cents per kilowatt hour without subsidies

will result in rapid, large-scale adoption of solar electricity across the United States. Reaching this goal will re-establish American technological leadership, improve the nation's energy security, and strengthen U.S. economic competitiveness in the global clean energy race.

The Foundational Program to Advance Cell Efficiency (F-PACE) works to build a technical foundation for significant increases in PV efficiency. These projects identify cost and efficiency barriers, research PV sub-cell materials and processes, as well as train a new generation of researchers to lead future technology development. The F-PACE research investment funds work to eliminate the significant gap between the efficiencies of prototype cells achieved in the laboratory and the efficiencies of cells produced on manufacturing lines.

The Next Generation PV program supports 23 solar projects that investigate transformational PV technologies with the potential to meet SunShot cost targets. The program's early-stage applied research investment aims to demonstrate new PV concepts and train a new generation of graduate students and post-doctoral fellows who will ultimately lead the development and commercialization of PV technologies in future years.

The PV Manufacturing Initiative focuses on projects that strengthen the competitiveness of the U.S. PV module industry and supply chain by overcoming technical barriers, reducing costs for PV installations, helping the U.S. regain the lead in the global market for solar technologies, and supporting clean energy jobs.

The PV Supply Chain and Cross-Cutting Technologies effort serves to strengthen the domestic PV industry by accelerating the development of revolutionary products and processes that provide cost reductions and performance improvements with broad applications. These projects encourage innovation in companies across the solar energy supply chain and develop PV-specific solutions from non-solar innovations, including:

- Processing steps that improve throughput, yield, or diagnostics

- Materials that improve reliability or enhance optical, thermal, or electrical performance
- System components that streamline installation.

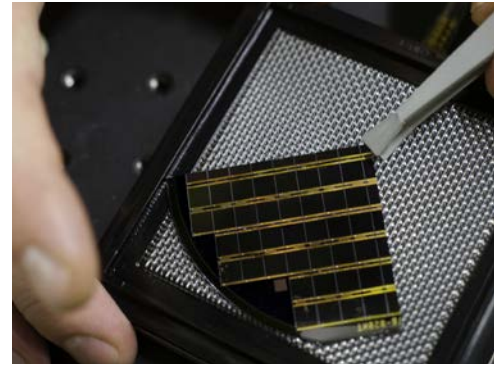
The effort targets manufacturing and product cost reductions with the potential to have an impact on the PV industry within 2 to 6 years.

Scaling Up Nascent PV at Home (SUNPATH) aims to help the nation reclaim its competitive edge in solar manufacturing by supporting the initial ramp up to high-volume production. SUNPATH funding enables innovative, high-tech companies to accelerate cost reductions and commercialization of PV technologies.

Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs are highly competitive programs that encourage U.S.-based small businesses to engage in technology R&D with the potential for future commercialization. Both SBIR and STTR take a phased approach with three funding levels: feasibility demonstration (Phase I) prototype development (Phase II), and commercialization (Phase III). Under STTR awards, companies must collaborate with non-profit research institutions. There are more than 20 projects under SBIR/STTR programs supported by SunShot and managed by the Office of Science.

The SunShot Incubator program provides early-stage assistance to help startup companies overcome technological barriers to commercialization while encouraging private sector investment.

The SunShot Incubator focuses on accelerating the commercialization of PV, concentrating solar power (CSP), and balance of systems (BOS) research, development, and validation



An array of multijunction solar cells produced by PV Incubator partner Solar Junction is used in NREL's High-Intensity Pulse Solar Simulator. The NREL instrument can produce the intensity of up to 90 suns. *Photo by Dennis Schroeder, NREL/PIX 18579*

to meet aggressive installed cost and market penetration goals. The program accomplishes this through a tiered-program structure:

- Tier 1 takes promising proven technologies and scales them in the laboratory to produce commercially relevant prototypes.
- Tier 2 accelerates the transition to commercial production or product release by advancing the laboratory prototypes of equipment or processes to full-scale manufacturing, production, or deployment.

Since 2007, \$92 million in government funds has leveraged more than \$1.7 billion in follow on venture capital and private equity investment.

Funding Opportunities

For more information on current funding opportunities, visit the SunShot Initiative's financial opportunities page: www.eere.energy.gov/solar/sunshot/financial.html.

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