

The Solar Energy Technologies Office supports the SunShot Initiative goal to make solar energy technologies cost competitive with conventional energy sources by 2020. Reducing the total installed cost for utility-scale solar electricity by approximately 75% (2010 baseline) to roughly \$0.06 per kWh without subsidies will enable rapid, large-scale adoption of solar electricity across the United States. This investment will help re-establish American technological and market leadership in solar energy, reduce environmental impacts of electricity generation, and strengthen U.S. economic competitiveness.

### What We Do

The Solar Energy Technologies Office uses an integrated, five-pronged approach to deliver results toward SunShot's objectives:

- ✓ **Photovoltaic Research and Development** advancements have resulted in U.S. leadership in world records, scientific publications, and patents to provide U.S. solar industry technology advantages.
- ✓ **Concentrating Solar Power (CSP)** develops advanced thermal storage to provide dispatchable electricity and improves system efficiency.
- ✓ **Systems Integration** develops technologies to enable improved integration of solar power with the grid including power electronics and systems level research on renewables integration.
- ✓ **Balance of Systems Soft Cost Reduction** works with stakeholders at the state and local levels to cut red tape; these soft costs can account for more than 50% of system costs.
- ✓ **Innovations in Manufacturing Competitiveness** invests in technologies that provide U.S. companies defensible competitive advantages focusing on segments of the solar value chain, such as equipment and process automation.

- ✓ **Incubator investments** support small businesses, rapidly commercialize products and services, and attract follow-on private capital.

### Program Goals/Metrics

The Office's performance goals are designed to achieve the following targets by 2020:

- CSP levelized cost of electricity of \$0.06/kWh
- Utility-scale PV system price of \$1.00/Wdc
- Commercial-scale PV system price of \$1.25/Wdc
- Residential-scale PV system price of \$1.50/Wdc

By the end of 2013—3 years into a 10-year initiative—the U.S. Department of Energy (DOE) has tracked progress at 60% toward 2020 goals. Progress includes:

- CSP levelized cost of electricity of \$0.13/kWh
- Utility-scale PV system price of \$1.85/Wdc
- Commercial-scale PV system price of \$2.61/Wdc
- Residential-scale PV system price of \$3.69/Wdc

### FY 2015 Priorities

- Leveraging promising early research supported by DOE in FY 2013 and FY 2014, the Advanced Solar Power Cycles R&D Program will conduct research on advanced, supercritical CO<sub>2</sub> Brayton-cycle power systems, which offer higher efficiency and lower cooling water needs than conventional steam-Rankine power cycles. This technology pathway has the opportunity to enable CSP to achieve SunShot objectives, and advances developed for CSP can revolutionize the entire power generation industry.
- Non-hardware soft costs remain one of the largest challenges in achieving the 2020 SunShot targets. These soft costs account for 64% of the total cost of residential systems. Increased focus on engagement with state and local governments, small businesses, and community colleges will help reduce soft costs and enable a trained and efficient domestic solar workforce, which

(Dollars in Thousands)	FY 2013 Current	FY 2014 Enacted	FY 2015 Request
Concentrating Solar Power	43,080	48,571	61,400
Photovoltaic R&D	150,580	56,641	42,000
Systems Integration	45,773	52,816	56,900
Balance of Systems Soft Cost Reduction	29,617	42,558	45,100
Innovations in Manufacturing Competitiveness	0	44,472	67,700
NREL Site-Wide Facility Support	0	12,000	9,200
<b>Total, Solar Energy Technologies</b>	<b>269,050</b>	<b>257,058</b>	<b>282,300</b>

currently numbers more than 142,000 jobs.

- R&D and technology development to enable higher levels of integration of solar and distributed generation with the grid. This includes integration with the built environment, as well as electric vehicles and other renewable energy technologies.
- Solar Manufacturing Technologies III will be the third round of a successful program that has helped U.S. industry develop manufacturing technologies and advanced materials to manufacture solar products.

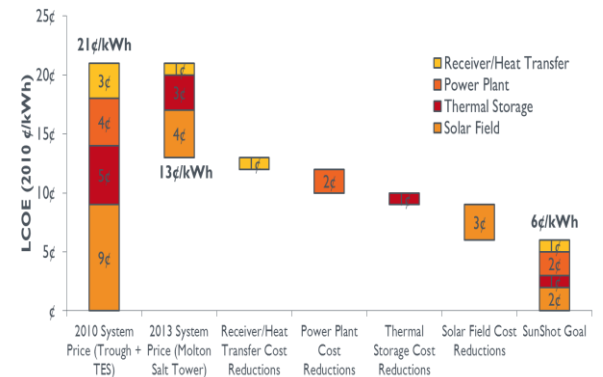
### Key Accomplishments

- **Commercialization of DOE-supported technologies in CSP:** Technologies developed with DOE investments over the years have led to large-scale commercial deployment of CSP systems in the United States—totaling more than 1.3 GW completed and under construction. DOE-supported technological advances have enabled higher-temperature, higher-efficiency, and lower-cost operation of CSP with storage.
- **R&D leadership:** Over the past 35 years, R&D funding at the nation’s academic, national, and industrial laboratories has resulted in more than 50% of the world records for solar cell efficiency. This leadership has continued and accelerated in recent years, with three new world records set in 2013 with DOE support.
- **Enabling higher levels of renewables integration:** Office-supported R&D to develop better methodology to interconnect distributed generation sources helped inform the final Small Generator Interconnection Procedures, which will streamline the interconnection of residential and commercial solar.
- **Cutting Red Tape:** Engagement with state and local governments, as well as businesses, through the Rooftop Solar Challenge I and II programs, has made going solar easier and cheaper for consumers. Examples include Solarize group purchase programs run in Massachusetts and Connecticut, as well as online permitting in states, such as Florida and Illinois.
- **Supporting small businesses:** Since 2007, the SunShot Incubator program has provided early stage assistance to

small businesses to rapidly bring new products and services to the marketplace. Approximately \$104 million invested since the inception of this program has resulted in more than \$1.7 billion in follow-on private capital financing of these businesses.

- **Supporting a trained workforce:** The Solar Instructor Training Network of almost 400 community colleges across the nation helps meet the growing demand for workers in the solar industry, with a focus on recruiting returning veterans. Thus far, this network has trained more than 10,000 workers to enter the solar field.
- **Supporting gains in domestic solar manufacturing:** Through R&D in manufacturing technologies—such as automation and high-performance processes to lower manufacturing costs—the Office supports U.S. industry to capture a greater portion of the global value chain.

2010 & 2013 CSP Baselines and SunShot Goal



Utility Scale PV Progress by 2013

