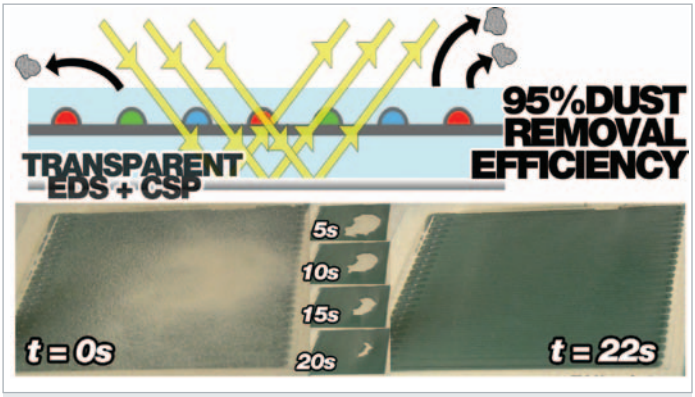
Self-Cleaning CSP Collectors

BOSTON UNIVERSITY	
PROGRAM:	SunShot CSP R&D 2012
TOPIC:	Advanced Collectors
LOCATION:	Boston, Massachusetts
AWARD AMOUNT:	Up to $0.8 million
PROJECT TERM:	2012–2014



This graphic illustrates the project's self-cleaning concentrated solar power collectors.
Illustration from Boston University

CONTACTS

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Partnering Organizations:
- Abengoa Solar
- Sandia National Laboratories

For more information, visit the project page at:
www.solar.energy.gov/sunshot/csp_sunshotrnd_boston.html

MOTIVATION

Large-scale solar concentrators are best suited for semi-arid and desert regions of the Earth, where sunlight is abundant. These regions, however, are also very dusty. When dust deposits on solar collectors, it obscures reflection and reduces energy yield. Current methods of cleaning reflective surfaces are expensive, interruptive, inefficient, and potentially damaging to collector surfaces. The concentrated solar power (CSP) industry needs an automated, efficient cleaning process that requires neither water nor moving parts to keep the solar collectors clean for maximum reflectance and energy output.

PROJECT DESCRIPTION

Boston University, Abengoa Solar, and Sandia National Laboratories are working together to develop a transparent electrodynamic screen (EDS) as a self-cleaning technology for solar concentrators. The EDS uses traveling-wave electric fields to lift and move dust particles across the surface of the collector, ultimately removing dust entirely. The team is producing and evaluating laboratory-scale prototypes of self-cleaning solar collectors, including flat and curved mirrors, under this SunShot CSP R&D award. The project aims to quantify and assess the technological and commercial viability of EDS-incorporating collectors as a means for maintaining high optical efficiency of the reflective surfaces of solar concentrators located in semi-arid and desert regions.

IMPACT

Current laboratory-based EDS systems can remove over 90% of deposited dust in minutes, using a very small fraction of energy produced by the solar collectors. This cleaning is achieved without water, moving parts, or manual labor. The process is scalable. These valuable features provide strong potential for worldwide deployment of the transparent electrodynamic screen technology.

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