SELF-CLEANING CSP OPTICS

Boston University

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PROJECT OBJECTIVES

Boston University, Abengoa Solar, and Sandia National Laboratories are working together to develop the electrodynamic screen (EDS) as a self-cleaning technology for solar concentrators. The EDS uses traveling-wave electric fields to move dust particles across the surface of the collector, ultimately removing them entirely.

Large-scale solar concentrators are best situated 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.
EDS can remove dust with more than 90% efficiency in less than 2 minutes using a very small fraction (< 0.1%) of energy produced by the solar collectors, without requiring any water or manual labor.
Milestones: Conduct fundamental studies

APPROACH

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- Characterization of electrodynamic removal process
- Analyze dust related losses in CSP plants
- Study Dust Adhesion and Removal mechanisms
- Develop a model for electrodynamic removal process
- Perform cost-to-benefit analysis

[3]Reference
[4]Reference

KEY RESULTS AND OUTCOMES

- Experimental studies are in progress to develop self-cleaning CSP optics.
- Conduct study on the fundamental science of deposition, adhesion, removal mechanisms, and reflectivity/transmission improvement for CSP applications. ?
- The project aims to quantify and assess the technological and commercial viability of EDS-incorporated collectors as a means for maintaining high optical efficiency of the reflective surfaces of solar concentrators located in semi-arid and desert regions.

NEXT MILESTONES

- **Fundamental Studies**
- **EDS Modeling and Characterization**
- **EDS laboratory Evaluation**
- **EDS Field Testing**
- **EDS cost Analysis**