Supplemental Project Notice

SOLAR PV TRACKERS TECHNOLOGY ASSESSMENT

A technoeconomic analysis using actual performance and cost data

Tracker Technology

PROJECT HIGHLIGHTS

- Determine the overall impact of tracking systems on plant affordability and reliability, considering real-world development and operational data
- Develop methodology to evaluate designs and engineering of tracking systems under site-specific conditions
- Assess trackers' ability to mitigate hail damage and extreme wind impacts
- Inform facility development and operation by evaluating such factors as tracker availabiilty and performance algorithms, civil work considerations, slope limits, and other lifecycle considerations

Background, Objectives, and New Learnings

Energy companies' installation of solar photovoltaic (PV) power systems has grown an average of about 20% annually over the last decade. Development is expected to continue worldwide due to achieve emission reduction goals and realize theoretical expected gains in annual energy production.

In the Unites States, more than 90% percent of new utility-scale PV projects are single-axis tracking systems, which maximize generation by following the sun's path across the sky. PV trackers are a developing technology undergoing rapid innovation in a highly cost-competitive environment.

Decisions to utilize a specific tracking system are made at the early stage of project development. The design and model have a significant impact on the project's decades-long lifetime, including its construction and operation, potential expansion and/or hybridization, and end-of-life solutions. Project owners need a clear understanding of all elements impacted by implementing trackers to optimize the full project lifecycle.

EPRI is a non-profit, collaborative research institute that has conducted applied research in all aspects of the electric power sector for over 50 years. Within its Solar Generation program (Program 207), EPRI has extensive experience with utility-scale PV plants, including tracking systems (see publication 3002020316 – Photovoltaic Tracker Fundamentals). EPRI leads industry-level collaboration to assess actual performance and reliability across components of a utility-scale PV project.

This project aims to help energy companies develop a deeper understanding of tracker technology, leveraging EPRI's expertise and data from real-world field operation. Learnings of this project will support project owners' and operators' decision-making on tracker technologies during project planning, project valuation, and assessment of repowering scenarios.

Benefits

A comprehensive understanding of tracker technology will help enable more informed decisions across all aspects of tracking projects, from inception to end-of-life. Highlights include design optimization insight, improved performance modeling, more accurate O&M cost models, and improved risk management for tracking systems. Results are expected to inform the reliable and affordable development and operation of solar assets for the benefit of the public.

Project Approach and Summary

Investigation builds on EPRI's historical research and current efforts connected with tracking systems by conducting four primary tasks:

1. **PV trackers technology assessment**
   - 1.1. Analysis of state-of-the-art available technology options for PV trackers
   - 1.2. Market penetration of each technology
   - 1.3. PV trackers' typical failure modes and their impact (FMEA)
   - 1.4. Predicted AEP impact of tracker technologies as a function of site characteristics
   - 1.5. Design considerations for different geographical locations
   - 1.6. Installation and ITM impacts of different tracker technologies and fixed-tilt systems
   - 1.7. Criteria and methods to evaluate existing tracker system reliability
2. **PV tracker stowing strategy to extend system reliability**
   - 2.1. A review of PV tracker stowing strategy for increased system reliability
   - 2.2. Case study for stowing strategy for high wind events
   - 2.3. Case study for stowing strategy for hailstorm events
   - 2.4. Case study for stowing strategy for heavy snow events
3. **Techno-economic analysis of PV trackers using actual data from operating tracking projects**
   - 3.1. Reliability assessment, downtime computation, generation of reliability KPIs
   - 3.2. Estimation of energy losses due to trackers' malfunctioning
   - 3.3. Actual operational expenditures related to trackers
   - 3.4. Actual AEP gain of projects with trackers vs modeled fixed tilt
4. **Summary of optimal design(s) and operation based on project findings**

Deliverables

A detailed written report documenting project findings, summarized powerpoint presentation, live debrief, and template proforma for modeling mounting scenarios.

Price of Project

The project cost is $37,000 USD per funder, with a minimum of five funders to begin work for $185,000.

Project Status and Schedule

The project completion target is twelve months from start date, which begins once a minimum of five funders have joined the project. If additional funders join post-start date, additional data from new funder(s) will be incorporated into scope, and ideally published following the original twelve-month timeline. If this option is not possible due to time limitations, initial results will be updated to include new data and an updated report will be released.

Who Should Join

Any entities connected to or seeking insight into solar tracking systems would benefit from involvement, including:

- Project developers and EPCs
- Project owners
- O&M providers
- Financiers
- Underwriters

Contact Information

For more information, contact the EPRI Customer Assistance Center at 800.313.3774 (askepri@epri.com).

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