

Preliminary Design of Heliostat Field and Performance Analysis of Solar Tower Plants (SEI-2)



A joint India-U.S. research consortium funded under the *Joint Clean Energy Research & Development Center (JCERDC)*

Scientific Achievement:

We developed a methodology to estimate the preliminary design of a heliostat field and performance of a tower plant with storage and hybridization using an external cylindrical receiver.

Significance and Impact:

The methodology facilitates an initial design to estimate the optimum height of the tower and, thereby, the size and performance of the solar field for a plant of a given capacity.

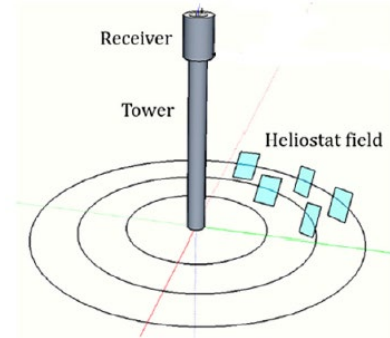
Research Details:

The preliminary design of heliostat field and tower height for a given plant capacity are estimated considering the following:

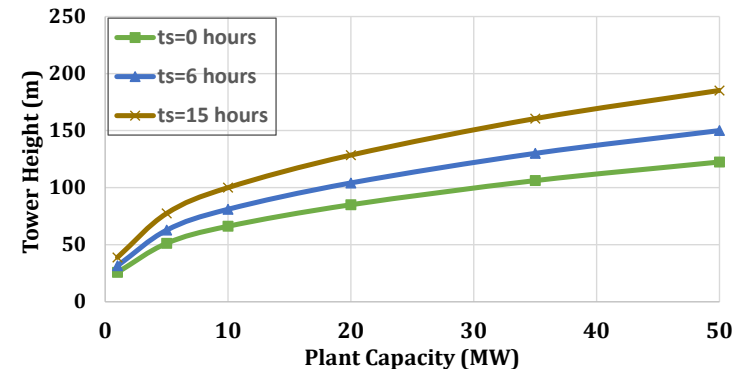
- Non-dimensional heliostat field: coupling the solar field with tower height and fixing the the boundary of the field considering useful energy.
- Efficiency of various systems: heliostats, receiver, power block (both full load and part load), heat exchanger.
- Optimization of the system : performed by considering the annual solar-to-electrical efficiency.

The design has been used to generate data on hypothetical plants of various capacities in Jodhpur, and thermal storage hours and hybridization for technical performance assessment.

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Schematic of solar tower technology.



Variation of tower height with plant capacity for different thermal storage (ts) hours.

Contacts: G. Srilakshmi (srilakshmi@cstep.in), N.S. Suresh (suresh@cstep.in), N.C. Thirumalai (thirumalai@cstep.in) and M.A. Ramaswamy (mar@cstep.in)