Control and Load Regulation Aspects of CO_2 Brayton Cycles (CSP-1)

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

Scientific Achievement:

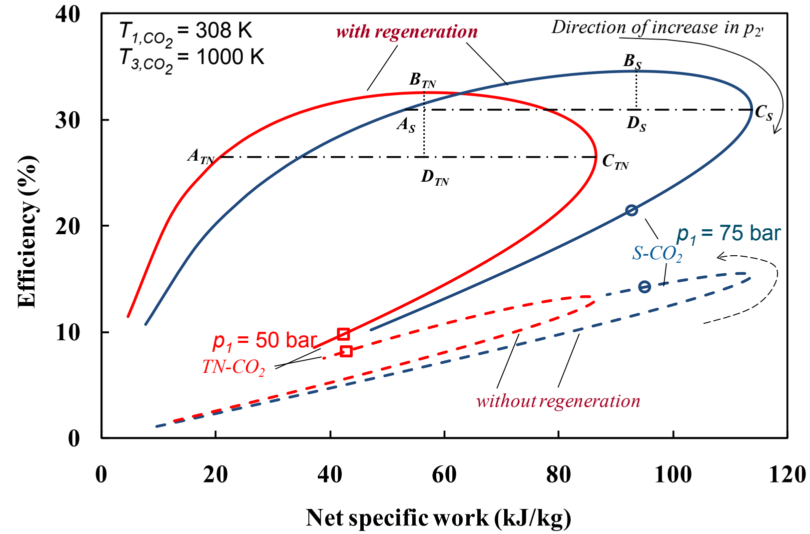
We developed a framework for the control and regulation aspects of CO_2 Brayton cycles for solar and non-solar power plants using a relatively unconventional coordinate system involving two thermodynamic path functions, namely, efficiency and specific work output.

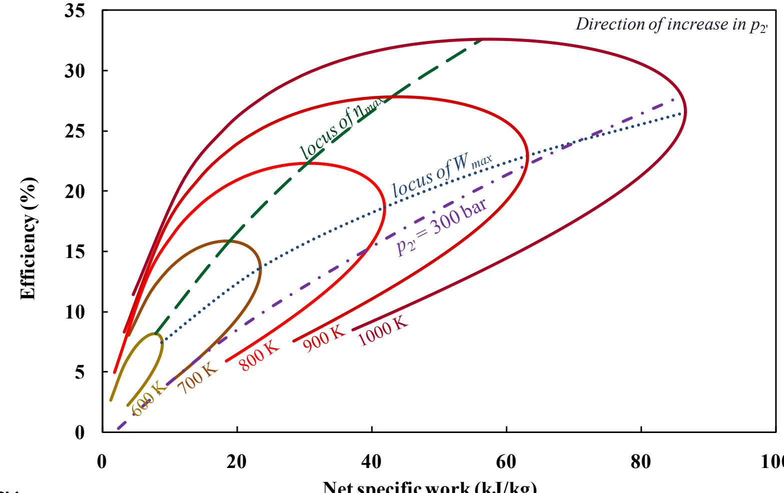
Significance and Impact:

Design of robust, but practically implementable, operating strategies in part-load or low-DNI scenarios that ensure the power plant operation at the maximum power or maximum efficiency, respectively.

Research Details:

- We developed a numerical model in MATLAB that is integrated to a NIST database to get property data for CO_2.
- Presented the usefulness of the coordinate system involving efficiency and specific work output.
- To maximize the efficiency, which is generally the case in CSP applications, then supercritical CO_2 cycle is appropriate. However, if the demand is efficient performance under part-load conditions, as in nuclear or fossil-fuel-based applications, then transcritical CO_2 cycle offers more flexibility.





Publication: P. Garg, P. Kumar, K. Srinivasan, "A trade-off between maxima in efficiency and specific work output of super- and trans-critical CO_2 Brayton cycles," *J. Supercritical Fluids* **98**, 119–126 (2015). DOI: 10.1016/j.supflu.2014.12.023

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